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3.2.2 Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during the year 2021-2022.

Sl. No.	Name of the teacher	Title of the book/chapters published	Title of the paper	Title of the proceedings of the conference	Name of the conference	National / Inter national	Year of publication	ISBN/ ISSN number of the proceeding	Affiliating institute at the time of publication	Name of the publisher	Pg. No
1.	Dr.Y.Aparna		Impact of triazoles on drug discovery-a review	International conference on recent trends in multidisciplinary research	-	National	2021-22	978-81-9555089-2-1	Matrusri Engineering College	Prahas Research Consultancy	7-11
2.	Dr.K.Sharath Babu	Operations research and its applications	-	-	-		2021-22	978-1-63278-990-7	Matrusri Engineering College	Shineeks Publishers	12-14
3.	Dr.B.Chandana	Patriachal society and gender power-a critical analysis of the	-	-	-	National	2021-22	978-93-5529-162-2	Matrusri Engineering College	Authors Press	15-17

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4.	Dr. T. Raghunadha Reddy	Data mining concepts & techniques	-	-	-	National	2021-22	976-9391117-30-6	Matrusri Engineering College	Shree Publishing House	18
5.	Dr.L.K. Indumathi	Book chapter: introduction to machine learning for business analytics	-	-	-	International	2021-22	9781003206316	Matrusri Engineering College	CRC Press Tylor &Francis	19
6.	M.Naresh	VoWiFi Cell Capacity IEEE 802.11ax for VBR Traffic using IoT	-	-	-	International	2021-22	978-1-956861-10-5	Matrusri Engineering College	Namya International Publisher	20-26
7.	M.Naresh	Neural networks(Image processing)	-	-	-	National	2021-22	978-93-91074-98-2	Matrusri Engineering College	Taurean Publisher	27-29
8.	Dr. T. Raghunadha Reddy	-	A new supervised term weight measure based machine learning approach for text classification	International conference on intelligent systems & sustainable computing	International conference on intelligent systems & sustainable computing	International	2021-22	978-981-19-0011-2	Matrusri Engineering College	Springer	30-31

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Volume 1 Issue 1

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Impact of Triazoles in Drug Discovery –A Review

Y.Aparna
Department of Sciences and Humanities, Matrusri Engineering College, Saidabad
Paper ID R211101

Introduction

Triazole chemistry is transforming the synthetic chemistry in to a new approach towards increasingly reliable drug discovery process. The simple transformation of terminal azides into triazoles through well-known linking reactions exhibit a greater degree of specificity and compatibility [Kolb, H.C. et al. (2001)].This is probably due to their easy association with chemical and biochemical targets via vanderwaal's interaction. Dipole interactions and hydrogen bonding. A wide range of organic moieties containing active hydrogen can participate in click reactions and their lies a huge scope for linking up triazoles with biocompatible molecules. Triazoles give wide scope for faster discovery of lead compounds with variety of starting materials and the beauty of the click reaction lies in simple workup and easy isolation.

Heterocyclic scaffolds bearing five-membered ring with three nitrogens are termed triazoles. Triazole, a heterocyclic core has gripped ample attention in scientific fraternity in search of new therapeutic molecules of medical importance. Triazoles are well known five membered heterocyclic moieties as most widely used class of antifungal drugs identified as azoles.

Synthetic procedures of Triazoles

Azide mediated synthesis of triazoles

Anand et al., have reported the synthesis of 1,4-substituted -1,2,3-triazole hybrids via three component one pot in situ azide-alkyne cycloaddition of 2-propargylthiobenzimidazole with 4-(bromomethyl)-6-methyl-2H-chromen-2-one in presence of sodium azide using copper ascorbate in DMF/water at room temperature.

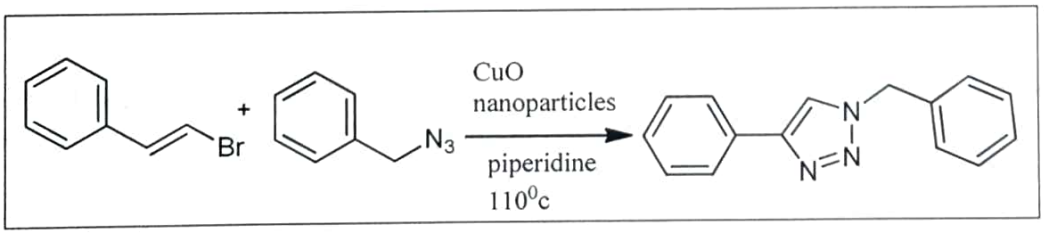
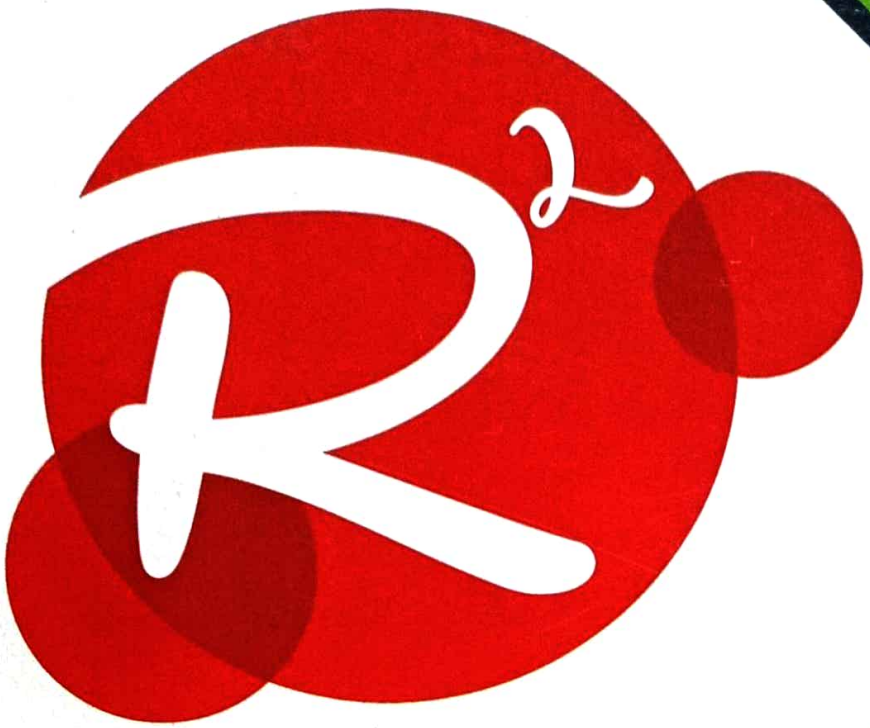


Fig-1

M Khoobi et al.,have reported the azide-alkyne cycloaddition of 2-(prop-2-yn-1-ylthio)-1*H*-benzo[d]imidazole with 1-(azidomethyl)-2-bromobenzene in presence of catalytic amount of $Cu(OAc)_2$,ascorbic acid and base as Na_2CO_3 at 80^0C in ethanol as solvent to give the product 2-(((1-benzyl-1H-1,2,3-triazol-4-yl)methyl)thio)-1H-benzo[d]imidazole given below.



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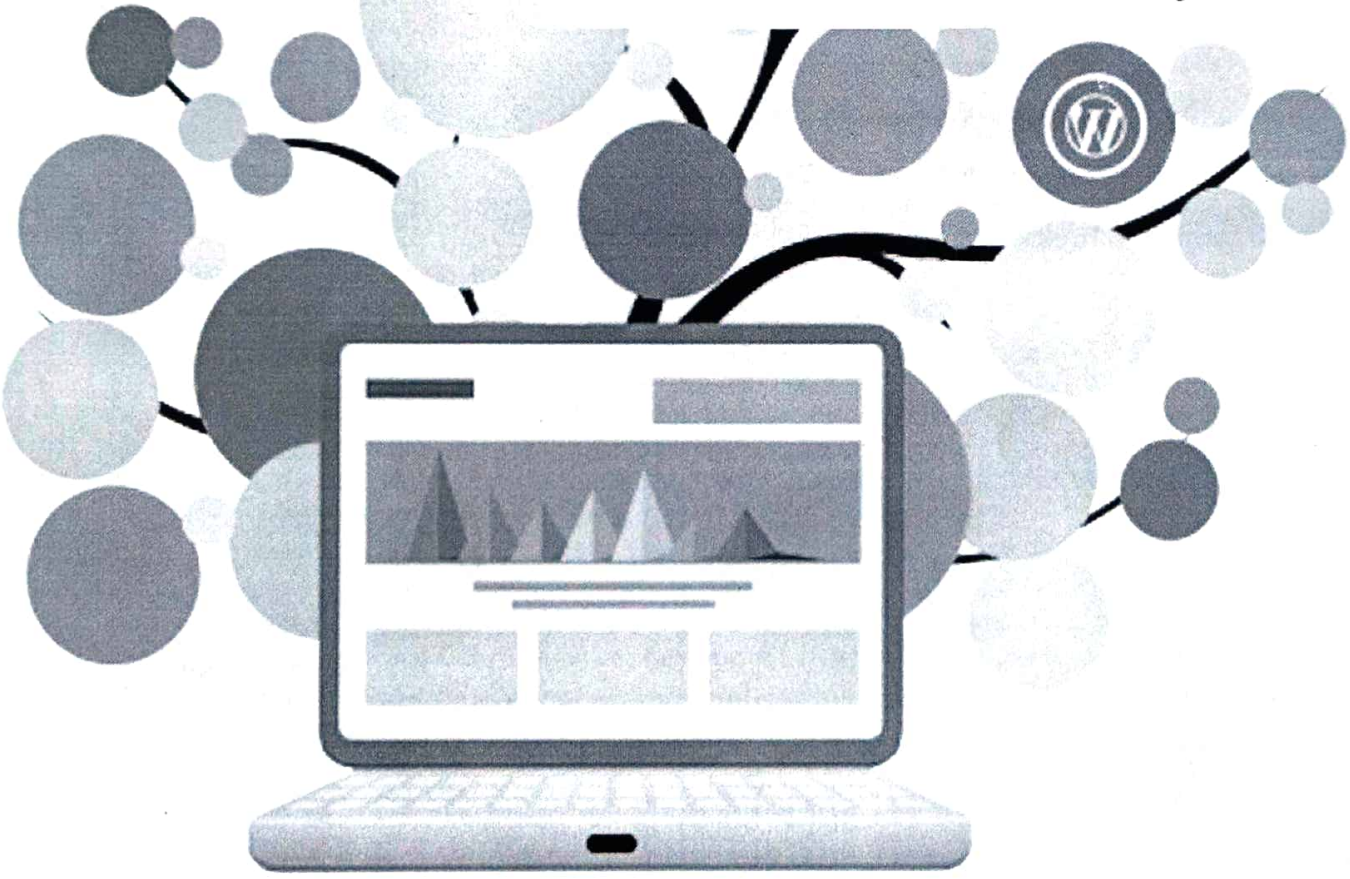

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About the Author

Dr K. Sharath Babu

Dr. K. Sharath Babu pursued his Post Graduation in M.Sc (Mathematics) in the field of Applied Mathematics at Jawaharlal Nehru Technological University, Hyderabad (JNTUH) in the year 1999 with Distinction. He joined Janab Sibte Nabi (JSN) Engineering College at Khaghaz Nagar in 1999 as an Assistant Professor. He moved to Swarna Bharathi Institute of Science and Technology (SBIT) in 2003, the year of its inception as an Assistant Professor and was subsequently elevated to the position of Associate Professor in 2009 and became a Professor of Mathematics and HOD of Humanities and Sciences in 2012. SBIT Management sponsored him for the Ph.D program for a period of three years under Quality Improvement Program (QIP) at National Institute of Technology (NIT), Warangal in 2008. His Thesis entitled "Numerical solution of some steady state convection - diffusion and impact problems" was accepted for the award of the Doctoral Degree on January 16, 2012. He joined Malla Reddy Engineering College (Autonomous) Campus-I in 2014 as a Professor of Mathematics. He worked as a Professor of Mathematics at Marri Laxman Reddy Institute of Technology and Management (AUTONOMOUS) in 2016. At present, he is working as an Assistant Professor at Matrusri Engineering College (MECS), Hyderabad. He is also entrusted with the responsibilities of Anti-Ragging Committee Coordinator, Time Table Committee Coordinator and R&D Committee Member. Dr. Babu is also BOS Chairman, Editorial Member of various journals across the country, Subject Expert for conducting JNTUH Panel and a Resource Person in the field of Applied Mathematics. He has to his credit 21 National & International SCI papers published in International Journals and some research papers submitted to reputed journals are under review. He has presented 28 papers in International and National conferences across the country. His paper was awarded the Best Research Paper award in the field of Applied Mathematics at XIX Congress of Andhra Pradesh Society for Mathematical Sciences (APSMS) in 2010 at Jyothishmathi Institute of Technology & Sciences. His research work was presented at Indian Institute of Technology (IIT) Roorkee, NIT Hamirpur, University of Delhi, Delhi, Sri Venkateshwara University (SVU), Thirupathi, Kakatiya University, Dravidian University, NIT GOA, AVN College, Vishakapatham and in the prestigious International Congress of Mathematicians (ICM) held at Hyderabad in 2010. He has more than 21 years of teaching experience in reputed engineering colleges. His area of research is Numerical Analysis, Mathematical Modeling and Operations Research.

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WOMEN AND IDENTITY in Literature

Edited By

Shikha Sharma

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CHAPTER 7

Patriachal Society and Gender Power – A Critical Analysis of *The Palace of Illusion* by Chitra Divakaruni

Dr B. Chandana

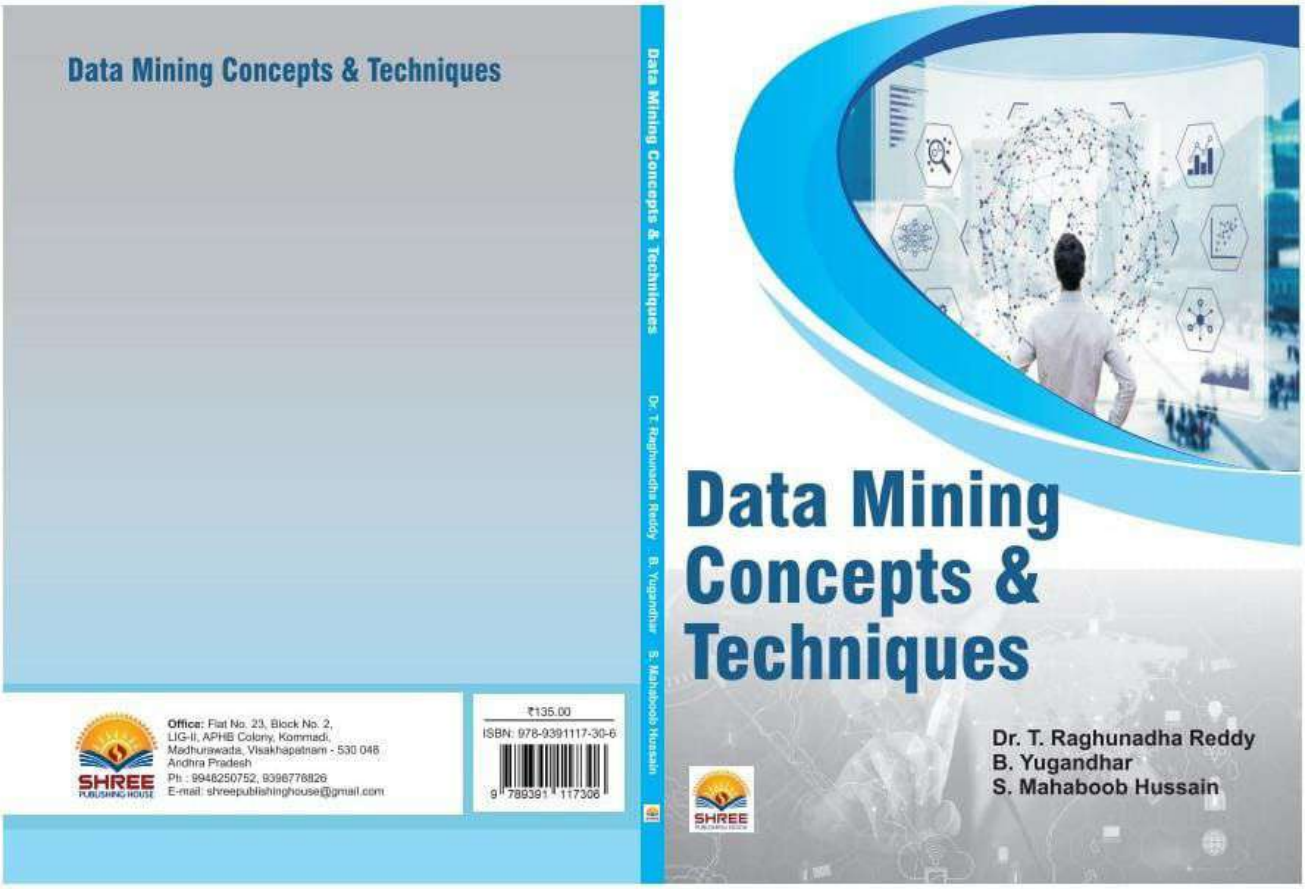
Abstract

"The Palace of Illusion" is a novel of historical fiction delineating one of the two great epics of Hindus, "The Mahabharata". The author of the book, Chitra Banerjee Divakaruni is a sixty-three year old Indo-American author with a Master's degree in English from Wright University of United States. The present book is a historical fiction that narrates the story of "The Mahabharata" from the time of the genesis of Panchaali or Draupadi, the daughter of King Drupadi. The story evolves round her while exploring the then patriarchal world and its happenings. The book is a reflection of the society of its kings and queens and the reflection of their psychology. The research paper highlights of woman living in a patriarchal world and Gender power structure through the character of Draupdi.

Keywords: patriarchal society, gender power, life of women, element of fate, power structure

Introduction

Chitra Banerjee Divakaruni is the writer of the book "The Palace of Illusion" – based on the Indian epic Mahabharat. Chitra an Indian born America is a well-known poet, writer and activist. Her published works bring out her love for Indian mythology. The Palace of Illusion was written in the year 2008, in an era seen as emergence of women power. The novel is a beautiful narration of the emotions of a lonely yet brave princess who has a secret attraction towards a mysterious man no other than one of her husband's ferocious enemy (Keerthana,. 2019).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Chapter 1

Introduction to Machine Learning for Data Analytics

L. K. Indumathi, Abdul Rais, and Juvairia Begum

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CHAPTER - 06

VoWiFi Cell Capacity IEEE 802.11ax for VBR Traffic using IoT

Dr. Muddamalla Naresh

Assistant Professor, ECE Department, Matrusri Engineering College, Hyderbad,Telanaga
nareshmuddamalla@matrusri.edu.in

Thanam Pullaiah

Associate Professor, ECE Department, Vignan's Institute of Management and Technology for Women, Hyderabad, Telangana. thanam.tp@gmail.com

ABSTRACT

Apart from mobile cellular networks, IEEE 802.11based wireless local area networks (WLANs) represent the most widely deployed wireless networking technology. With the migration of critical applications onto data networks, and the emergence of multimedia applications such as digital audio/video and multimedia games, the success of IEEE 802.11 depends critically on its ability to provide quality of service (QoS). A lot of research has focused on equipping IEEE 802.11 WLANs with features to support QoS. In this survey, we provide an overview of these techniques. We discuss the QoS features incorporated by the IEEE 802.11 standard at both physical (PHY) and media access control (MAC) layers, as well as other higher-layer proposals. We also focus on how the new architectural developments of softwaredefined networking (SDN) and cloud networking can be used to facilitate QoS provisioning in IEEE 802.11-based networks. We conclude this paper by identifying some open research issues for future consideration.

Key: *VoWiFi, Cell, Capacity, IEEE 802.11,ax VBR ,Traffic, IoT, media access control.*

INTRODUCTION

The IEEE 802.11 wireless local area networking (WLAN) standard defines one of the most widely deployed wireless technologies in the world. The popularity of wireless networking is driven by the ubiquity of portable mobile hand-held devices, and the convenience of untethered communications. With the increasing deployment of multimedia content on the Internet—such as digital video, voice over IP (VoIP), videoconferencing, and multi-player networked games—along with the deployment of time-sensitive critical applications, there is a strong motivation to develop QoS features to meet the more stringent performance requirements [1].

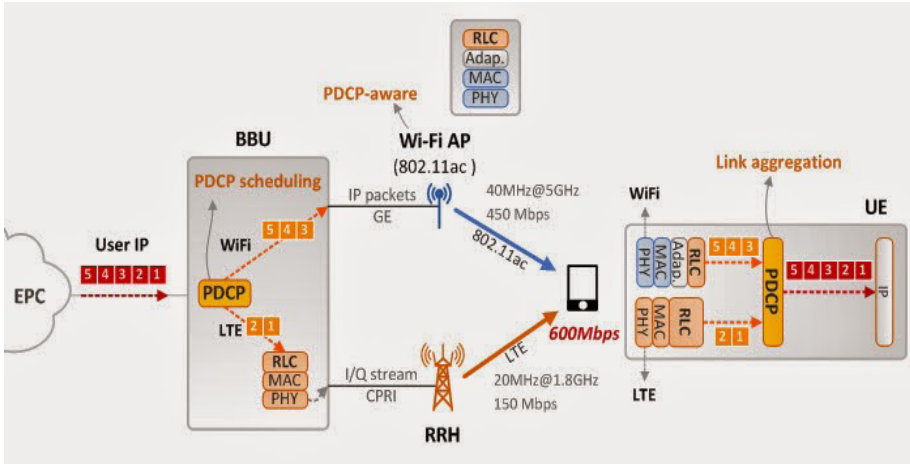


Fig. 1: VoWiFi Cell Capacity IEEE 802.11ax for VBR Traffic using IoT

While the Internet and data networking models of the IEEE 802.11 WLAN technology, which are based on the datagram delivery model of IP, provide simple, adaptive and fault resilient network, they are ill-suited to QoS provisioning. The underlying datagram model of IP is a best-effort service— i.e., while the network tries to deliver packet to the destination correctly without any packet losses, it makes no guarantees. Multimedia applications, in particular, need stronger guarantees about the minimum throughput and maximum latency to work satisfactorily. An expensive solution for ensuring QoS is to overprovision. Most of the Internet QoS effort has focused on how to get a network with less capacity meet application

Chapter 03

NEURAL NETWORK (DIGITAL IMAGE PROCESSING)

Dr. Muddamalla Naresh
Assistant Professor, ECE Dept.
Matrusri Engineering College,
Hyderabad, Telangana State, INDIA-500059.
Mrs. B. Indira Priyadarshini
Assistant Professor, ECE Department,
Matrusri Engineering College,
Hyderabad, Telangana State, India-500059.

ABSTRACT

Our Invention" NEURAL NETWORK (Digital Image Processing)" is a computerized picture might be prepared by an outfit of convolutional neural organizations (CNNs) to group objects in the advanced picture and each CNN, a competitor engineering and up-and-comer boundaries might be chosen to fabricate a majority of CNNs. The created innovation likewise incorporates the foreordained number of CNNs, each having various qualities for the chose up-and-comer boundaries meet an approval limit an outfit of CNNs might be produced from the foreordained number of CNNs and the forecasts from the group of CNNs may then be collected to precisely arrange the articles in the advanced picture. The DIP-Intelligent Neural Networks is an advanced picture preparing regularly includes handling a computerized picture, for instance, from a computerized still picture or computerized video, to find out, recognize, and characterize specific elements or items in the picture and the example acknowledgment might be applied during the picture handling to distinguish a specific article in the picture. The created innovation additionally an advanced picture preparing with design acknowledgment has been utilized in a wide assortment of utilizations, like facial acknowledgment, location of land highlights from ethereal photos, vehicle tag assurance.

FIELD

Our development "NEURAL NETWORK (Digital Image Processing) "is identified with computerized picture preparing utilizing canny neural organizations framework and furthermore an identifies with picture acknowledgments frameworks for: (a) performing searches of pictures and sharing hunts via web-based media to adapt indexed lists: (b) preparing neural organizations to recognize items: and (c) choosing and buying stock on the web.

FOUNDATION

Advanced picture preparing regularly includes handling a computerized picture, for instance, from a computerized still picture or computerized video, to determine, recognize, or potentially group specific elements or items in the picture. Example acknowledgment might be applied during the picture preparing to identify a specific article in the picture. Computerized picture preparing with design acknowledgment has been utilized in a wide assortment of utilizations, like facial acknowledgment, identification of land highlights from ethereal photos, vehicle tag assurance, and so on

Various sorts of customary AI capacities might be utilized for design acknowledgment, nonetheless, numerous traditional AI capacities are not adjusted or might be hard to adjust for design acknowledgment in advanced picture preparing.

This particular identifies with preparing pictures utilizing profound neural organizations, e.g., convolutional neural organizations. Convolutional neural organizations for the most part incorporate two sorts of neural organization layers. convolutional neural organization layers and completely associated neural organization layers. Convolutional neural organization layers have meager availability, with every hub in a convolutional layer getting input from just a subset of the hubs in the following least neural organization layer. Some convolutional neural organization layers have hubs that offer loads with different hubs in the layer. Hubs in completely associated layers, notwithstanding, get input from every hub in the following most reduced neural organization layer.

In a first angle, the current innovation gives a framework to adapting query items based on particularly produced and saved URLs. In particular, the current framework contains a favored technique for a client to adapt picture looks for an article of product. including:

(a) the client transferring a picture to a PC framework in a hunt question;

(b) the PC framework utilizing picture acknowledgment programming to discover pictures like the transferred picture in the inquiry;

(c) the PC framework showing to the client the pictures that are like the transferred picture, wherein the presentation of pictures is introduced to the client as a website page having a special URL:

(d) the client saving the interesting URL:

(e) the client sharing the one of a kind URL via web-based media;

(f) the client being paid when a subsequent client:

(I) sees the novel URL, (ii) prefers the extraordinary URL, (iii) shares the exceptional URL. or (iv) buys the article of product through the remarkable URL. Ideally, the client is paid by the business substance controlling the PC framework, and the sum paid to the client is determined as a level of the buy made constantly client to a dealer of the article of product.

A benefit of this part of the innovation is that the current methodology makes, saves and offers remarkable URLs for its pursuits. Frameworks presently exist for performing on the web stock looking. Be that as it may, with the current option of novel pursuit URLs added to the ventures, various individuals can perform (and refresh) distinctive indexed lists, with those various clients sharing their own query items with others. Accordingly, different clients of the framework might figure out how to trust or follow the ventures of searchers they are following. This gives a framework wherein clients can best

discover the merchandise they are searching for online by trusting the pursuits performed by people having comparable preferences.

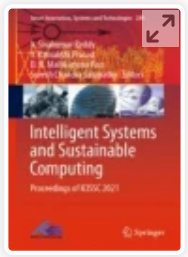
In other favored perspectives, the query items depend on inclinations from different clients in a partiality bunch that incorporates the client. Enrollment in the liking gathering can be founded on likenesses in inclinations of buying the article of product. For instance, the inclinations of buying the article of product can remember likenesses for: (I) sum spent to buy the article of product, (ii) the recurrence of buying the article of product, or (iii) the personality of the dealer of the article of product. The benefit of utilizing a fondness bunch is that liking bunches help with advancing query items. In particular, the list items given to one client can be founded on comparative indexed lists given to people who make comparable buys and have comparative preferences.

In favored viewpoints, the picture transferred by the client is a picture from a video, with the client labeling the picture from the video with watchwords. In discretionary parts of the current framework, the query items can be shown as 2D pictures, 3D pictures, or pictures in computer generated experience (for example shown over fanciful or remote foundations) or increased reality (showed over a foundation picture as right now saw by a cell phone camera). In additional discretionary parts of the development, extra query not really settled and showed for the client as the client looks down the page.

In other favored perspectives, the picture search can be iterative with the aftereffects of the inquiry creating results that are taken care of into the following hunt. A particularly iterative pursuit can be performed by: (1) the client seeing the showed pictures, (2) the client choosing one of the showed pictures as a favored picture, (3) the PC framework iteratively refreshing the inquiry question utilizing picture acknowledgment programming to discover pictures like the favored picture, and (4) the PC framework showing to the client the pictures that are like the favored picture. Steps (1) to (4) can be rehashed quite a few times, and the PC framework can show the favored picture along with the pictures that are like the favored picture at every emphasis of the hunt.

Benefits of the iterative quests can incorporate inquiries that are kept up with constantly exceptional (with the latest articles of product being distinguished by one client to help different clients). In a subsequent angle, the current creation gives a framework to choosing 3D articles either for a client to print, or to have others print for the client. In particular, the current framework incorporates a strategy for a client to choose an article of product online for 3D printing, including: (a) the client transferring a picture to a PC framework in a pursuit inquiry; (b) the PC framework utilizing picture acknowledgment programming to discover pictures like the transferred picture in the hunt question; (c) the PC framework showing to the client the pictures that are like the transferred picture; (d) the client choosing one of the showed pictures, in this way choosing an article of product comparing thereto: and (e) the client buying the article of product for 3D printing by:

(1) downloading a 3D print model of the article of product and afterward 3D printing the article of product, or (ii) buying the article of product from a seller that 3D prints the article of product. The assurance with regards to whether to buy the 3D article of product from the seller can incorporate choosing the merchant based on: (1) vicinity to the client, or (ii) cost. The PC framework might settle on this choice consequently, or



Intelligent Systems and Sustainable Computing pp 563–571

A New Supervised Term Weight Measure Based Machine Learning Approach for Text Classification

T. Raghunadha Reddy, P. Vijaya Pal Reddy & P. Chandra Sekhar Reddy

Conference paper | First Online: 29 May 2022

Part of the Smart Innovation, Systems and Technologies book series (SIST,volume 289)

Abstract

Text classification is a technique of predicting assigning a class label of an anonymous document or classifying the documents into known classes. The content of a text is a primary source for classifying the data in text classification. The researchers used the content of a text in different ways like most frequent terms, TFIDF scores of terms, N-grams of word and character for text classification. In this work, a term weight measure-based machine learning approach is proposed for text classification. In this approach, we propose a new term weight measure to represent the

importance of a term in a document. The terms which are more frequent in the dataset are extracted to represent the documents as vectors. The term value in vector representation is determined by using term weight measure. Four term weight measures are used in this experiment to compute the weight of a term. Machine learning algorithms are trained by using these vectors to generate the model for classification. The performance of a proposed system is predicted by using this classification model. Accuracy measure is used as a performance evaluation measure. Six machine learning algorithms and two datasets namely, IMDB and Enron Spam datasets are used in this work. The proposed term weight measure-based approach efficiency is good when compared with results of popular approaches to text classification.

Keywords

Text classification **Term weight measures**

Machine learning algorithms **Accuracy**

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A Standardized Approach for Evaluating UPFC's Optimal Location Using Metaheuristic Algorithms to Improve Power Quality

N.Kalpana[1]
Assistant Professor
Department of Electrical &Electronics Engineering
Matrusri Engineering College
Hyderabad. Telangana.
E-mail: kalpananyavanandhi@gmail.com.

Dr.Venu Gopala Rao.M[2]
Professor&HOD
Electrical and Electronics Engineering,
PVP Siddartha Institute of Technology
Vijayawada. A.P.
E-mail: venumannam@gmail.com.

Abstract -The development of Flexible A C Transmission System (FACTS) devices in electrical power systems has increased over the past decade because of its multiple advantages like reliability, enhancing power transfer capability, improving security and compensating for reactive power. Though the FACTS devices having many merits we can derive its efficiency only when the size and location is optimal. Among many FACTS devices available, this paper emphasizes on third generation of FACTS devices i.e. Unified Power Flow controller(UPFC) because of its merits like it improves the voltage stability, reduces the real power losses etc. The optimum location and size of UPFC in the power system is discussed in this paper using L-Index, evolutionary optimization techniques such as Non-Sorting Dominated Particle Swarm Optimization (NSPSO) and Firefly algorithm (FFA). The focal point is to improve the power quality by reduce the real power losses of transmission line and maintain voltage stability. The minimization of real power losses of transmission line and voltage variations are recognized as basic priority. By using the IEEE 14 bus network the feasibility of NSPSO , FFA are tested by selecting 125%, 150%,175% and 200% overloading cases. For all cases of loadings NSPSO and FFA are compared by that we can conclude NSPSO becomes an effective method to identify UPFC size, location as well as to reduce real power losses including improving the stability of the system than FFA.

Keywords:- Non-Sorting Dominated Particle Swarm Optimization(NSPSO), Firefly Algorithm(FFA), Power flow algorithm, Power system stability, UPFC, Optimal Location.

I. INTRODUCTION

Effective functioning of the power system on a daily basis is essential in order to satisfy the desires of the consumers. The usage of power consumption is increasing day by day with the development of new technology, new upcoming industries and its applications. Along with this the new innovations in the field of electronics also increases the lavish usage of electricity by the end users. So in order to meet the above increased requirements there are two options, one is the efficiency of existing system must be increased to the desired level, second both generating stations and new power lines must be upgraded. But before going for up gradation there are some issues to be resolved such as unbalance in the voltages, increasing in line losses, over-loads.[1] Apart from these issues there are some other new challenges to be addressed like rising in demand of electricity and fall off resources of generation. In order to address above challenges and issues this paper is very much relevant to meet the increasing demand of the end users. For this the new technological advancements is the need of the hour there by we can minimise the existing challenges. This could be gained by introduction of FACTS devices in the line.[2-3] Though the facts devices classified in to 3 types

1. Series controllers – injects Voltage
2. Shunt controllers- injects Current
3. Combined series-shunt controller- injects Voltage and Current.

UPFC has all the earmarks of being progressively pragmatic in voltage balance up gradation [7-8] out of different sorts of FACTS devices,[5-6] because of its capability to oversee shunt and series factors synchronously. For pointing out UPFC's ideal location, size we need to have proper methodology. To investigate the voltage stability, to detect the weak bus of the entire system, to place the UPFC at appropriate position L-index shall be used.

Conventional optimization techniques give the desired results in solving the optimization solutions but due to non-monotonic solution surface they are highly sensitive to initial points and thus unable to find the optimum value. In order to overcome this drawback instead of using conventional methods meta-heuristic, evolutionary algorithms are the appropriate methods to identify optimization solutions. basically the evolutionary algorithms are designed based on the population-based optimization methods. This paper highlights the NSPSO evolutionary algorithm in order to address the above challenges and most importantly it will identify optimum location of UPFC there by suppressing real power losses (RPL) and enhance bus voltage output in achieving greater stability. IEEE 14-bus system for simulation purposes is considered as test system. The test system results acquired with the NSPSO method to show the potential of the proposed algorithm which is compared with the results of the FFA method.

The primary belief of the system to achieve better dependability execution, for this enhance bus voltages and

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to maintain the same dependability confine Real Power Losses.

This paper covers 7 segments, Introduction in segment 1, segment 2 deals Problem Identification, which effectively addresses problem constraints and objective functions. Segment 3 deals with Modeling of UPFC . Segment 4 provides voltage stability Index. Segment 5 deals with Optimal Location Of UPFC using NSPSO and FFA which is the focal point of this paper and also introduces NSPSO,FF algorithms. All the interesting observations and detailed analysis presented in segment 6. Lastly, in segment 7, it perfectly encapsulates the conclusions

II. PROBLEM IDENTIFICATION

The primary belief of the system to achieve better dependability execution. For this enhance bus voltages and to maintain the same dependability confine Real Power Losses. To acquire, it is mandatory to consider the UPFC 's optimum ranking, with respect to all constraints. This is exhibited mathematically as

min X=[X1, X2, X3] (1)

$$X1 = \sum_{k \in Ni} g_k \left(V_i^{\,2} = V_j^{\,2} - 2V_i V_j \cos\theta_{ij} \right) = P_{activeloss} \quad (2)$$

Equation (2) gives real power losses.

$$X2 = VD = \sum_{k=1}^{N} {}^{PQ} \left(V_K - Vrefk \right)^2 \quad (3)$$

Equation (3) gives the total load buses voltage profile.

X3 gives the L-index of L^{th} bus [12] :

$$X3 = L_l = \left| 1 \pm \frac{V_{ok}}{V_l} \right| = \frac{S_l^*}{Y_{ll} V_l^{\,2}} \quad (4)$$

The minimisation problem involves the consequent equality and inequality limits:

(i) Load Flow Constraints:

$$P_k - V_k \sum_{j=1}^{Ng} V_j \left(G_{kj} \cos\theta_{kj} + B_{kj} \sin\theta_{kj} \right) = 0,$$

k=1,2,….N_B-1 (5)

$$Q_k - V_k \sum V_j \left((G_{kj} \cos\theta_{kj} - B_{kj} \sin\theta_{kj} \right) = 0 \quad (6)$$

k=1,2,….N_{PQ}-1

(ii) Voltage limits:

$$V_i^{\min} \le V_i \le V_i^{\max}, i \in N_B \quad (7)$$

(iii) Reactive Power generation Limit:

$$Q_{gi}^{\min} \le Q_{gi} \le Q_{gi}^{\max}, i \in N_g \quad (8)$$

(iv)Reactive power generation at condensing banks:

$$Q_{ci}^{\min} \le Q_{ci} \le Q_{ci}^{\max}, i \in N_c \quad (9)$$

v) Limits of Transformer Tap setting are:

$$ta_{p,\min} \le ta_p \le ta_{p,\max}, p \in N_t \quad (10)$$

(vi)Transmission line power flow limit:

$$S_j \le S_j^{\max}, j \in N_t$$

III. UNIFIED POWER FLOW CONTROLLER

"In 1991 Gyugyi introduced the UPFC concept"[4] fig ure.1 the basic structure of UPFC is provided by 2 converters that holds a common DC connection supplied with the DC condenser. It employs 2 transformers one is linked with converter1 in parallel and other with converter 2 in series to the transmission system. Converter2 designed in series which performs the one of the main functions of UPFC. The required voltage and phase angle is injected in to the lines by monitoring the active, reactive power through converter2.[10]

(2)

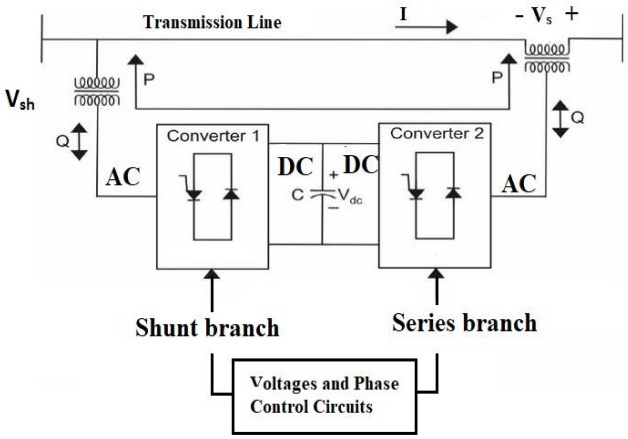

Fig. 1. Principal Diagram of UPFC

The converter1 delivers the real power needed for the converter2 by means of DC connection, that is attached with in line parallely. In addition, this provides the line's reactive power by giving significant adjustments to the shunt compensation. For the entire transmission line the two converters control whole parameters. For instance, the active, reactive power, regulation of voltage and control of phase angle.

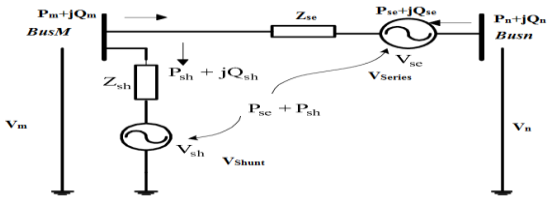

Fig. 2. Mathematical modelling of UPFC

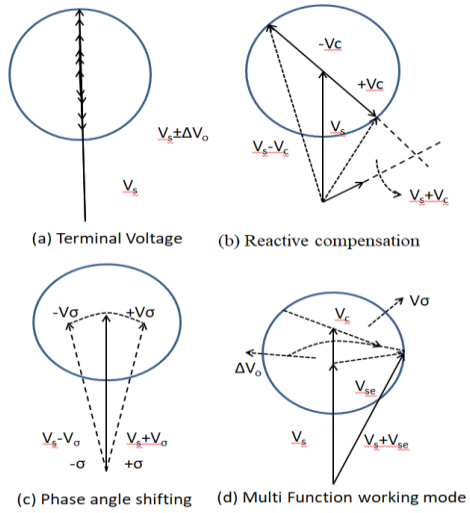

Fig.3.UPFC Operating Modes

Figure 2 gives UPFC Mathematical Modelling, below equation (12) represents real, reactive power injected by the converter2

$$S_{series}=P_{series}+jQ_{series} \tag{12}$$

Where

$$P_{series}= rb_xV_mV_n\sin(\theta m-\theta n+\gamma)-rb_xV^2\sin\gamma \tag{13}$$

$$Q_{series} = -rb_xV_mV_n\cos(\theta m-\theta n+\gamma)+rb_xV^2{}_m\cos\gamma+r^2b_xV^2{}_m \tag{14}$$

Generally the function of the converter1 is to generate reactive power and also to consume, but this function is not considered here, though its effect will be identified as another controllable source of reactive shunting. The voltage is held at m^{th}bus under the influence of reactive power under defined values. 'Q'shunt will be rendered as 0 in reference to the above clarifications.

Hence, converter1 derives mathematical design of UPFC which is represented in figure2.

The power-injection design of UPFC has appeared at figure.4

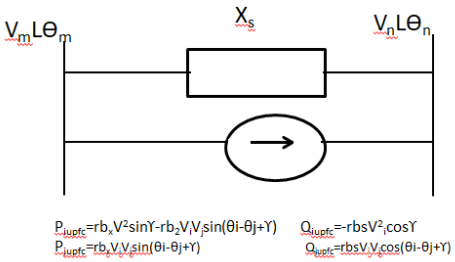

Fig.4. Power-injection design of UPFC

Finally, the power injections and shunting at both bus m and n or constructed by attaching in series with the help of mathematical modelling of UPFC which is represented in figure 4.

IV. VOLTAGE STABILITY INDEX

The power network working criterion is illuminated by regulating the occurrence of voltage collapse which is crucial. L-index was developed by Kessel[12] as an alternative to the power flow condition there by providing a voltage stability index.[13] For the maintenance of system stability limit and separation of true state L-Index quantitative measure is used. Moreover the L-index stands for the entire quality of the system. With this, load-flow effects are being introduced at required locations i.e. at generator, other load parameters of the specific operating conditions of the network.

For instance, the S-bus power system consists of load buses and PV buses whereas PV buses are put at the lowest level and termed as αQ, load buses are segregated at apex which is termed as αP.

i.e. αP ={1,2,…,s P} and αQ ={ sL+1, sL+2,……s s} Then corresponding statement of the hybrid system is obtained.

$$L_g=\left|1\pm\frac{V_{xg}}{V_g}\right|=\frac{S_g^*}{Y_{gg}V_g{}^2} \tag{15}$$

Where $V_{xg}=-\sum_{i\in\alpha J}F_{gi}V_I$

In L-index switches from 0 to 1 i.e. no load to voltage collapse. Stability of voltage is ensured once its value reaches '0'.

V. UPFC OPTIMAL LOCATION WITH NSPSO AND FFA

5.1.NSPSO Overview:

A brief overview of the Non-dominated Sorting Particle Swarm Optimization (NSPSO) algorithm is given in this section . "NSPSO is the new version of the PSO by making a better use of particles' personal bests and offspring for effective non-domination comparisons. "[13].Instead of a solitary examination between individual

components best and their offspring, NSPSO considers every aspect of individual bests and their offsprings within the population as a whole.
NSPSO algorithm depending on the non-dominated sorting concept used in NSGA-II[14-16], where the entire population is placed at different non-dominated levels.

The following equation represents the fundamental PSO

$$S_q^{k+1}=S_q^{k}+V_q^{k+1} \quad (16)$$

$$V_q^{k+1} = w\, V_q^{k} + c_1\, rand_1(\ldots) \times (q\ best_q - s_q^{k}) + c_2\, rand_2(\ldots) \times (gbest - s_q^{k}) \quad (17)$$

Here , k represents generation of components

S_q^{k}: position of component q

V_q^{k}: velocity of component q

wt : Weighting function,

c_q : Weighting factor,

$qbest_q$: Pbest of component q,

rand : arbitary number between 0 and 1,

gbest: group Gbest

Equation (18) represents weighing function

$$w_t = w_{t\max} - \frac{w_{t\max} - w_{t\min}}{iterat_{\max}} Xiterat \quad (18)$$

Here ,
iterat: present iteration number,
w_{tmin} : last weight,
w_{tmax} : starting weight.

The biggest drawback in PSO is, comparisons of dominance not used to its peak while updating each elements personal best. So as to dispose off the above drawback and increase the level of sharing among components of rigorously checked. This method ensures an enhanced non-dominated approach solutions by comparisons of domination and allows the classification of the entire population at different levels of non-domination as used in NSGA-II.

Algorithm for finding sizes of UPFC with the implementation of NSPSO Methodology:

NSPSO steps are mentioned below

1. Initialize and save the populace in a PSOList(PL) :
   a) Within the predetermined limit, each swarm element is arbitrarily selected and Zero velocity is assumed at the beginning.
   b) Explore all the components from populace
   c) Iteration Counter (I_k)=*0*.
2. $I_k=I_k+1$
3. Differentiate every component from the PSOList, transfer them in NonDomList and save it.
4. Among each component from swarm Crowding Distance(CD) is calculated.
5. The *NONDOMPSOLIST is resorted* depending on the Crowding Distance(CD),
6. For (q=0; q < *num* component *q*++)
   a) Choose a global best Gbest for q^{th} component randomly from the given upper portion (example top 5 percent) from sorted portion Non-DomPSOList
   b) revise velocity V_q and position S_q 'Depending on (17)& (16)
   $S_q^{k+1}=S_q^{k}+V_q^{k+1}$ (16)
   c) $V_q^{k+1} = w\, V_q^{k} + c_1\, rand_1(\ldots) \times (q\ best_q - s_q^{k}) + c_2\, rand_2(\ldots) \times (gbest - s_q^{k})$ (17)
   d) For a temporary population, add *qbestq*, *Sq of the q*th component and saved at *NEXTPOPLIST* i.e.*NPL*.
   e) If *q* < *numb components*, back to 1).
7. Update the components of *NPL* that gives non dominated solutions and preserve those in non-domPSOList. Places remaining elements in the *NEXTPOPLISTREST* i.e.*NPLR*..
8. During next iteration, reset *PSOLIST*.
9. Pick the components randomly from the NONDOMPSOLIST and add it to the *PSOLIST*.
   a) Repeat, If *numb components* > *PSOLIST* size.
   b) From *NPLR* separate non-dominated components and move to *NNDL*.
   c) Till the size < numb components, place the components of *NNDL* into *PList* .
   d) Reset *NPLR* after ripping *NPLR to NPLRC.*
   e) Load *NPLR* with the left over elements other than non-dominated ones from *nextPop List Rest Copy (NPLRC)*.
   f) If *PList* size > *numb components*, Jump to i)
10. Jump to (II).If I_C > *maximumIterations*

where NNDL-next non dom list,NPLR-next poplist rest,EPLRC-extra poplist restcopy

5.2.FFA Overview

"Xin- She Yang initially developed the Firefly Algorithm (FFA) at Cambridge University in late 2007 and 2008."[15] Firefly 's algorithm attracted a huge amount of interest and extended to a multiple fields. "Firefly algorithm is a metaheuristic swarm-based, optimization algorithm inspired by nature".[15] This FFA emulates the flashing behaviour of firefly. [16] FA is much like various algorithms of Optimization that use swarm intelligence in the same way like PSO. At many situations this FFA shown improved maximum efficiency.[14-20] It consists 3 steps which includes

1. "All fireflies are unisex, so one firefly may be interested in the opposite fireflies, regardless of sex".[15]
2. Fireflies' attraction relies on its brightness, hence

the movements of each firefly towards a brighter one. More brightness implies less away from two fireflies. Regardless if two fireflies are having same sex by then they move subjectively.

3. Fireflies brightness and its fitness function both are correlated and proportional for maximization problem and analogous to minimization.

The inverse square law is also applicable to the Light intensity , eq. (19) represents this.

$$I_r = \frac{I_s}{r^2} \quad (19)$$

Here I_s determines the intensity at the source, and I_r indicates intensity of light at 'r.' For any given medium, the light intensity I_r and the distance r changes according to the absorption coefficient 'γ ' which is provided in the equ. (20).

$$I=I_0\exp(-\gamma r) \quad (20)$$

Where I_0 represents the initial light of intensity [17] and 'r' is the fireflies distance. The light intensity and attractiveness of the fireflies both are equivalent to each other; the attractiveness of the firefly is represented by β.

$$\beta= \beta_0 \exp(-\gamma r^m) \ (m\geq 1) \quad (21)$$

If the attractiveness at r = 0 is given by β0. 'I' and 'j' are measured as 'r' for two fireflies.

$$r_{ij} = \sqrt{\sum_{k=1}^{d} (xi,k - xj,k)^2} = \|x_i\text{-}x_j\| \quad (22)$$

In equation(22) i.e. r_{ij} represents distances of two fireflies X_i and X_j[16]

Fireflies migrate to neighbour fireflies in every generation based on the brightness which is represented in Eq. (23).

$$x_i=x_i+ \beta\exp(-\gamma r^2_{ij})(x_i-x_j)+\alpha\varepsilon \quad (23)$$

where α represents the random number vector for randomization parameter which is barrowed from Gaussian distribution. In this α regulates the step size and thereby based on the brightness ranking of the fireflies is done at the end. In this way in every generation best fireflies are detected. For the future generations the remaining fireflies are shifted by altering the light intensity of every firefly based on the fitness function of every generation. In this way many iterations take place in all the generations and the strongest brightness firefly is selected at the end and this strongest brightness fire fly is termed the best fitness value and the best result for the problem.

5.2.1.Firefly Algorithm

FFA procedure is mentioned below [21-24]

1. All parameters and constants as β ,α, Δ, the number of fireflies and maximum number of iterations are initiated
2. Assume Iteration counter I = 0.
3. Increment I= I+1
4. The fire flies fitness determined in each iteration is correlated with every firefly's light intensity which is represented in equation (23)
5. In each iteration
   Arrange fireflies according to their light intensity and find more effective fireflies.
6. Relying on the light intensity and gap between the fireflies differentiate the strongest and weak fireflies.
7. Depending on the light intensities and control parameters differentiate the fireflies further.
8. Go through the finishing process, if it is acceptable Jump to 9 if not jump to 3.
9. Show the strongest brightness fireflies as the best solution to the problem

VI.RESULTS AND DISCUSSION

To authenticate the potentiality, adaptability robustness and feasibility of the proposed NSPSO on a real power optimal solution IEEE 14-bus test system[25] is implemented, this is contrasted with an algorithm, such as FFA, **a**s NSPSO algorithm is based on population which have deep interest in solving the real power optimization problems effectively. The test system of IEEE 14-bus incorporates five generator buses 1,2,3, 6 and 8, load buses are nine, they are 4, 5, 7,9,10,11,12,13 and14, and 20 transmission lines with 3 transformers. Initially by using L index method, three week buses are determined they are 4,9,14. By installing the UPFC at the weak buses the enhancement of the voltage profile at different loading cases are shown below. It is evident that from the below Figures after positioning UPFC on weak buses the voltage profile increases considerably at different loading cases.

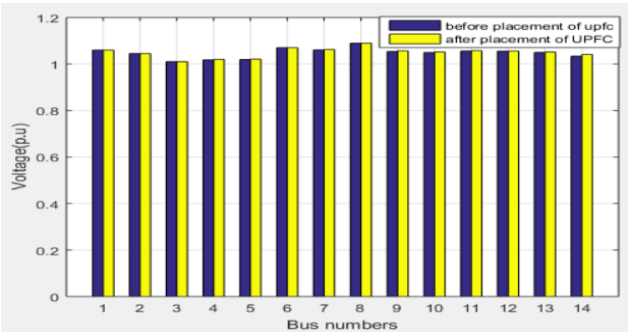

Fig. 5 Deviation of voltages for 100% of load

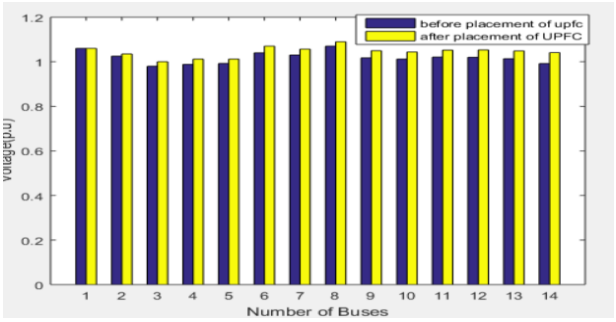

Fig. 6 Deviation of voltages for 125% of load

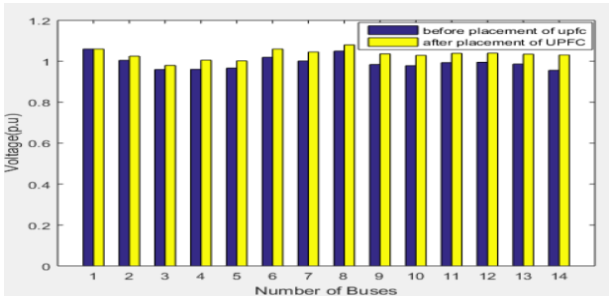

Fig. 7 Deviation of voltages for 150% of load

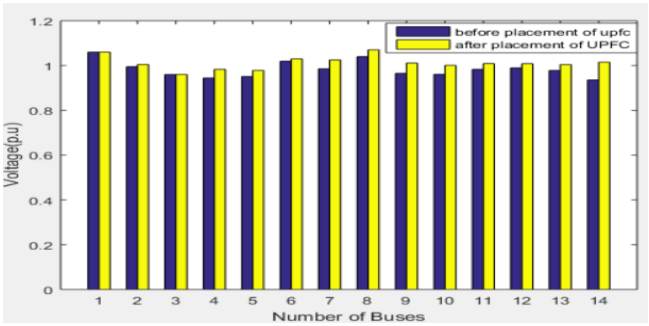

Fig. 8 Deviation of voltages for 175% of load

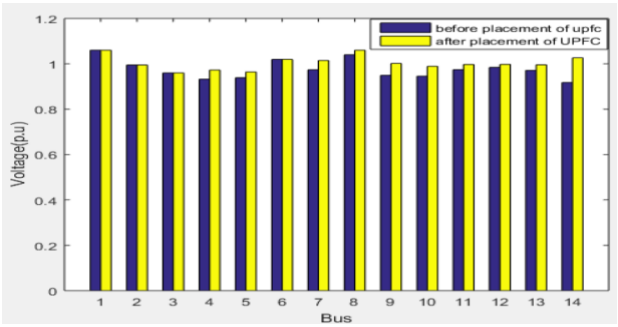

Fig. 9 Deviation of voltages for 200% of load

Table 1 shows the comparative results of NSPSO with FFA for IEEE 14 bus system

Cases	Losses Before UPFC is placed	UPFC Optimal location	Injection of UPFC with series (MVAr)		Injection of UPFC into bus shunt (MVAr)		Losses after UPFC (MW)	
			NSPSO	FF	NSPSO	FF	NSPSO	FF
100	13.3934	4-9 9-14	7.4204 10.6444	6.2814 8.2912	6.0000 7.0000	4.00 5.00	13.3355	13.3796
125	22.7259	4-9 9-14	9.9246 0.0506	8.8216 0.0108	15.00 10.00	13.0 8.00	22.219	22.269
150	35.5578	4-9 9-14	24.1683 14.7925	22.1893 12.2915	43.00 6.000	39.0 5.00	34.639	34.9276
175	51.61	4-9 9-14	14.7639 30.6572	14.0629 28.6512	61.00 15.00	59.0 13.0	49.804	50.02
200	70.8595	4-9 9-14	3.0375 65.2245	2.9295 62.1239	92.00 0.000	89.0 2.00	69.2677	70.0624

Upon implementing the NSPSO the real power loss is 13.3355MW while it is 13.3796 MW for FFA under normal loading conditions . For other loads the reduction in real power losses has been tabulated in the above table. Finally with the above tabular observations the NSPSO algorithm is impressive when compared to the FFA

VI.CONCLUSION

The present paper is tested on IEEE14 bus system, L-Index and NSPSO methods are used to find the UPFC's location and size respectively. Moreover the achieved results are compared between NSPSO and FFA. Thereby greatly improving the voltage profile with NSPSO rather than FFA. Apart from this line losses have been lowered and the optimum solution is obtained with less iterations when tested with NSPSO. Finally, we can conclude that NSPSO is the most appropriate and efficient algorithm to explore the UPFC optimal location and size .

References

[1] Hingorani NG, Gyugyi L. "Understanding FACTS: concepts and tech. of flexible AC transmission systems." New York: Wiley IEEE Press; 2000.

[2] Yesuratnam G, Thukaram D. Congestion management in open access based on relative electrical distance using voltage stability criteria. Electr Power Syst Res 2006; 77:1608–18.

[3] Verma KS, Singh SN, Gupta HO. "Location of unified power flow controller for congestion management." Electric Power Sys. Res 2001;58(2):89–96.

[4] Gyugyi L. "A unified power flow control concept for flexible AC transmission syst." IEE Proc Part C 1992;139(4):323–31.

[5] Nagendra P, Halder Sunita, Paul S, Datta T. A novel approach for global Voltage stability assessment of a power system incorporating static var compensator. Eur Trans Electr Power 2012;22(7):1016–26.

[6] Noroozian M, Angquist L, Ghandhari M, Anderson G. Use of UPFC for optimal power flow controller. IEEE Trans Power Deliv 1997:12(4):1629-34.

[7] Gyugyi L, Shauder CD, Williams SL, Rietman TR, Torgerson DR, Edris A. "The unified power flow controller: a new approach to power transmission control." IEEE Tran Power Del 1995; 10(2):1085–97.

[8] Glanzman G, Anderson G. Coordinated control of FACTS based on optimal power flow. In: Proceedings, 37th annual North American power symp, Ames, IA, 23–25 October; 2005.

[9] Nabavi-Niaki A, Iravani MR. "Steady-state and dynamic models of unified power flow controller (UPFC) for power system studies." IEEE Tran Power Syst 1996; 11(4):1937–43.

[10] R. Benabid M. Boudour A. HellalM. "Non-dominated Sorting Particle Swarm Optimization (NSPSO) for Static Voltage Stability using TCSC and SVC" 4th International Conference on Computer Integrated Manufacturing CIP'2007.

[11] T.V.cutsem, "Voltage instability: phenomena, counter measures and analysis methods", proc of IEEE, Vol.88, pp.208- 227,Feb, 2000.

[12] P.Kessel, H.Glavitsch "Estimating the Voltage Stability of a Power System" IEEE, Trans on Power Delivery, Vol.PWRD-1, N3, July1986.

[13] Xiaodong Li: "A non-dominated sorting particle swarm optimizer for multi-objective optimization" (2003).

[14] P. Balachennaiah" Optimizing real power loss and voltage stability limit of a large transmission network using firefly algorithm", Engineering Science and Technology, an International Journal, Vol. 19, no. 2, pp. 800-810, 2015

[15] N.Kalpana, M.VenuGopalaRao."Optimal location of UPFC to minimize the real power losses using Firefly Algorithm", International Journal of Engineering and Advanced Technology, Blue Eyes Intelligence Engineering & Sciences Publication, vol. 9, issue.3 , pp. 2675-269,2020.

[28]

[16] N.Kalpana, M.VenuGopalaRao."Optimal location of UPFC to minimize the real power losses using NSPSO Algorithm", IJITEE, Blue Eyes Intelligence Engineering & Sciences Publication, vol. 8, no.12 , pp. 924-931,2019.

[17] N.Kalpana, M.VenuGopalaRao "A Generalized Technique to Assess the Optimum Location and Performance Analysis of UPFC using Swarm-Based Algorithms" Journal of Green Engineering, Volume 11, issue 1, Jan 2021.

[18] N.Kalpana, M.VenuGopalaRao "Impact of crow search algorithm to minimize transmission system poer lossess" Journal of Green Engineering, Volume 10, issue 12, DEC 2020.

[19] Lashkar Ara A, Kazemi A, Gahramani S, Behshad M. Optimal reactive power flow using multi-objective mathematical programming. Sci Iranica Tran D: Comput Sci Eng Electr Eng 2012; 19(6):1829–36.

[20] Singh SN, Erlich I. "Locating unified power flow controller for enhancing power system loadability." In: International conference on future power system. Amsterdam, Netherlands; Nov. 2005, p. 162–66.

[21] Yang XS. Firefly algorithm: stochastic test functions and design a optimization. Int J Bio-Inspired Comput 2010;2(2):78–84.

[22] Xin-She Yang," Firefly Algorithms for Multimodal Optimization", Xiv: 1003.1466v1 [math.OC] 7 Mar 2010.

[23] Yang XS. Firefly algorithm for multimodal optimization. SAGA 20, vol. 5792; 2009. p. 169–78.

[24] Yang X-S. Nature-inspired meta heuristic algorithms. Luniver Press; UK, 2010.

[25] http://www.ee.washington.edu/research/pstca.

[26] Karuppusamy, P. "Design of Adaptive Estimator for Nonlinear control system in Noisy Domain." Journal of Electronics and Informatics 3, no. 3 (2021): 150-166.

[27] b. Wang, Haoxiang. "Fault Diagnosis in Hybrid Renewable Energy Sources with Machine Learning Approach." Journal of Trends in Computer Science and Smart technology (TCSST) 3, no. 03 (2021): 222-237.

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Prof. M. Vijjulatha
Principal, UCW

Cooperative Spectrum Sensing Optimization in Cognitive Radio networks based on a Hybrid (MFO-GDO) Heuristic Search Algorithm

Swati Thimmapuram
Dept of Electronics, PhD Scholar
S.K.University, Ananthapuramu, &
Asst professor, Dept of ECE, GPREC,
Kurnool, A.P, India.
swati.thimmapuram@gmail.com

Dr. M. V. Laxmaiah
Head & Professor, Dept of Electronics
S.K.University
Ananthapuramu, A.P, India.
drmvl2009@gmail.com

Dr. M. Sreelatha
Assistant prof, Dept of S&H
Matrusri Engg college
Hyderabad, T.S, India.
srimudiam1972@gmail.com

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Abstract— **Cognitive radio Network (CRN) is an intelligent technology and it periodically monitor unused licensed spectrum in a specific frequency band. The main issues with spectrum sensing in CRNs are the hidden terminal problem, which occurs during cognitive radio shading, severe multi-path faded or in buildings with high infiltration loss, while operating near a primary user (PU). Due to the hidden terminal problem, a cognitive radio (CR) can have failed to notice the PU's presence. Then access the unlicensed channel, cause interference in the license scheme, while this interference occurs in the system the probability errors will occurs in the network and reduces the spectrum utility. To overcome these issues, Quick Cooperative Spectrum Sensing (CSS) optimization framework in CRN (CSS-CRN) based on a May Fly optimization (MFO) and Gradient Descent Optimization (GDO) algorithm is proposed in this paper. Here, the weight vectors of CSS-CRN are optimized utilizing the hybrid heuristic Search based optimization algorithm namely May Fly optimization (MFO) and Gradient Descent Optimization (GDO) algorithm. Finally these weight vectors are used in the data fusion centre to assign spectrum in secondary users (SUs).**

Keywords— Cooperative Spectrum Sensing (CSS), Cognitive Radio Network (CRN), May Fly optimization (MFO), Gradient Descent Optimization (GDO), secondary user, Primary user, Fusion center.

I. INTRODUCTION

The expected development and wireless devices multiplication with different network requires advanced, intelligent devices to overcome the spectrum scarcity challenges , operating capacity, power consumption, high data rates, better service quality [1, 2]. The CR is an advantageous mechanism for improve spectrum consumption by allowing second users (SU) to access irregularly existing unmanned spectrum bands that are expressed as spectrum holes without interfering with the primary or licensed users' developments. [3]. Here spectrum sensing is a significant function of CR [4]. Identify the transfer of licensed users; acknowledge idle stocks in the frequency bands to eliminate barriers to licensed users. Base on their distinct characteristic, sensing method may characterized in2devices i.e., cooperative, non-cooperative sensing [5, 6]. In previous work there are several methods are used to place the secondary licensed user [7]. Every cognitive user notices the radio environment, creates the unconventional assessment depend on collect the radio data [8]. In the later, cognitive users perceive their radio environment, to make a cooperative decision these collected radio state information were shared [9]. In cooperative centric results, various fusion methods like as hard decision contains OR, AND, majority scheme, then soft decision contains square-law combining (SLC), maximal ratio combining (MRC) is worked [10, 11]. Since each node doesn't require much computational processing capability cooperative realization utilizes improvements in overcoming hidden node issues as well as hardware simplicity [12]. Conversely, cooperative sensing absorbs an energy's higher level, hence energy saving becomes an important challenge [13]. Sensing time allocation is furthermore important on cooperative sensing [14]. Energy consumption is high when sensing time is increases; it also causes important delay in network. A CR can fail to notice the occurrence of PU due to hidden terminal problem as well as it is contact an unlicensed channel with cause interference to licensed system. Multiple cognitive manipulators may collaborate to transfer the spectrum sensing in deal with hidden terminal problem in the CRN. It has exposed the spectrum sensing performance is significantly enhanced by improving the probability detection, and several signal detecting methods that can be accessed in spectrum sensing.

II. LITERATURE SURVEY

Some of the recent literatures related to this research work are reviewed here as follows:

In 2019, *Karimi, et.al.,*[21] has presented optimum CR spectrum access with combined spectrum sensing, power allocation. Here, the concept of probabilistic access, which assigns the probability for CR signal transmission over a PU's spectrum, shows that the optimum spectrum access method be associated with the family of real-valued continuous function, here the accessing probability or not accessing a spectrum by means of SUs was a real number among0,1. Furthermore, they report that the probability of spectrum access was constantly greater than or equal to a acceptable probability of miss detection.

In 2020, ***Liu, et.al.,***[22] has presented a cooperative spectrum sensing optimized on energy-harvesting CRN (EH-CRN). Here, it was improve an ideal CSS approach in terms of concluding decision threshold K to increases a predicted possible throughput of EH-CRN, subject to the collision constraint, an energy connection constraint. Extensive numerical simulations were enabled to demonstrate efficiency against a last decision threshold. The foremost outcome specifies the optimum limit of final decision threshold on the state of energy-deficit can be established by the count of reports known in FC.

In 2019, *Gharib, et.al.*,[23] has presented an enhanced multiband multiuser CSS for distributed CRNs. Here, an improved M2CSS (EM2CSS) system was presented to permit novel SUs to contribute on sensing process. To minimize sensing energy consumption they dispense the sensing assignments amid existing, connection SUs. An extensive simulation result demonstrates the effectiveness of the presented method was likened to other existing method.

In 2020,***Liu, et.al.***,[24] has suggested an intelligent spectrum resource allocation depend on combined optimization in heterogeneous CR. Here, the presented a strategy to develop a SU's throughput in a heterogeneous CR, an intelligent spectrum resource allocation depend on combined optimization. Subsequently, access to the SU was limited not only to the PU's spectrum overlay but also to the underlay mode allowed by the recommended technique. When PU was present with a controlled power, SU access the spectrum incomplete power and while PU was absent. The simulation consequences have designated that the suggested heterogeneous CR was higher than the traditional CR.

In 2020, ***Sarikhani, et.al.***,[25] has presented a cooperative spectrum sensing meets machine learning based deep reinforcement learning algorithm. In this presented a DRL depend CSS approach that was engaged for diminish a signaling in SUs' network. The simulation outcomes signifies the advantage of the suggested method to the art methods state, comprising DEEP Cooperative Sensing DCS), K-out-of-N, Support Vector Machine (SVM) depend CSS methods.

In 2021, ***Varun,et.al.***,[26] has suggested a PALM-CSS: A high accuracy, intelligent machine learning based CSS methodology in CR health care networks. In this suggested a new machine learning approach to spectrum sensing on CRN that shows a vital part in medical data transfer. A high-speed proactive decision depend multi-layer extreme learning engines are executed to CSS in CR health care networks. To executing the real-time cognitive scenario the experimental tested were intended based on Multi core CoxtexM-3 boards.

In 2018, ***Fu, et.al.***,[27] has presented a quantization-based multi bit data fusion system for CSS in CRN. Here, the simple quantization depend multi bit data soft fusion instruction for CSS to its unadorned framework, easy enactment. Underneath the quantization established based on sensing approach every cooperative SU accepts an energy detector for local spectrum sensing. Every SU conducts quantized multi bit data forwards local sensing data, as a replacement for sending local 1-bit hard decision outcomes or new tracking figures for the fusion center.

III. PROPOSED METHOD

Cooperative Spectrum Sensing Optimization framework in Cognitive Radio networks (CSS-CRN) based on a Hybrid (MFO-GDO) Heuristic Search Algorithm

In this a Quick CSS-CRN is proposed to optimize the hidden node problem. In this hybrid heuristic Search based optimization algorithm namely May Fly optimization (MFO) and Gradient Descent Optimization (GDO) algorithm is used to optimize the problems in the CSS-CRN. Then, the proposed MFO-GDO algorithms are estimate the optimum weighting vectors utilized in a data fusion canter. It is also utilized to allocate spectrum to SUs. Important steps involved in CSS-CRN optimized using MFO-GDO algorithms, contains 4 steps as follows: (1) local sensing, (2) reporting, (3) decision (Fusion canter (FC)),(4) allocation. In local sensing step, every SU senses the assumed spectrum, gathers observations, capture the signals of PU. In reporting step, SUs sends their observations or local decisions to FC. In decision phase, FC creates a global decision about the presence or primary sensors users' absence depend on local observations collected utilizing a hard or smooth joining process.

3.1. Optimization of Cooperative Spectrum sensing for selecting optimal fusion center

This hybrid heuristic Search-based optimization algorithm namely Mayfly optimization (MFO) and Gradient Descent Optimization (GDO) algorithm is used to minimize the miss probability of a false alarm or maximizing spectrum utilization of the target. The proposed algorithms used to estimate the optimum weighting vectors utilized in a data FC. It is also used to allocate spectrum to SUs. In this May flies are the insects which are known as the palaeptera. It is a high quality meta-heuristic optimization algorithm and optimizes in three models such as unimodel, multimodal, and fixed dimensions. It not only optimizes the local search and also optimizes the global search probabilities.

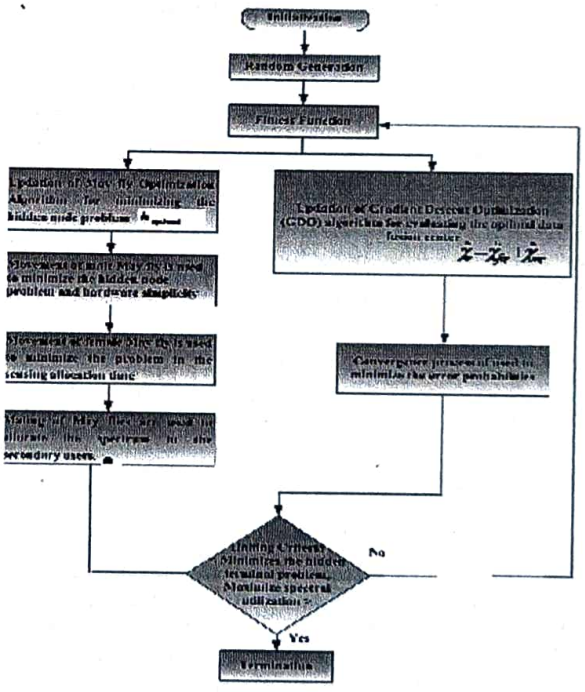

Figure1: Block diagram of CSS-CRN optimization using MFO &GDO.

Step 1: Initialization

Initialize the initial populations of the may fly and Gradient Descent Optimization (GDO) algorithm. From this the populations of the may fly is denoted as $M=(M_1, M_2, \ldots M_{dimension})$ and the gradient parameters as ∇k , ∇ is the gradient function, k is represented as the gradient length.

Step 2: Random Generation

After initialization randomly generate gradients of the Gradient Descent Optimization (GDO) algorithm and the mating behavior of the May flies used to evaluate the optimal weighting vectors used in the data fusion centre. This is further used for allocation of spectrum to the secondary users.

Step 3: Determination of Fitness function (FF)

Here, the FF is evaluate to obtain the objective function used to allocate a spectrum to a SU by finding a optimum weighting vectors utilizing in a data FC by minimizing the total probability of the error functions detected in the CSS in CRN. Then, the FF equation is given in equation (1):

$$Fitness\ function = Minimize\left\{\vec{\chi}_{fa,r}, \vec{\chi}_{m,r}, h_{optimal}\right\} (1)$$

Here h is represented as the AWGN, this function is selected as a optimal solution is given as $h_{optimal}$ and this function is used to reduce the hidden node problem in the CSS.

Where $\vec{\chi}_r^{'}$ is represented as the mean of the probability error function, $\left(\vec{\chi}_{fa,r}\right)$is represented as the probability of the false alarm probability in CSS and $\left(\vec{\chi}_{m,r}\right)$ is represented as the probability of the missed detection probability in cooperative Spectrum Sensing and maximizes the spectrum utilization.

Step 4: Updating of May fly Optimization Algorithm for minimizing the hidden terminal problem $h_{optimal}$

May flies are the insects which are known as the palaeptera. It is a high quality meta-heuristic optimization algorithm and optimizes in three models such as uni model, multimodal, and fixed dimensions. It not only optimizes the local search but also optimizes the global search probabilities. In this the mating behaviors of the May flies are explained for allocating the licensed secondary users in the spectrum.

Step 5: Movement of male May fly for minimizing the hidden node problem

In this the male may flies are used to minimize the hidden node problem the licensed users' transmission, evade interference to them, while identify any unused portions in a frequency bands by the process of attracting the female by nuptial dancing by up and down format, and swarms a less meter above the water. For detecting the transmission of licensed users, both the May flies adjusted their own experience and the mating equations with the velocity in the frequency bands M_a^{t+1} are given in equation (2)

$$M_a^{t+1} = M_a^t + \beta_r$$

$$M_a^0 \approx \left(h_{optimal_{mim}}, M_{\max}\right) \rightarrow (2)$$

This function is known as the optimal fusion centre. Then the optimal spectrums to the secondary users are optimized using $h_{0ptimal}$ and its optimal equation is given in equation (3):

$$h_{optimal} = mimimize\left(M, \left\lceil \frac{M}{1+\beta_r} \right\rceil\right) \rightarrow (3)$$

Where $\beta_r = \dfrac{\ln \dfrac{pb_{af}}{1-pb_m}}{\ln \dfrac{pb_m}{1-pb_{af}}}$

M is represented as the cognitive radios (secondary users) to allocate the vacant place, These parameters are optimized using the May fly optimization algorithm using the mating behaviors of the may flies for allocating the licensed secondary users in the spectrum.

Where M_a^t is represented as the current positions of may fly, a is represented as the search space at the time $t+1$, β_r is represented as the velocity of the may fly and this function is determined by the process of probability of the false alarm probability in CSS, the probability of the missed detection probability in CSS.

Then, minimize the sensing time allocation and to increase the speed of the transmission of licensed user is increased by getting the best solutions and the problem is minimized in equation (4)

$$L_{bestab} = \begin{cases} M_a^{t+1}, & if\ h\left(M_a^{t+1}\right) < hL_{bestab} \\ otherwise\ same & \end{cases}$$

(4)

Where h is represented as the objective function for the efficient transmission of licensed users and to allocate the secondary user to use the vacant place. Then the optimal equation is given in equation (15)

$$\left\|M_a - M_b\right\| = \sqrt{\sum_{b=1}^{m}\left(M_{ab} - N_{ab}\right)^2} \rightarrow 5$$

Where M_{ab}, N_{ab} is represented as the position of may fly in dimension.

Step 7: Movement of female May fly for minimizing the problem in the sensing allocation time

In this female May flies will minimize the problem n the sensing allocation time for reducing the delay with efficient band width. This process is estimated by the movement of the May flies in the process of breeding. Then the minimization equation is given in equation (6)

$$V_{ab}^{t+1} = \begin{cases} M_{ab}^{t+1} + h_{optimal_2} Z^{-\delta r_{n2}^2}\left(M_{ab}^t - N_{ab}^t\right), if h\left(N_a\right) \geq h\left(M_a\right) \\ V_{ab}^t + h * Random, \quad if\ h\left(N_a\right) \geq h\left(M_a\right) \end{cases}$$

(6)

Where V_{ab}^{t+1} is represented as the female may fly velocity, h is represented as the optimal spectrums to the secondary users, $h * Random$ is represented as the co efficient of random walk this co efficient is utilized if a female is not attracted with male and the random value is ranges from [-1,1].

Step 8: Mating of May flies for allocating the spectrum to the secondary users.

In this Mating of May flies are used to allocate the spectrum to the secondary users. In this cross over operation is evaluated on the basis of the mating of the male and the female flies. Then attain the fitness function and the mating equation is given in equation (7-8):

$$May_{offspring}1 = M_{max} * May_{maleaparen} + (1-M) * May_{female}$$

--(7)

$$May_{offspring}2 = M_{max} * May_{femaleapaent} + (1-M) * May_{male}$$

--(8)

Where M_{max} is represented as the maximizing spectral utilization for allocating licensed secondary user in the spectrum, $May_{offspring}$ with the velocity and settled as zero.

Step 9: Updating of Gradient Descent Optimization (GDO) algorithm for evaluating the optimal data fusion center

In this Gradient decent optimization algorithm is used to optimize the problems of local minima by this way the error probabilities of the Cognitive radio spectrum is minimized. In this GDO algorithm is mainly used to minimize the computation time, errors, and gradients of all the samples at each iteration.

Then, the total error functions are given as $\bar{\chi}_{fa,r} + \bar{\chi}_{m,r}$. Then, the optimum fusion rule for CSS to reduce $\bar{\chi}_{fa,r} + \bar{\chi}_{m,r}$ is given in equation (7):

$$\bar{\chi}_r = \bar{\chi}_{fa,r} + \bar{\chi}_{m,r} --(9)$$

In this, χ_r is represented as the probability error function and it is solved using the Gradient optimization algorithm, $(\bar{\chi}_{fa,r})$ is represented as the probability of the false alarm probability in CSS and $(\bar{\chi}_{m,r})$ represents the probability of missed detection probability in CSS.

Step 10: Convergence process for minimizing error probabilities

By using stability of the convergence process the probability of the error functions are used. In this weight parameters are used to find the optimum weighting vectors in the data FC. Then the error probability minimized equation is given in equation (10-11):

$$f \leftarrow f + \left|\nabla_{\chi} k(\bar{\chi}_0)\right| --(10).$$

$$\bar{\chi} = \bar{\chi}_{fa,r} - \frac{\beta}{f+\sigma} . \nabla_{\chi} k(\bar{\chi}_0) --(11)$$

(11)

Where $|k(\bar{\chi}_0)|$ is represented as the length of the gradient for selecting the optimal fusion center to allocate the secondary user to use the vacant place. Here f is represented as the sum of square of gradients, the initial value is 0, σ is represented as the smoothing term that evades division by 0, β represents a learning rate, $\bar{\chi}_0$ is represented as the parameters of the cooperative spectrum sensing for updating, $k(\bar{\chi})$ is represented as the error function of CSS. Here d is represented as the gradients of χ, from this the sum of the square function f is given in equation (12):

$$f = f + lengthof\ d \rightarrow (12)$$

Then the minimized probability error function of CSS is given in equation (13)

$$\bar{\chi}_r = \chi_{m,r} - fy * d / (f + smooth\_r) \rightarrow (13)$$

Where fy is represented as the number of learning rate. The above equation (13) is known as the optimal fusion center equation, equation 5 and 6 is known as the optically allocating spectrum to the cognitive radios (secondary users).

Step 9: Termination

In this by using MFO-GDO Algorithm optimal fusion center is selected for the allocating secondary user to allocate the vacant place by reducing hole problem and this values are optimized otherwise iteratively repeat step 3 till met the halting criteria in the CSS in CRN.

IV. RESULT AND DISCUSSION

In this section, the simulation performance of the proposed Quick Cooperative Spectrum Sensing optimization framework in CRN based on a May Fly optimization and Gradient Descent Optimization algorithm (CSS-CRN-Hyb-MFO-GDO) is discussed. The simulations are conducted on a PC with the Intel Core i5, 2.50 GHz CPU, 8GB RAM and Windows 7. The proposed method is simulated using the CRNS-2 (Cognitive Radio Network Simulator) tool. Here evaluation metrics like delay, delivery ratio, drop, Overhead, network lifetime, and throughput are analyzed. Then the performance of the proposed Hyb-MFO-GDO algorithm is compared with the existing algorithm such as Intelligent Spectrum Resource Allocation with alternating direction optimization based joint optimization algorithm in Heterogeneous Cognitive Radio (Hyb-ADO-JOA) [24] and Hybrid PSO-GSA for energy efficient spectrum sensing in cognitive radio network (Hyb-PSO-GSA)[29].Then the performance of the proposed CSS-CRN-Hyb-MFO-GDO method is compared with the existing method such as optimal cognitive radio spectrum access with joint spectrum sensing and power allocation (CSS-CRN-JOA) [21], Intelligent Spectrum Resource Allocation with alternating direction optimization based joint optimization algorithm in Heterogeneous Cognitive Radio (CSS-CRN-Hyb-ADO-JOA) [24]. The simulation parameters of the proposed algorithm are shown in Table 1.

Table I. Simulation parameter

Parameter	Value
Simulation area	1000m
No of user	20,40,60,80,100
Size of packet	1024 bytes
Population size	50
Total number of time periods in a data collection round.	3000s
Range of transmission	100m
Number of node	100

Simulation: performance comparison of various methods

Figure 1-4 shows the simulation performance of the proposed CSS-CRN-Hyb-MFO-GDO method is compared with the existing method such as CSS-CRN-JOA [21] and CSS-CRN-Hyb-ADO-JOA [24] by varying the number of nodes with a fixed data rate of 50 Mbps in the network. The various evaluation metrics such as delay, delivery ratio, drop, Overhead, network lifetime, and throughput are analyzed in this segment.

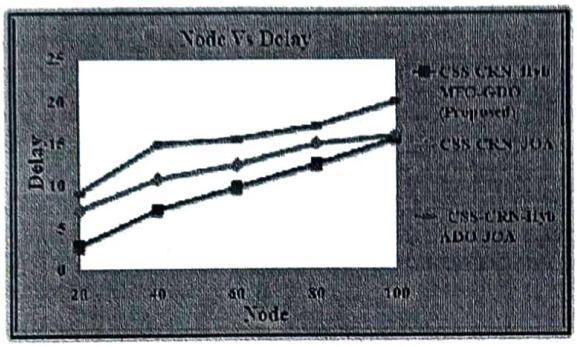

Figure 2: Performance analysis of Delay with various methods

Figure 2 shows the performance analysis of delay with various methods. At node 20, the proposed CSS-CRN-Hyb-MFO-GDO method provides 64.01%, 70.31% lower delay compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively. At node 40, the proposed CSS-CRN-Hyb-MFO-GDO method provides 34.52%, 52.12% lower delay compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively. At node 60, the proposed CSS-CRN-Hyb-MFO-GDO method provides 22.51%, 37.52% lower delay compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively. At node 80, the proposed CSS-CRN-Hyb-MFO-GDO method provides 17.60%, 27.23% lower delay compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively. At node 100, the proposed CSS-CRN-Hyb-MFO-GDO method provides 3.01%, 22.35% lower delay compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively.

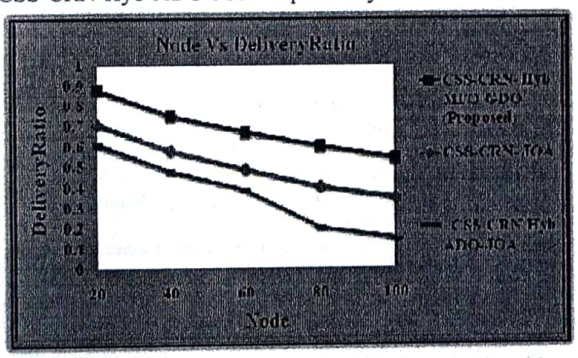

Figure 3: Performance analysis of Delivery ratio with various methods

Figure 3 shows the performance analysis of delivery ratio with various methods. At node 20, the proposed CSS-CRN-Hyb-MFO-GDO method provides 23.83%, 44.15% higher delivery ratio compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively. At node 40, the proposed CSS-CRN-Hyb-MFO-GDO method provides 29.56%, 56.72% higher delivery ratio compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively. At node 60, the proposed CSS-CRN-Hyb-MFO-GDO method provides 36.70%, 72.10% higher delivery ratio compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively. At node 80, the proposed CSS-CRN-Hyb-MFO-GDO method provides 49.23%, 98.22% higher delivery ratio compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively. At node 100, the proposed CSS-CRN-Hyb-MFO-GDO method provides 54.73%, 65.88% higher delivery ratio compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively.

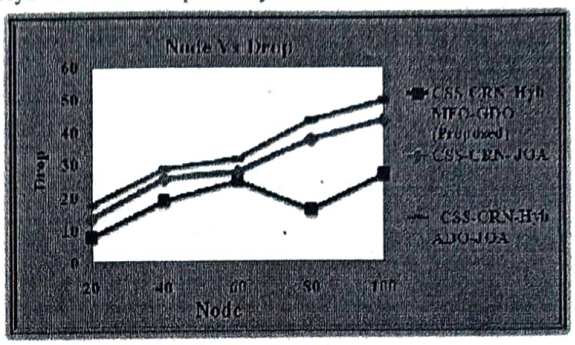

Figure 4: Performance analysis of Drop with various methods

Figure 4 shows the performance analysis of drop with various methods. At node 20, the proposed CSS-CRN-Hyb-MFO-GDO method provides 42.85%, 55.55% lower drop compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively. At node 40, the proposed CSS-CRN-Hyb-MFO-GDO method provides 26.92%, 34.48% lower drop compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively. At node 60, the proposed CSS-CRN-Hyb-MFO-GDO method provides 10.71%, 21.87% lower drop compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively. At node 80, the proposed CSS-CRN-Hyb-MFO-GDO method provides 57.89%, 63.63% lower drop compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively. At node 100, the proposed CSS-CRN-Hyb-MFO-GDO method provides 38.63%, 46% lower drop compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively.

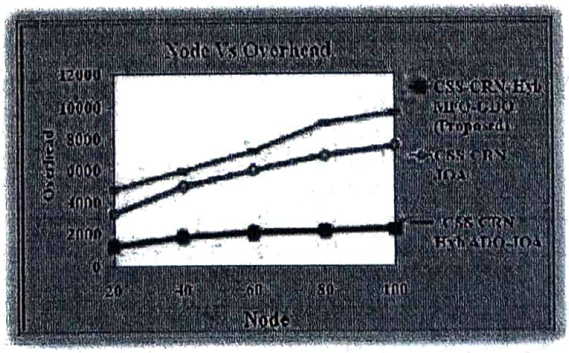

Figure 5: Performance analysis of Overhead with various methods

Figure 5 shows the performance analysis of Overhead with various methods. At node 20, the proposed CSS-CRN-Hyb-MFO-GDO method provides 63.30%, 74.27% lower overhead compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively. At node 40, the proposed CSS-CRN-Hyb-MFO-GDO method provides 64.35%, 70.22% lower overhead compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively. At node 60, the proposed CSS-CRN-Hyb-MFO-GDO method provides 66.17%, 71.73% lower overhead compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively. At node 80, the proposed CSS-CRN-Hyb-MFO-GDO method provides 68.58%, 75.62% lower overhead compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively. At node 100, the proposed CSS-CRN-Hyb-MFO-GDO method provides 69.63%, 76.23% lower overhead compared with existing method like CSS-CRN-JOA and CSS-CRN-Hyb-ADO-JOA respectively.

V. CONCLUSION

In this manuscript, Quick CSS-CRN based on a May Fly optimization (MFO) and Gradient Descent Optimization (GDO) algorithm is successfully implemented. In this the hidden problem in the CSS-CRN are successfully optimized utilizing the May Fly optimization (MFO) and Gradient Descent Optimization (GDO) algorithm Finally these weight vectors are used in the data fusion centre to assign spectrum in SU as well as maximize the spectral utilization. Then the performance of the proposed Hyb-MFO-GDO algorithm provide 19.55%, 32.82% lower delay, 14.48%, 28.128% higher delivery ratio, 39.49%, 64.616% lower drop, 36.75%, 29.62% lower overhead, compared with existing algorithm such as Intelligent Spectrum Resource Allocation with alternating direction optimization based joint optimization algorithm in Heterogeneous Cognitive Radio (Hyb-ADO-JOA) and Hybrid PSO-GSA for energy efficient spectrum sensing in cognitive radio network (Hyb-PSO-GSA) respectively.

REFERENCES

[1] Raza, S., Faheem, M. and Guenes, M., 2019. Industrial wireless sensor and actuator networks in industry 4.0: Exploring requirements, protocols, and challenges—A MAC survey. *International Journal of Communication Systems*, *32*(15), p.e4074.

[2] Hossain, M.A., Noor, R.M., Yau, K.L.A., Ahmedy, I. and Anjum, S.S., 2019. A survey on simultaneous wireless information and power transfer with cooperative relay and future challenges. *IEEE access*, *7*, pp.19166-19198.

[3] Gupta, M.S. and Kumar, K., 2019. Progression on spectrum sensing for cognitive radio networks: A survey, classification, challenges and future research issues. *Journal of Network and Computer Applications*, *143*, pp.47-76.

[4] Nareshkumar, S. and Bikshalu, K., 2019. Adaptive absolute SCORE algorithm for spectrum sensing in cognitive radio. *Microprocessors and Microsystems*, *69*, pp.43-53.

[5] Li, S., Rodríguez, R.M. and Wei, C., 2021. Managing manipulative and non-cooperative behaviors in large scale group decision making based on a We Chat-like interaction network. *Information Fusion*, *75*, pp.1-15.

[6] Chao, X., Kou, G., Peng, Y. and Viedma, E.H., 2021. Large-scale group decision-making with non-cooperative behaviors and heterogeneous preferences: an application in financial inclusion. *European Journal of Operational Research*, *288*(1), pp.271-293.

[7] Mukherjee, A., Choudhury, S., Goswami, P., Bayessa, G.A. and Tyagi, S.K.S., 2019. A novel approach of power allocation for secondary users in cognitive radio networks. *Computers & Electrical Engineering*, *75*, pp.301-308.

[8] Hou, J., Gai, W.M., Cheng, W.Y. and Deng, Y.F., 2020. Statistical analysis of evacuation warning diffusion in major chemical accidents based on real evacuation cases. *Process Safety and Environmental Protection*, *138*, pp.90-98.

[9] Rapetswa, K. and Cheng, L., 2020. Convergence of mobile broadband and broadcast services: A cognitive radio sensing and sharing perspective. *Intelligent and Converged Networks*, *1*(1), pp.99-114.

[10] Nallagonda, S., Kumar, G.K. and Nallagonda, A.K., 2019. Comprehensive performance analysis of data-fusion aided cooperative cognitive radio network over $\eta-\mu$ fading channel. *IET Communications*, *13*(16), pp.2558-2566.

[11] Abrardo, A., Barni, M., Kallas, K. and Tondi, B., 2021.Basic Notions of Distributed Detection, Information Fusion and Game Theory. In *Information Fusion in Distributed Sensor Networks with Byzantines* (pp. 9-27).Springer, Singapore.

[12] Kurzo, Y., Kristensen, A.T., Burg, A. and Balatsoukas-Stimming, A., 2020. Hardware implementation of neural self-interference cancellation. *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, *10*(2), pp.204-216.

[13] Srivastava, A., Gupta, M.S. and Kaur, G., 2020. Energy efficient transmission trends towards future green cognitive radio networks (5G): Progress, taxonomy and open challenges. *Journal of Network and Computer Applications*, p.102760.

[14] Ansere, J.A., Han, G., Wang, H., Choi, C. and Wu, C., 2019. A reliable energy efficient dynamic spectrum sensing for cognitive radio IoT networks. *IEEE Internet of Things Journal*, *6*(4), pp.6748-6759.

[15] Ostovar, A., Keshavarz, H. and Quan, Z., 2021. Cognitive radio networks for green wireless communications: an overview. *Telecommunication Systems*, *76*(1), pp.129-138.

[16] Haldorai, A., Ramu, A. and Murugan, S., 2019. Cognitive Radio Communication and Applications for Urban Spaces. In *Computing and Communication Systems in Urban Development* (pp. 161-183). Springer, Cham.

[17] Saeed, N., Nam, H., Al-Naffouri, T.Y. and Alouini, M.S., 2019. A state-of-the-art survey on multidimensional scaling-based localization techniques. *IEEE Communications Surveys & Tutorials*, *21*(4), pp.3565-3583.

[18] Simpson, O. and Sun, Y., 2020, June. Robust Statistics Evidence Based Secure Cooperative Spectrum Sensing for Cognitive Radio Networks. In *2020 International Wireless Communications and Mobile Computing (IWCMC)* (pp. 1733-1739).IEEE.

[19] Abdul-Aziz, M., Senthilraja, S., Zayed, M.E., Elsheikh, A.H., Mustafa, R.R. and Lu, S., 2021. A new random vector functional link integrated with mayfly optimization algorithm for performance prediction of solar photovoltaic thermal collector combined with electrolytic hydrogen production system. *Applied Thermal Engineering*, *193*, p.117055.

[20] Zhang, N., Lei, D. and Zhao, J.F., 2019, January. An improved Adagrad gradient descent optimization algorithm.In *2018 Chinese Automation Congress (CAC)* (pp. 2359-2362).IEEE.

[21] Karimi, M., Sadough, S.M.S. and Torabi, M., 2019. Optimal cognitive radio spectrum access with joint spectrum sensing and power allocation. *IEEE Wireless Communications Letters*, *9*(1), pp.8-11.

[22] Liu, X., Zheng, K., Chi, K. and Zhu, Y.H., 2020. Cooperative spectrum sensing optimization in energy-harvesting cognitive radio networks.*IEEE Transactions on Wireless Communications*, *19*(11), pp.7663-7676.

[23] Gharib, A., Ejaz, W. and Ibnkahla, M., 2019. Enhanced Multiband Multiuser Cooperative Spectrum Sensing for Distributed CRNs. *IEEE Transactions on Cognitive Communications and Networking*, *6*(1), pp.256-270.

[24] Liu, X. and Jia, M., 2020. Intelligent spectrum resource allocation based on joint optimization in heterogeneous cognitive radio. *IEEE Transactions on Emerging Topics in Computational Intelligence*, *4*(1), pp.5-12.

[25] Sarikhani, R. and Keynia, F., 2020. Cooperative spectrum sensing meets machine learning: Deep reinforcement learning approach. *IEEE Communications Letters*, *24*(7), pp.1459-1462.

[26] Varun, M. and Annadurai, C., 2021. PALM-CSS: A high accuracy and intelligent machine learning based cooperative spectrum sensing methodology in cognitive health care networks. *Journal of Ambient Intelligence and Humanized Computing*, *12*(5), pp.4631-4642.

Alternative Design Modifications for Enhancement of PV Panel Efficiency

[1*]M. Raja Nayak
Assistant Professor, EEE Department
KKR & KSR Institute of Technology and Science (Autonomous)
Vinjanampadu-522017, Guntur (DST), A.P, India.
**mrajanayak4260@gmail.com*

[2]T.Nagaraju
EEE, Department
KKR & KSR Institute of Technology and Science (Autonomous)
Vinjanampadu-522017, Guntur (DST), A.P, India.
nagarajutalatoti232@gmail.com

[3]S.Uma Maheswara Reddy
Assistant Professor, Mecanical Dpt.
Lakireddy Bali Reddy College of Engineering (Autonomous)
Mylavaram-521230,NTR (DST), A.P India; Jawaharlal Nehru Technological University Kakinada, Kakinada (DST), A.P, India
sumr341@gmail.com

[4]A.Srinivasarao
Assistant Professor, EEE Department.
Guntur Engineering College
Yanamadala-522019, A.P, India;
srinu.veeru@gmail.com

[5]M.Saritha
Assistant Professor, EEE Department
Matrusri Engineering College
Saidabad-500059, Hyderabad, Telangana, India.
saritha@matrusri.edu.in

[6]P.Deepak Reddy
Associate Professor, EEE Department
Lakireddy Bali Reddy College of Engineering (Autonomous)
Mylavaram-521230,NTR (DST), A.P India; Jawaharlal Nehru Technological University Kakinada, Kakinada (DST), A.P, India
pdeepakr@gmail.com

***Abstract*—The alternative design modifications of photovoltaic (PV) panels with the concept of light reflector arrangements are becoming more popular in recent years due to the limitations of the usual solar power generation. The concept of this light reflection technique mitigates the incessant power generation limitation of the usual solar power generation. The light-reflecting materials are arranged so that continuous illumination reflections are to be generated and imposed on the solar panel offering enhanced power generation from the solar panel. This emphasizes that the design configuration of solar panels using the light reflection scheme supports the enhanced PV cell efficiency compared to other maximum power point tracking techniques (MPPT). However, the design configurations of the solar panels using various light-reflecting materials are offering incessant power generation: limited enhanced PV panel efficiency is obvious due to its light reflection coefficient magnitude. Hence, comprehensive research work is necessary to nullify the limited panel efficiency compared to the other MPPT techniques. The concept of instantaneous light reflection scheme consists of profuse effect on any cell-contained object due to its instantaneous source actions. Hence, the authors made an attempt to verify the PV cell efficiency using instantaneous light source arrangements at various light reflection materials. Therefore, this paper shows the various experimental works carried out on PV panel design configurations using the instantaneous light reflection technique. Also, other alternative PV panel design configurations are suggested for further improvements.**

Keywords*— *Photovoltaic panel, light reflector, light source, Instantaneous light.

I. INTRODUCTION

The application of electrical power energy becomes increased abundantly in recent years due to digitalization, industrialization etc. modifications. To full fill these enhanced power application requirements, alternative power sources i.e., eco-friendly power sources are needed [1] [2]. There are various eco-friendly power sources such as solar, tidal, biomass etc. are available to full fill these enhanced power demand requirements. Among the all these eco-friendly renewable sources, solar energy source is the vivid power source significantly supports the maximum power generation compared to other power sources. However, the power generation is limited due to its intermittent presence in the atmosphere. Hence, the design engineers are developed maximum power extraction techniques elsewhere in the world. Although, all these MPPT techniques [3-6] are developed, it is also limited to full fill the continuous power generation requirement. In recent times, the concept of light reflection technique [7] was developed on PV panels which is observed from figure 1 to nullify this intermittent power generation problem and supports to meet the power demand requirement significantly. Even though, it meets continuous power generation requirement, this novel technique is also limited to meet the maximum power demand requirement. Hence, the comprehensive research work is necessary to alleviate this maximum power requirement.

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Figure 1. Schematic View of Solar panel with Light Reflector Arrangement panel with Light Reflector Arrangement

Figure 1 demonstrates the solar PV panel design arrangement with sun light reflectors and offers the enhanced panel efficiency: limited to achieve this enhanced PV panel efficiency continuously especially night hours [9] [10]. Hence, the alternative design modification of light illumination energy was replaced with sun light energy is shown in figure 2 and tested for continuous power generation.

Figure 2. PV panel design with the light source

It is clear from figure 2 that, PV panels are arranged with light source and light reflectors. This experimental configuration may extend with various light reflector arrangements carried out by the various researchers elsewhere in the world. The application of light source is also limited to these indoor type of design configurations due to concentrated heat generation on the PV panel and may lead to damage of the panels. Not only the damage of the PV panels, it also important to switch the minimum power consuming light source application. Hence, minimum power consuming light sources such as LED type light sources are recommendable. Also, it is clear from figure 2 that, the design configuration of PV panels with continuous light source reflector arrangements may not support the maximum power generation from the PV cells and alternate design modifications are essential. In this context, authors are attempted to modify the above figure 2 design configuration with instantaneous light source arrangement with various light reflecting material considerations. All the experimental works [11-16] are carried in indoor box contained set up and tested with two light reflecting material arrangements. From the experimental findings, other alternative design modifications are also suggested.

II. METHODOLOGY

To achieve the incessant power generation from the PV cells, continuous and multiple light reflections are essential. These continuous and multiple light reflections are obtained using the concept of light reflection scheme which is already elucidated by our ancient engineers. The light reflection concept consists two categories i.e., regular type light reflections and irregular type light reflections given in figure 3. Regular type light reflections are obtained for flat and plane reflector bodies and vice versa for irregular light reflections [16-19]. Among these two types of light reflections, multiple number of light reflections are offered from irregular type of body arrangements compared to the regular body arrangements. Hence, the irregular type of light reflection arrangements is recommended for this proposed PV panel design configuration. Also, the selection of suitable light reflecting material is essential to achieve the maximum number of multiple reflections. There are multiple number of reflecting materials consists its own light reflecting coefficients are given in table 1.

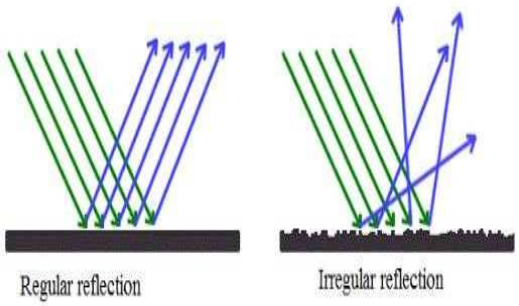

Figure 3. Light reflection classification

The magnitude of solar power of given solar panel depends on the type of reflector material selected for operation and the reflection coefficient of various reflecting materials is projected in table 1.

TABLE 1: VARIOUS SURFACES REFLECTION COEFFICIENTS

Material	Reflection Coefficient
Polished (highly) silver	0.92
Glass mirrors	0.70 to 0.85
White paper	0.82
green paper	0.18
Black paper	0.05
Dark Blue suit	0.03
Dark blue(overcoat)	0.02
grey suit (light)	0.11
Grey suit	0.07
Concrete	0.08 to 0.15

Therefore, among all these reflecting materials, aluminum foil and mirror material are selected to achieve the maximum number of light reflections.

III. EXPERIMENTAL STUDIES

To study the proposed light reflection-based PV cell power generation, various experimental case studies are carried out with two i.e., aluminum reflecting material and mirror as reflecting material.

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A. Case Study 1: Solar Panel Measurement Under Outdoor Conditions

The investigate the accuracy and efficiency comparison of the proposed light reflection technique methodology, PV panel power measurements are observed under usual dry weather conditions. To conduct experimental studies following PV panel specifications are considered throughout the experiments and also observed from figure 4:

Maximum Power output : 10W
Open Circuit Voltage : 21V
Short Circuit Current : 0.57 Amp

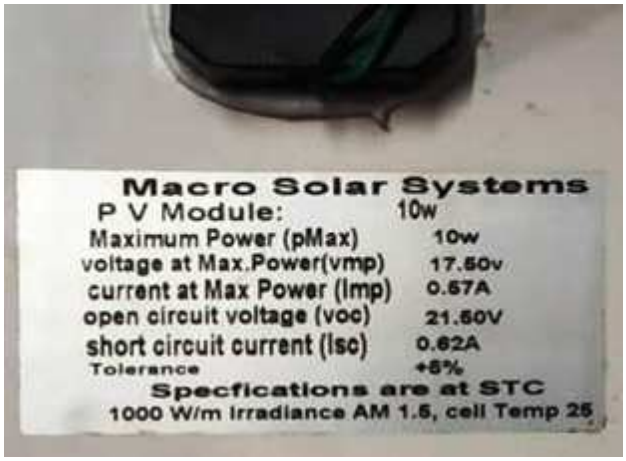

Figure 4: Solar panel Specifications

Figure 5: Solar panel Measurement at outdoor conditions

The measurements are noted at afternoon 12.00 PM to 1.00 PM dry weather conditions on plane ground surface observed from figure 5 are 20.0 volts and 0.111 Amp respectively. Generally, the sun luminous intensity at dry climatic atmospheric conditions was recorded at 1 lakh luminous lux. This sun luminous intensity was vast compared to the market available light bulb luminous intensity.

B. CASE STUDY 2: Without Light Reflector Arrangement With Light Source Consideration

The PV panel parameters are measured at without light reflector arrangement and with light source consideration to observe the effective performance of the proposed light reflection technique. Hence, the experimental set up uses the 12W LED light source capacity with 1300 lux illumination intensity and observed from figure 6. The PV panel parameters such as panel potential and current are measure under this configuration are 17.5 V and 0.005 amp respectively.

Figure 6. Solar panel with light source and without reflector arrangement and its measurements

It is clear from figure 6, the PV panel power was very poor compared to the outdoor panel measurements and insists to extend the further design modifications.

C. CASE 3: Light Source with Aluminum material Reflecting Material Arrangement on walls

The above case study 2 experimental work was carried out with consideration of aluminum foil sheet as light reflecting material and observed from figure 7. The PV panel readings are measured under this experimental configuration are 18 V and 0.011 Amp respectively. The panel measurements are confirming that the presence of light reflecting material sows profound influence on panel power generation as compared to the above case study 2. Also, the PV panel measurements demonstrates that, the proposed light reflection technique with light reflector arrangements facing the serious drawback of maximum power generation from the panel. Hence, further design modifications are needed to obtain the maximum power generation.

Figure 6. Solar panel with light reflector arrangement and its measurements.

D. CASE 4: Instantaneous Light Source with Aluminum as Reflecting Material

To obtain the maximum power generation from the PV panel, authors are modified above case 3 study with novel instantaneous light source effect on the PV panel. The instantaneous effect of light source offers significant affect of the object compared to the continuous light source arrangement. Hence, this methodology was adopted and tested to here to verify the maximum power generation from the PV panel. The experimental measurements under this instantaneous light source are 18.8 V and 0.016 Amp respectively. The same experimental reading is carried out for improved luminous intensity are demonstrated in table 2.

TABLE 2. SOLAR PANEL MEASUREMENTS FOR VARIOUS EXPERIMENTAL ARRANGEMENTS UNDER INSTANTANEOUS LIGHT SOURCE CONSIDERATION WITH ALUMINIUM LIGHT REFLECTOR MATERIAL ARRANGEMENT

Item /Discerption	Panel Open Circuit Voltage (volts)	Panel current Magnitude (amp)	Panel Output Power (watts)
1 Instantaneous LED bulb source Consideration	18.8	0.016	0.30
2 Instantaneous LED bulb source Consideration	19.08	0.031	0.59
3 instantaneous LED bulb source combination consideration	19.44	0.050	0.972

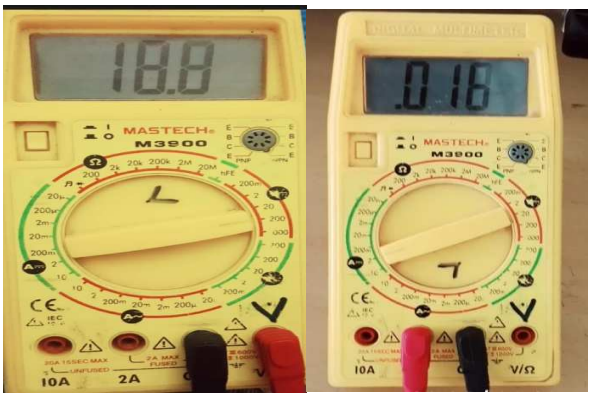

Figure 7. Solar panel with light reflector arrangement and its measurements.

Therefore, the experimental results are verified at maximum of 4200 lux luminous intensity only and which was negligible magnitude compared to sun available luminous intensity.

TABLE 2. SOLAR PANEL MEASUREMENTS FOR VARIOUS EXPERIMENTAL ARRANGEMENTS UNDER INSTANTANEOUS LIGHT SOURCE CONSIDERATION WITH ALUMINIUM LIGHT REFLECTOR MATERIAL ARRANGEMENT

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3 instantaneous LED bulb source combination consideration	19.44	0.050	0.972

E. CASE 5: Instantaneous Light Source with Aluminum and Mirror Light Reflectors Arrangement

To achieve the maximum power extraction from the PV panels, authors are extended the above case studies with the application of two light reflecting materials. Therefore, the above case study was repeated with the addition of mirrors and the experimental configuration and experimental findings are observed from figure 8. The experimental measurements of panel potential and current are recorded at 21 V and 0.47 Amp respectively: which is a terrible results compared to the all above case study results. In addition to this, the PV panel output power was met nearly with the

outdoor experimental measurements. Therefore, for easy performance analysis of the proposed instantaneous light reflection technique, the comparison of PV panel power generation using the above case studies are listed in table 3. Table 3 authorizes that, the PV panel design modifications with the instantaneous light source consideration with multiple light reflecting material applications achieves the incessant and maximum power generation.

TABLE 3. COMPARISON OF SOLAR PANEL OUTPUT POWER VARIATION FOR INDOOR INSTANTANEOUS LIGHT SOURCE EFFECT AND OUTDOOR EFFECTS.

Case Study	Actual Solar Panel Output Power in Watts	Proposed Case Study Solar Panel Output Power in Watts
Without Any Light Reflector Arrangement & With Continuous Light Source	10	0.0875
With Aluminum Light Reflector Arrangement & With Instantaneous Light Source	10	0.972
With combination of Aluminum, Mirror Light Reflector Arrangement & With Instantaneous Light Source	10	9.87

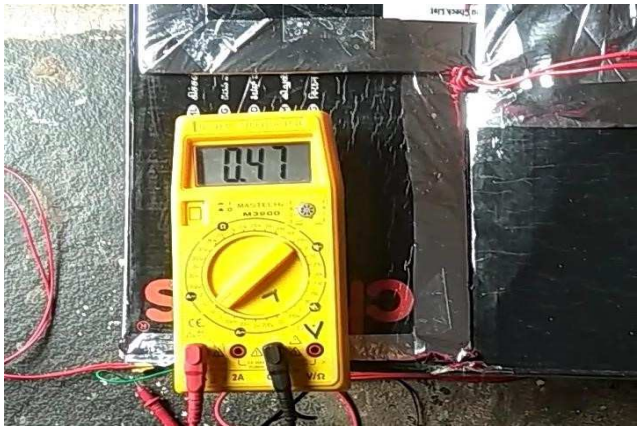
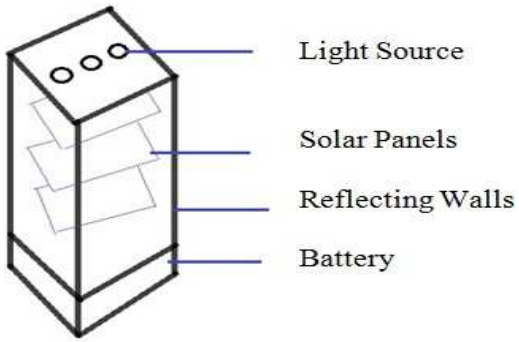


Figure 8. Solar panel with aluminium & mirror light reflector arrangement and its measurements.

Furthermore, from the observation of outstanding results obtained using instantaneous light reflection technique with multiple reflecting materials, authors are also concentrated on the further novel design modifications of application of multiple PV panel arrangements with optimal space constraints. The three-dimensional sketch of proposed novel design modification is presented in figure 9. The authors are now extended their work on this novel design modification and expecting the remarkable results.

Figure 19. 3-dimensional sketch of PV panels



IV. CONCLUSION

The electrical power generation using pollution free solar PV panels is acting as significant support to existing power sources to meet the enhanced power demand requirements. The erratic problem on solar power generation is its irregular existence in nature. Hence, alternative design configurations using PV panels are essential. In view of this, the alternative novel design configurations using instantaneous light reflection concept was proposed by authors and carried out the various experimental studies. From the various experimental studies discussed in above sections, it is clear evident that, the application of instantaneous light reflection technique with the consideration of multiple number of effective reflecting materials offering incessant and maximum pollution free power generation. In addition to this, authors are also proposed the extended novel design configuration using PV panels for enormous power generation with optimal space constraints.

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REFERENCES

[1] S. Bouguerra, M. R. Yaiche, O. Gassab, A. Sangwongwanich and F. Blaabjerg, "The Impact of PV Panel Positioning and Degradation on the PV Inverter Lifetime and Reliability," in IEEE Journal of Emerging and Selected Topics in Power Electronics, vol. 9, no. 3, pp. 3114-3126, June 2021, doi: 10.1109/JESTPE.2020.3006267.

[2] J. Macaulay, C. W. Lin and Z. Zhou, "An emulated PV source based on an Indoor Solar Panel with external excitement current and voltage compensation," 2018 International Symposium on Power Electronics, Electrical Drives, Automation and Motion (SPEEDAM), 2018, pp. 859-864, doi: 10.1109/SPEEDAM.2018.8445307.

[3] C. Moo and G. Wu, "Maximum Power Point Tracking With Ripple Current Orientation for Photovoltaic Applications," in IEEE Journal of Emerging and Selected Topics in Power Electronics, vol. 2, no. 4, pp. 842-848, Dec. 2014.

[4] M. Dhimish, "Assessing MPPT Techniques on Hot-Spotted and Partially Shaded Photovoltaic Modules: Comprehensive Review Based on Experimental Data," in IEEE Transactions on Electron Devices, vol. 66, no. 3, pp. 1132-1144, March 2019.

[5] T. S. Kumar, M. R. Nayak, R. V. Krishna and K. P. Rao, "Enhanced Performance of Solar PV Array-Based Machine Drives Using Zeta Converter," 2020 IEEE International Conference on Advances and Developments in Electrical and Electronics Engineering (ICADEE), Coimbatore, India, 2020, pp. 1-5, doi: 10.1109/ICADEE51157.2020.9368937.

[6] M. A. Elgendy, B. Zahawi and D. J. Atkinson, "Evaluation of perturb and observe MPPT algorithm implementation techniques," 6th IET International Conference on Power Electronics, Machines and Drives (PEMD 2012), 2012, pp. 1-6, doi: 10.1049/cp.2012.0156.

[7] K. Amara et al., "Improved Performance of a PV Solar Panel with Adaptive Neuro Fuzzy Inference System ANFIS based MPPT," 2018 7th International Conference on Renewable Energy Research and Applications (ICRERA), 2018, pp. 1098-1101, doi: 10.1109/ICRERA.2018.8566818.

[8] Y. Xue, S. Sun, J. Fei and H. Wu, "A new piecewise adaptive step MPPT algorithm for PV systems," 2017 12th IEEE Conference on Industrial Electronics and Applications (ICIEA), 2017, pp. 1652-1656, doi: 10.1109/ICIEA.2017.8283104.

[9] D. Rana, G. Kumar and A. R. Gupta, "Increasing the Output Power and Efficiency of Solar Panel by Using Concentrator Photovoltaic (CPV) and Low Cost Solar Tracker," 2018 4th International Conference on Computational Intelligence & Communication Technology (CICT), 2018, pp. 1-5, doi: 10.1109/CIACT.2018.8480199.

[10] M. Raja. Nayak and S. A. Mujeer, "New Computational Method for Study of Ionic Current Environment of HVDC Transmission Lines," 2020 IEEE International Conference on Advances and Developments in Electrical and Electronics Engineering (ICADEE), Coimbatore, India, 2020, pp. 1-5, DOI: 10.1109/ICADEE51157.2020.9368934.

[11] A. Banerjee, K. Hoffman, X. Xu, J. Yang and S. Guha, "Back reflector texture and stability issues in high efficiency multijunction amorphous silicon alloy solar cells," Proceedings of 1994 IEEE 1st World Conference on Photovoltaic Energy Conversion - WCPEC (A Joint Conference of PVSC, PVSEC and PSEC), 1994, pp. 539-542 vol.1, doi: 10.1109/WCPEC.1994.520017.

[12] T. S. Kumar, M. R. Nayak, R. V. Krishna and K. P. Rao, "Enhanced Performance of Solar PV Array-Based Machine Drives Using Zeta Converter," 2020 IEEE International Conference on Advances and Developments in Electrical and Electronics Engineering (ICADEE), Coimbatore, India, 2020, pp. 1-5, doi: 10.1109/ICADEE51157.2020.9368937.

[13] F. Cappelluti, A. Musu and A. Khalili, "Study of light-trapping enhanced quantum dot solar cells based on electrical and optical numerical simulations," 2016 Compound Semiconductor Week (CSW) [Includes 28th International Conference on Indium Phosphide & Related Materials (IPRM) & 43rd International Symposium on Compound Semiconductors (ISCS), 2016, pp. 1-2, doi: 10.1109/ICIPRM.2016.7528629.

[14] M. Raja. Nayak, G.Radhika, B.Devulal, P.Deepak Reddy, G.Suresh, "Optimization Of High Voltage Electrodes For 765 Kv Bus Post Insulators", Journal of Sustainable Energy Technologies and Assessments (ELSEVIER)- 47, Page 101529, August, 2021. ISSN: 2213-1388, https://doi.org/10.1016/j.seta.2021.101529.

[15] K. Forghani, R. Reddy, D. Rowell and R. Tatavarti, "MOVPE growth of AlInP-InGaP Distributed Bragg Reflectors (DBR) for Monolithic Integration into Multijunction Solar Cells," 2019 IEEE 46th Photovoltaic Specialists Conference (PVSC), 2019, pp. 0227-0229, doi: 10.1109/PVSC40753.2019.8980776.

[16] S. U. M. Reddy, N. Venkatesh, N. S. Nagendra, P. R. Prasad and M. R. Nayak, "Study On New Design Techniques for Enhancement of Solar Panel Efficiency," 2021 International Conference on Computing Sciences (ICCS), 2021, pp. 70-75, doi: 10.1109/ICCS54944.2021.00022.C.

[17] M. Raja. Nayak, M.Saritha, S. Abdul. Mujeer, B.Devulal, T.Santhosh Kumar, "A Photovoltaic Based Multilevel Inverter Fed Induction Motor Drive", Turkish Journal of Computer and Mathematics Education, Vol.12 No.10(2021), PP. 6196-6212. April-2021. DOI: https://doi.org/10.17762/turcomat.v12i3.1647

[18] M. Raja Nayak, T. Praveen, P. SaiTeja, K. Kshore, J. Sushma, "Electricity Generation using MAGNETOR" Journal of Advanced Research and Dynamic Control, vol 11, NO.5, pp: 173-176, November 2019.

[19] S. A. El Naggar, M. Y. Ghannam, N. H. Rafat and F. M. Tayel, "A detailed analysis of photogenerated current enhancement in thin silicon solar cells with a diffuse back reflector," ICM'99. Proceedings. Eleventh International Conference on Microelectronics (IEEE Cat. No.99EX388), 1999, pp. 197-200, doi: 10.1109/ICM.2000.884839.intermediate reflector,"IEEE journal of photovoltaic, vol.5, no.1, pp.33- 39, 2015.

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UWB Antenna for Cognitive Radio

Naresh Muddamalla [1], Abhishek Reddy A [2]
[1,2]Assistant Professor, Department of ECE, [1,2] Matrusri Engineering College,
Hyderabad, Telangana state , India
[1]nareshmuddamalla@matrusri.edu.in, [2]abhishek.a.reddy@matrusri.edu.in

***Abstract*:** A new frequency reconfigurable Ultra WideBand [UWB] microstrip antenna is designed for cognitive radio applications. The proposed system has sensing and communication antennas in the same system. Frequency configurability can be obtained by configuring switches that are connected between feeding lines and extended transmission lines. Configuring-I acts as sensing antenna that operates in the range of 2.96 GHz to 14.95 GHz. And Configurations II to V operates in narrow band within the ultra-wide band range.

Keywords: Micro-strip antenna, frequency configurability, ultra wideband, Cognitive radio, transmission line

I. Introduction

In today's world, wireless devices are increasing day by day, which results in the huge requirement of spectrum. But the available spectrum for communication is very less. Some of the application areas are cellular communication and wireless local area networks [3]. The spectrum congestion is very high and in some applications like military, TV etc. the spectrum is rarely used. To avoid the problems of lack of spectrum and inefficient use of spectrum, cognitive radio concept is introduced. Cognitive radio is a radio that detects the unused bands of the licensed user in the radio environment and assigns it to unlicensed users [4]. This avoids inefficient use of spectrum and improves spectrum efficiency.

Usage of UWB antennas increase day by day. UWB antennas have advantages such as less power consumption, less cost and provides high data rates which is the major requirement in today's world [1-2] .

Reconfigurable antennas are antennas that can modify its parameters such as frequency, radiation patterns based on the requirements [7]. The advantage of reconfigurable antenna is that it accommodates the features of a number of antennas within the same antenna. Microstrip antenna has many advantages such as low sizes, less power consumption and easiness to fabricate. Antenna parameters can be reconfigured by changing the electrical length or surface current distribution "v" of the antenna [5-6] which can be changed by inserting switches into the antenna. Some of the switches are RF MEMS, PEC switches, photoconductive switches, PIN diodes, varactors etc. The proposed design sense the band in the ultra-wideband range and communicates in narrow bands within the ultra-wideband range.

The order of this paper is as follows: Proposed model has been explained in section II, Results & discussions have been illustrated in section III, and finally section IV describes the Conclusion.

II. Proposed Model

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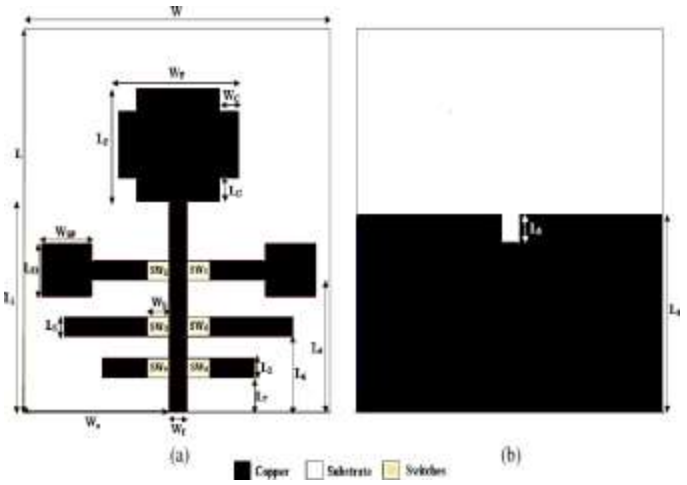

Fig.1 The proposed cognitive radio antenna, (a) Front side (b) Backside

The ground plane of the proposed antenna is partly elliptical, whereas the communication antenna has a rectangular patch with slots cut along four edges. Both structures are printed on a FR4 epoxy substrate with a specification of dielectric constant 'o' which is 4.4 and the height is 1.6 mm. The antenna is designed using the above parameters and the design rules provided by Balanis [8].

The back side of the antenna is the detecting antenna, and it has a partial ground plane, and so it allows working in the range of ultra-wide band. It has a slot in the middle that

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allows for impedance matching. Figure 2 depicts the sensing antenna.

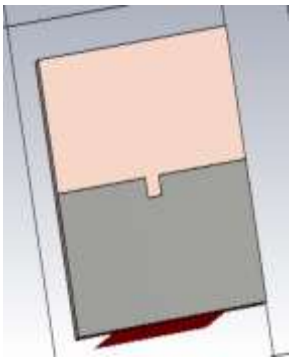


Fig 2. Back view of designed antenna

The communicating antenna consists of rectangular patch with slots cut at the four edges to allow the antenna to operate in ultra-wideband rages. The antenna is fed by 50ohm microstrip line. Six extended transmission lines are printed on the FR4 substrate that are connected or disconnected to the feeding line through PEC switches for obtaining frequency re-configurability [9]. Figure 3 shows the communicating antenna.

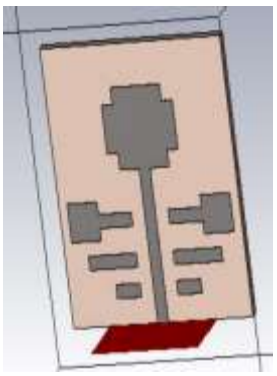


Fig 3. Front view of designed Antenna

The design equations are as follows.
The patch width, W is given by,

$$w = \frac{\lambda_0}{2\sqrt{0.5(\varepsilon_r + 1)}} \qquad \text{eq.1}$$

where,
The effective permittivity in the substrate is,

$$\varepsilon_{eff} = \frac{\varepsilon_r + 1}{2} + \frac{\varepsilon_r - 1}{2}\left(\frac{1}{\sqrt{1 + 12h/w}}\right) \qquad \text{eq.2}$$

where,

L is length of the microstrip patch antenna element with substrate thickness less than 0.0815 λ_d in this kind of media.

$$L = \frac{C_0}{2f_r\sqrt{\varepsilon_{eff}}} \qquad \text{eq.3}$$

where, f_r is
with $c_0 = 2.998 \times 108$ meter/second being the velocity of the electromagnetic wave in free space. This fringe factor is:

$$\Delta L = 0.412h\frac{\left(\varepsilon_{eff} + 0.300\right)\left(\frac{w}{h} + 0.264\right)}{\left(\varepsilon_{eff} - 0.258\right)\left(\frac{w}{h} + 0.813\right)} \qquad \text{eq.4}$$

Because of the fringing field at the edges of the patch, a fringe factor, ΔL, must be subtracted from length L to obtain the effective length.

Parameters for the design

The table 2.1 details about the specifications of all the parameters required for the antenna design.

Table 2.1 Parameters for the design

Parameter	Specification
Substrate size	40mmx40mmx1.6mm
Relative permittivity	4.4
Rectangular patch center frequency	5.8GHz
Microstrip feed line	50 Ω
Thickness of the substrate	1.6mm
Copper thickness	18um
Defective ground plane dimensions	40mmx20.75mm
Slot dimensions	2.36mmx2.9mm

III. Results and discussions

The proposed method of cognitive radio antenna is simulated by CST (Computer Simulation Technology) software and VNA (Vector Network Analyzer). The resultant S11 parameter and VSWR versus UWB sensing antenna frequencies are shown in Figures 4 & 5, with operating bands covering UWB 2.95 GHz and VSWR is less than 2.

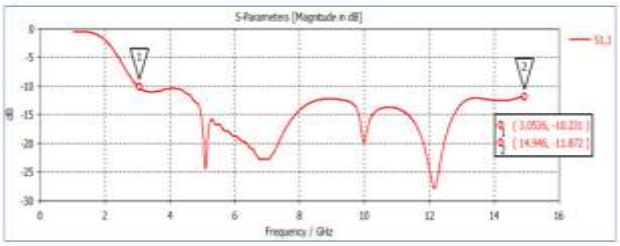


Fig 4. The simulated results (S11) parameter versus UWB sensing antenna

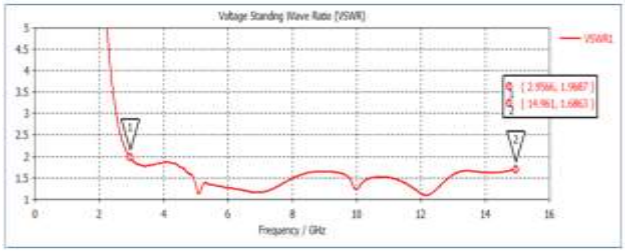


Fig 5 VSWR versus frequency of the UWB sensing antenna

The table 3.1 shows parameters like frequency, bandwidth, and return loss of the five configurations and table 3.2 represents comparative calculation.

Table 3. 1. Simulated results

Configuration	Simulation Result		
	Frequency (GHz)	Bandwidth	Return Loss (dB)
I	2.95 to 14.95	12 GHz	< -10
II	7.75 to 9.28	1.53 GHz	-31.76
III	9.46 to 13.48	4.02 GHz	-35.49
IV	6.43 to 6.86	0.43 GHz	-31.24
V	7.48 to 11.27	3.97 GHz	-35.0

Table 3.2. Comparison of the proposed system with existing systems

References	Size(mm^3)	UWB (GHz)	Narrow band (GHz)
[7]	58X65.5X1.6	3.3-11	3.4-4.85, 5.3-9.15
[9]	20X25.32X1.6	1.9-29.5	9.2-10.4
[10]	30X30X1.6	3.2-12	3.3-4.1
[11]	60X120X1.5	0.75-7.65	1.77-2.51
[12]	37X63.6X0.254	2-12	5.7-5.9
Proposed	40x40x1.6	2.95-14.95	6.43-6.86, 7.48-1.27, 7.75-9.28, 9.46-13.48

Whenever the switching status of antenna changes from all OFF condition to at least one ON condition, the antenna become narrow band with frequency reconfigurable nature. The figure 6 to 9 represents switching configurability and covers the frequency band between 2.95GHz to 14.95 GHz.

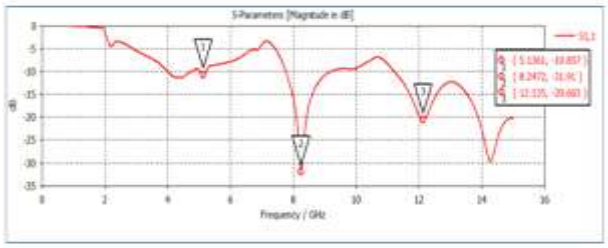


Fig 6. The simulated (S11) parameter versus frequency for Configuration II

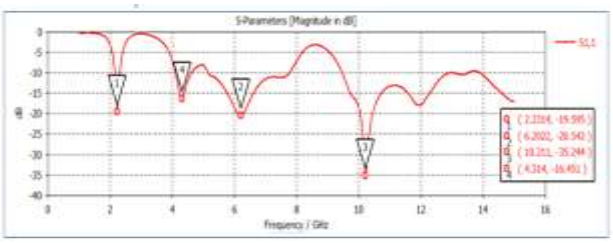


Fig 7. S11 versus frequency for Configuration III

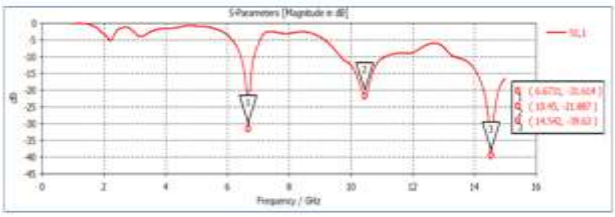


Fig 8 S11 Magnitude vs frequency for configuration IV

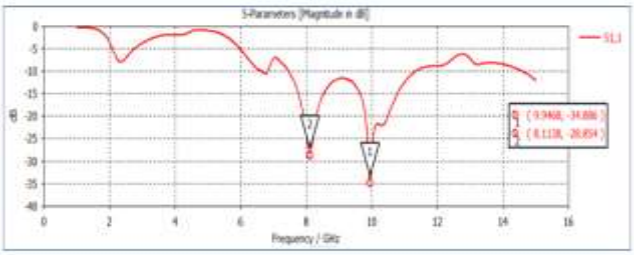
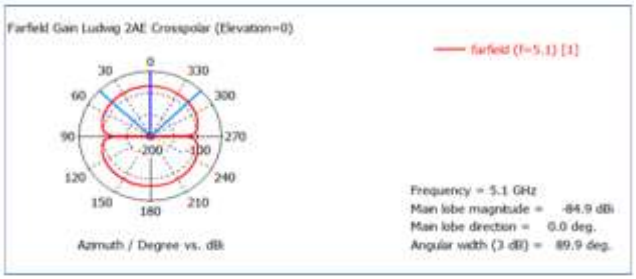


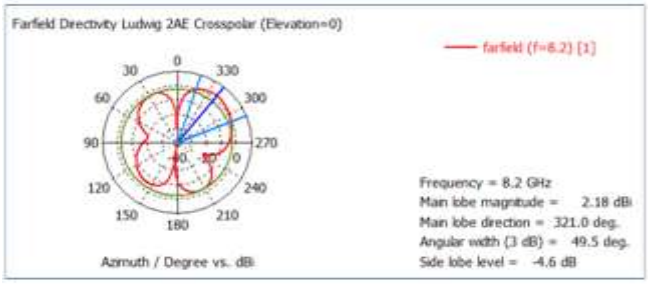
Fig 9 S11 Magnitude vs frequency for configuration V

2D Radiation Patterns:

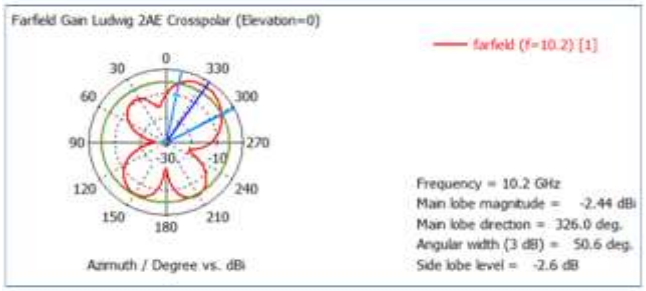
Figures 10(a) to 10(e) represent 2-dimensional radiation patterns of the proposed antenna with the frequencies at 5.1GHz, 8.24GHz ,10.23GHz, 6.66GHz and 9.94GHz respectively.



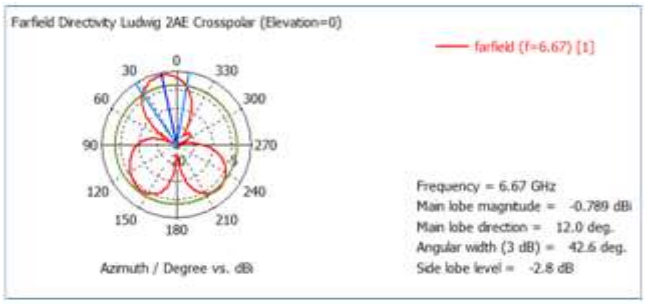
(a) Proposed antenna 2D radiation pattern -Configuration I



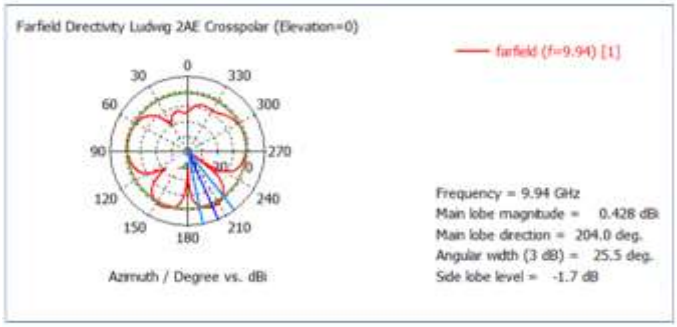
(b) Proposed antenna 2D radiation pattern -Configuration II



(c) Proposed antenna 2D radiation pattern -Configuration III



(d) Proposed antenna 2D radiation pattern -Configuration IV

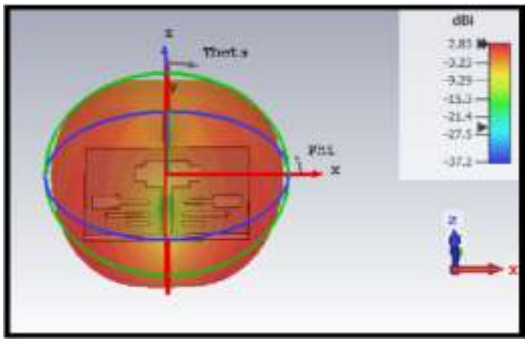


(e) Proposed antenna 2D radiation pattern -Configuration V

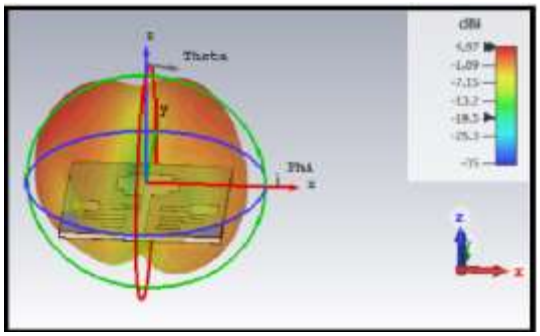
Fig.10. 2D radiation patterns

3D Radiation patterns:

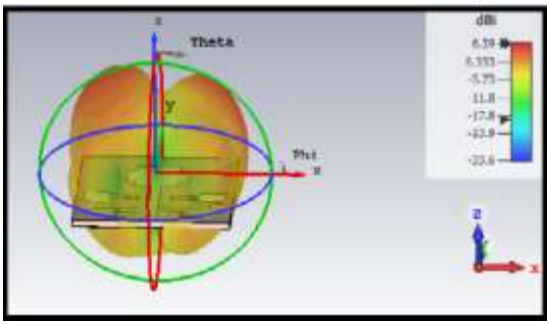
Figures 11(a) to 11(e) show the three-dimensional radiation pattern of configurations I to V.



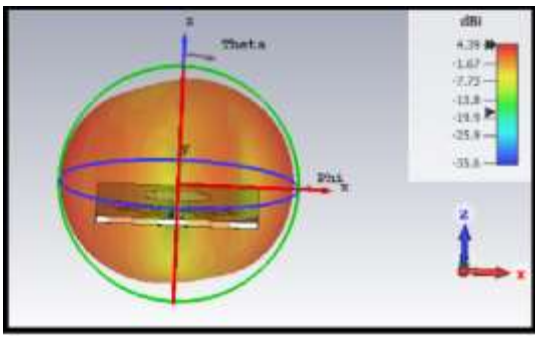
(a) 3D Radiation Pattern -Configuration-I



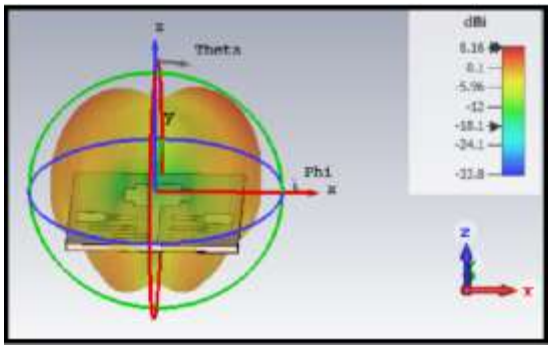
(b) 3D Radiation Pattern -Configuration-II



(c) 3D Radiation Pattern -Configuration-III



(d) 3D Radiation Pattern -Configuration-IV



(e) 3D Radiation Pattern -Configuration-V

Fig 11. 3D Radiation Patterns for I to V configurations

IV. Conclusion

The proposed antenna with single PIN diode is used to generate three resonant frequencies and it is simple, smaller in size, and polar structured antenna with the characteristics like return loss (-10dB), coupling loss less than -10dB and VSWR less than or equal to 2. And the configuration-I switched off condition allows to operate at USB range and it is used for spectrum detection in cognitive radio. While configurations-2 to 5 allow to communicate inside the UWB spectrum. As a result, the proposed UWB antenna is an excellent, self-contained antenna for cognitive radio applications

Future scope:

To maintain better VSWR characteristics, by adding some electromechanical switches.

REFERENCES

[1]. Liang, X. L., "Chapter 7: Ultra wideband current status and future trends" Ultra Wideband Antenna and Design, 2012 pp:127–152.

[2]. Fontana, R., "Recent system applications of short-pulse ultra-wideband (UWB) technology," IEEE Trans. Microwave Theory Technology, Vol. 52, No. 9, 2004, pp: 2087–2104.

[3]. Li, T., H. Zhai, X. Wang, L. Li, and C. Liang, "Frequency-reconfigurable bow-tie antenna for Bluetooth, Wi-MAX, and WLAN applications," IEEE Antennas Wireless Propagation Letter Vol. 14, 2015, pp:171–174.

[4]. Tawk, Y., J. Costantine, S. Hemmady, G. Balakrishnan, K. Avery, and C. G. Christodoulou, "Demonstration of a cognitive radio front end using an optically pumped reconfigurable antenna system (OPRAS)," IEEE Trans. Antennas Propag., Vol. 60, No. 2, 2012, pp: 1075–1083.

[5]. Tummas, P., P. Krachodnok, and R. Wongsan, "A frequency reconfigurable antenna design for UWB applications," 2014 11th International Conference on Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology (ECTICON), 2014.

[6].Li, F. and T. Wang, "Design of reconfigurable UWB microstrip antenna with MEMS switches," 2016 IEEE International Conference on Microwave and Millimeter Wave Technology (ICMMT), 2016, pp: 740–742.

[7]. Tawk, Y. and C. Christodoulou, "A new reconfigurable antenna design for cognitive radio," IEEE Antennas Wireless Propag. Lett., Vol. 8,, 2009, pp: 1378–1381.

[8]. Balanis, C. A., "Antenna Theory: Analysis and Design", John Wiley Sons, Hoboken, NJ, 2012.

[9].Pahadsingh, S., S. Sahu, and S. Das, "compact ultrawideband-reconfigurable antenna for cognitive radio platforms," 2017 International conference on Wireless communications, signal processing and networking (WiSPNET), 2017, pp: 2735-2738.

[10]. Ibrahim, A. A., A. Batmanov, and E. P. Burte, "Design of reconfigurable antenna using RF MEMS switch for cognitive radio applications," 2017 Progress In Electromagnetics Research Symposium — Spring (PIERS), 369–376, St Petersburg, Russia, May 2017, pp:22–25.

[11]. Hussain, R., M. S. Sharawi, and A. Shamim, "An integrated four-element slot-based MIMO and a UWB sensing antenna system for CR platforms," IEEE Trans. Antennas Propag., Vol. 66, No. 2, 2018, pp: 978–983.

[12]. Sahnoun, N., I. Messaoudene, T. A. Denidni, and A. Benghalia, "Integrated flexible UWB/Nb antenna conformed on a cylindrical surface," Progress In Electromagnetics Research Letters, Vol. 55, 2015,pp:121–128.

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UWB Antenna for Cognitive Radio

Naresh Muddamalla [1], Abhishek Reddy A [2]
[1,2]Assistant Professor, Department of ECE, [1,2] Matrusri Engineering College,
Hyderabad, Telangana state , India
[1]nareshmuddamalla@matrusri.edu.in, [2]abhishek.a.reddy@matrusri.edu.in

***Abstract*:** A new frequency reconfigurable Ultra WideBand [UWB] microstrip antenna is designed for cognitive radio applications. The proposed system has sensing and communication antennas in the same system. Frequency configurability can be obtained by configuring switches that are connected between feeding lines and extended transmission lines. Configuring-I acts as sensing antenna that operates in the range of 2.96 GHz to 14.95 GHz. And Configurations II to V operates in narrow band within the ultra-wide band range.

Keywords: Micro-strip antenna, frequency configurability, ultra wideband, Cognitive radio, transmission line

I. Introduction

In today's world, wireless devices are increasing day by day, which results in the huge requirement of spectrum. But the available spectrum for communication is very less. Some of the application areas are cellular communication and wireless local area networks [3]. The spectrum congestion is very high and in some applications like military, TV etc. the spectrum is rarely used. To avoid the problems of lack of spectrum and inefficient use of spectrum, cognitive radio concept is introduced. Cognitive radio is a radio that detects the unused bands of the licensed user in the radio environment and assigns it to unlicensed users [4]. This avoids inefficient use of spectrum and improves spectrum efficiency.

Usage of UWB antennas increase day by day. UWB antennas have advantages such as less power consumption, less cost and provides high data rates which is the major requirement in today's world [1-2] .

Reconfigurable antennas are antennas that can modify its parameters such as frequency, radiation patterns based on the requirements [7]. The advantage of reconfigurable antenna is that it accommodates the features of a number of antennas within the same antenna. Microstrip antenna has many advantages such as low sizes, less power consumption and easiness to fabricate. Antenna parameters can be reconfigured by changing the electrical length or surface current distribution "v" of the antenna [5-6] which can be changed by inserting switches into the antenna. Some of the switches are RF MEMS, PEC switches, photoconductive switches, PIN diodes, varactors etc. The proposed design sense the band in the ultra-wideband range and communicates in narrow bands within the ultra-wideband range.

The order of this paper is as follows: Proposed model has been explained in section II, Results & discussions have been illustrated in section III, and finally section IV describes the Conclusion.

II. Proposed Model

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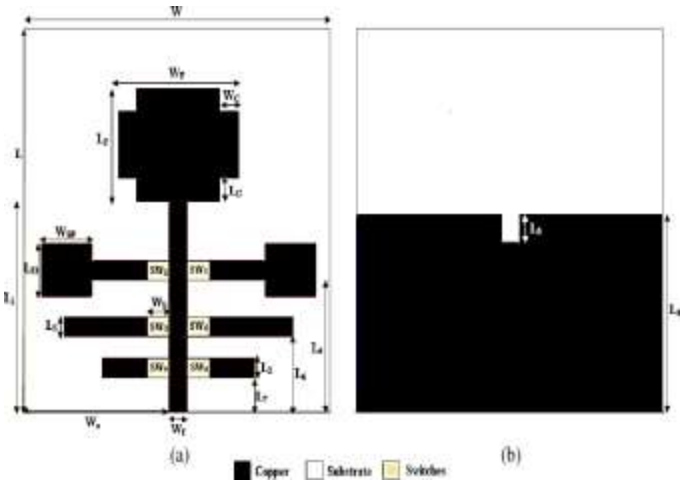

Fig.1 The proposed cognitive radio antenna, (a) Front side (b) Backside

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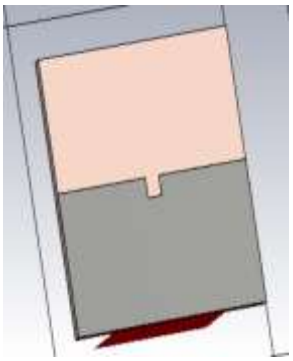

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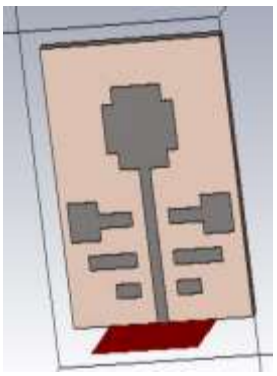

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where,

L is length of the microstrip patch antenna element with substrate thickness less than 0.0815 λ_d in this kind of media.

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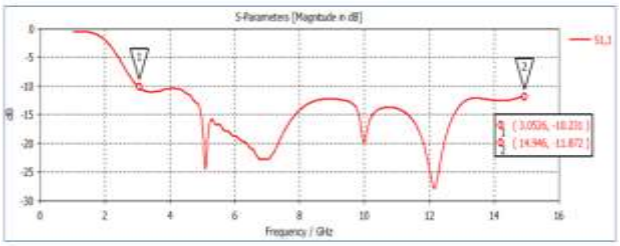

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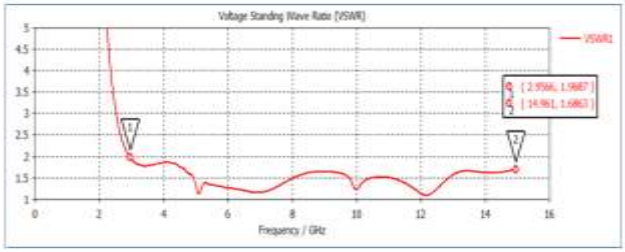

Fig 5 VSWR versus frequency of the UWB sensing antenna

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[11]	60X120X1.5	0.75-7.65	1.77-2.51
[12]	37X63.6X0.254	2-12	5.7-5.9
Proposed	40x40x1.6	2.95-14.95	6.43-6.86, 7.48-1.27, 7.75-9.28, 9.46-13.48

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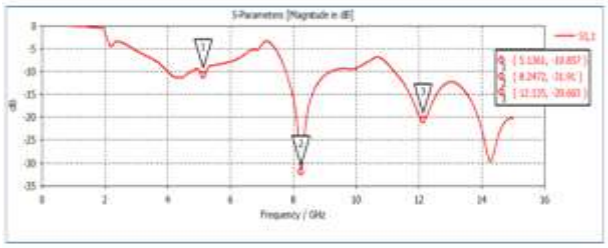


Fig 6. The simulated (S11) parameter versus frequency for Configuration II

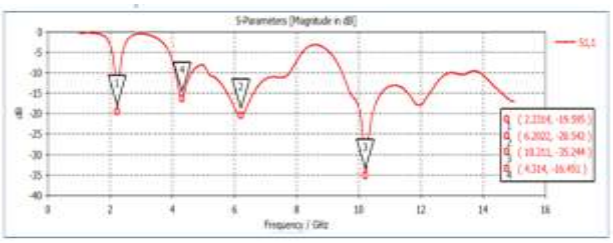


Fig 7. S11 versus frequency for Configuration III

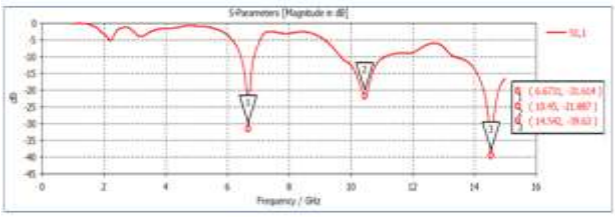


Fig 8 S11 Magnitude vs frequency for configuration IV

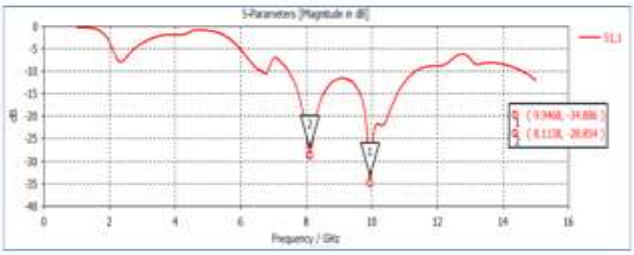
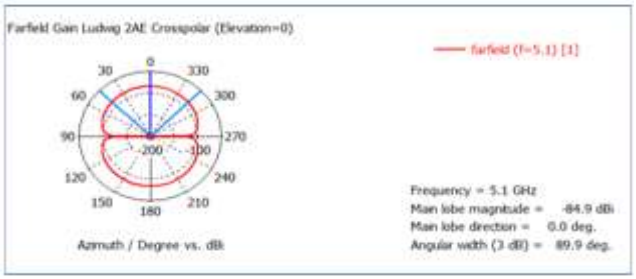


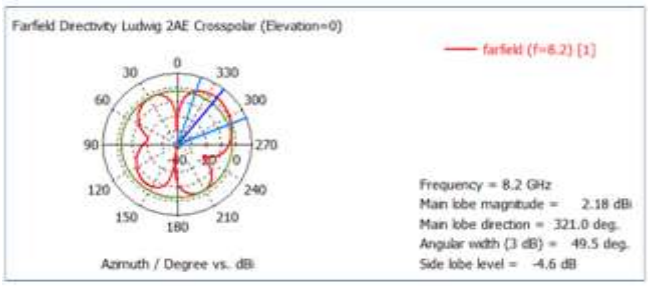
Fig 9 S11 Magnitude vs frequency for configuration V

2D Radiation Patterns:

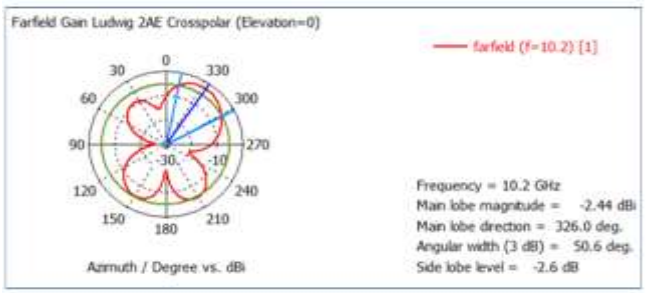
Figures 10(a) to 10(e) represent 2-dimensional radiation patterns of the proposed antenna with the frequencies at 5.1GHz, 8.24GHz ,10.23GHz, 6.66GHz and 9.94GHz respectively.



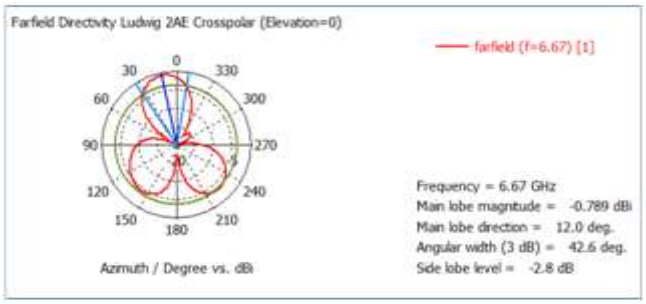
(a) Proposed antenna 2D radiation pattern -Configuration I



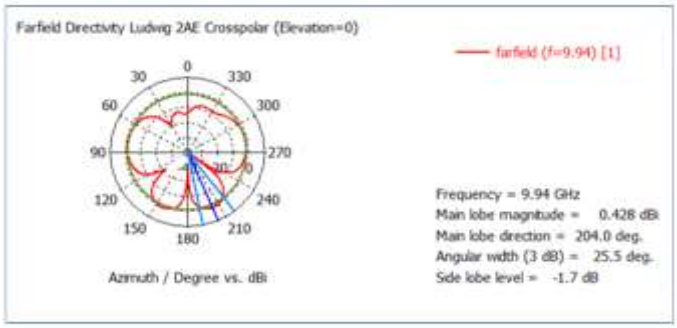
(b) Proposed antenna 2D radiation pattern -Configuration II



(c) Proposed antenna 2D radiation pattern -Configuration III



(d) Proposed antenna 2D radiation pattern -Configuration IV

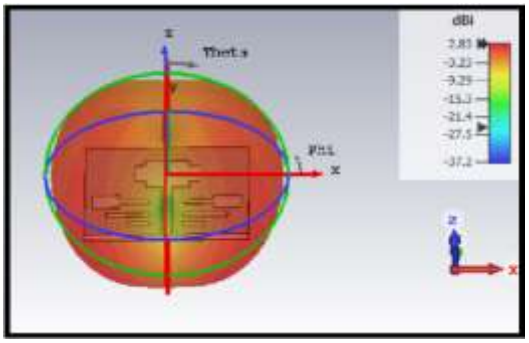


(e) Proposed antenna 2D radiation pattern -Configuration V

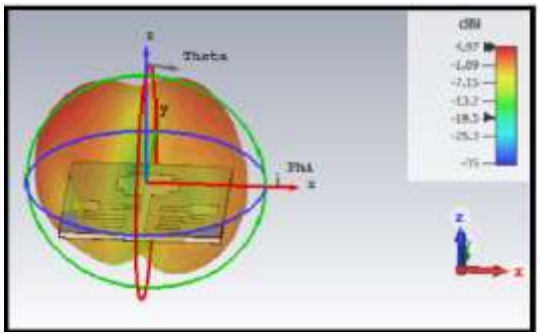
Fig.10. 2D radiation patterns

3D Radiation patterns:

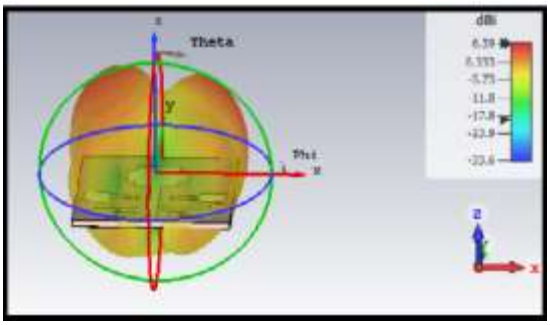
Figures 11(a) to 11(e) show the three-dimensional radiation pattern of configurations I to V.



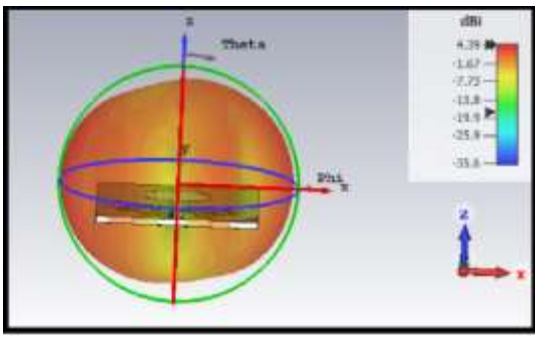
(a) 3D Radiation Pattern -Configuration-I



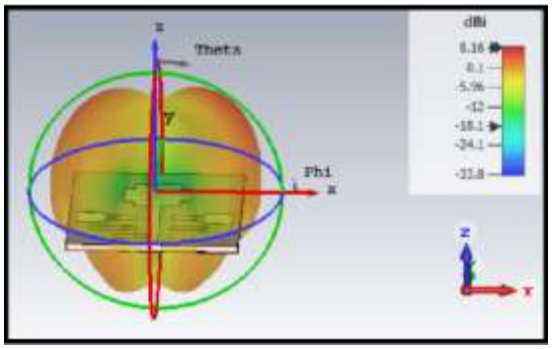
(b) 3D Radiation Pattern -Configuration-II



(c) 3D Radiation Pattern -Configuration-III



(d) 3D Radiation Pattern -Configuration-IV



(e) 3D Radiation Pattern -Configuration-V

Fig 11. 3D Radiation Patterns for I to V configurations

IV. Conclusion

The proposed antenna with single PIN diode is used to generate three resonant frequencies and it is simple, smaller in size, and polar structured antenna with the characteristics like return loss (-10dB), coupling loss less than -10dB and VSWR less than or equal to 2. And the configuration-I switched off condition allows to operate at USB range and it is used for spectrum detection in cognitive radio. While configurations-2 to 5 allow to communicate inside the UWB spectrum. As a result, the proposed UWB antenna is an excellent, self-contained antenna for cognitive radio applications

Future scope:

To maintain better VSWR characteristics, by adding some electromechanical switches.

REFERENCES

[1]. Liang, X. L., "Chapter 7: Ultra wideband current status and future trends" Ultra Wideband Antenna and Design, 2012 pp:127–152.

[2]. Fontana, R., "Recent system applications of short-pulse ultra-wideband (UWB) technology," IEEE Trans. Microwave Theory Technology, Vol. 52, No. 9, 2004, pp: 2087–2104.

[3]. Li, T., H. Zhai, X. Wang, L. Li, and C. Liang, "Frequency-reconfigurable bow-tie antenna for Bluetooth, Wi-MAX, and WLAN applications," IEEE Antennas Wireless Propagation Letter Vol. 14, 2015, pp:171–174.

[4]. Tawk, Y., J. Costantine, S. Hemmady, G. Balakrishnan, K. Avery, and C. G. Christodoulou, "Demonstration of a cognitive radio front end using an optically pumped reconfigurable antenna system (OPRAS)," IEEE Trans. Antennas Propag., Vol. 60, No. 2, 2012, pp: 1075–1083.

[5]. Tummas, P., P. Krachodnok, and R. Wongsan, "A frequency reconfigurable antenna design for UWB applications," 2014 11th International Conference on Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology (ECTICON), 2014.

[6].Li, F. and T. Wang, "Design of reconfigurable UWB microstrip antenna with MEMS switches," 2016 IEEE International Conference on Microwave and Millimeter Wave Technology (ICMMT), 2016, pp: 740–742.

[7]. Tawk, Y. and C. Christodoulou, "A new reconfigurable antenna design for cognitive radio," IEEE Antennas Wireless Propag. Lett., Vol. 8,, 2009, pp: 1378–1381.

[8]. Balanis, C. A., "Antenna Theory: Analysis and Design", John Wiley Sons, Hoboken, NJ, 2012.

[9].Pahadsingh, S., S. Sahu, and S. Das, "compact ultrawideband-reconfigurable antenna for cognitive radio platforms," 2017 International conference on Wireless communications, signal processing and networking (WiSPNET), 2017, pp: 2735-2738.

[10]. Ibrahim, A. A., A. Batmanov, and E. P. Burte, "Design of reconfigurable antenna using RF MEMS switch for cognitive radio applications," 2017 Progress In Electromagnetics Research Symposium — Spring (PIERS), 369–376, St Petersburg, Russia, May 2017, pp:22–25.

[11]. Hussain, R., M. S. Sharawi, and A. Shamim, "An integrated four-element slot-based MIMO and a UWB sensing antenna system for CR platforms," IEEE Trans. Antennas Propag., Vol. 66, No. 2, 2018, pp: 978–983.

[12]. Sahnoun, N., I. Messaoudene, T. A. Denidni, and A. Benghalia, "Integrated flexible UWB/Nb antenna conformed on a cylindrical surface," Progress In Electromagnetics Research Letters, Vol. 55, 2015,pp:121–128.

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Implementation of T-DET-FF using Predictive Power Control Circuit Model

Publisher: IEEE

<< Results

B.Mythily Devi ; Sharath Chandra Inguva ; R. Shashikala ; N. Laxmi All Authors

Abstract: Pulsed Latches circuits are one of the important aspects in the reduction of power, for each read and write operations in memories. As the design complexity increases wit... **View more**

Metadata

Abstract:
Pulsed Latches circuits are one of the important aspects in the reduction of power, for each read and write operations in memories. As the design complexity increases with improvement in technology, the design analysis on power and other performance factors in relation to the fundamental techniques encapsulated in Semiconductor gates. For improving the low power feature in memories, reduction of size of the transistor and its implementation with type of application is chosen. This paper has worked on the feature of power reduction by using a hybrid feature of T-DET-FF and its modelling with predictive power control (PPC) circuit and its design using transistor gates. The power and the transistor size in the proposed algorithm significantly improves the W/L ratio, that is used in different conditions for Pulsed latches for memory write and read operations. The simulated results with T-DET-FF are evaluated with Dynamic CMOS latch with PPC circuit using 32nm technology.

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Contents

Flip-flops are used for information storage in VLSI design. When it comes to flip flop performance and fault tolerance, the speed, power consumption, and dependability of the device are all critical factors to consider. Therefore, it is critical to design flip-flops with low power consumption, propagation delay, and area while providing the best of dependability and fault tolerance capabilities. As proposed in the latest research articles, device scaling reduces the supply voltage and device capacitances in digital VLSI designs, making the circuit more vulnerable to glitches. As soon as particles come into contact with the drain side of a MOSFET, electron hole combinations are formed. An induced drift transient current is produced by the opposite biased electric field [1–2]. A transient fault is defined as a voltage transient that occurs as a consequence of the accumulation of charge. Memory circuits may suffer from transient failures as a result of the combinational circuit glitches that have occurred before. Supply voltage scaling may be used to achieve low power usage in an efficient manner. Since a percentage of overall electricity usage, power consumption due to glitches cannot be ignored, as the percentage ranges from 9 percent to 38 percent [3]. At the moment, one of the most difficult challenges for researchers working on integrated designs is the construction of energy efficient circuits [4]. Latch designs that lower average power consumption as well as power delay product were provided in [5–6] by the authors (PDP). [7] It is possible that the clock distribution network consumes around 45 percent of the overall system power. Because a clock network uses more power than a single clock, it is necessary to reduce the overall number of clocks. With the basic registers, the true single phase clock (TSPC) technique has been recommended in order to reduce the number of clocks [8]. It is possible to reduce the frequency of the clock and hence reduce its power consumption by sampling the input data on both the rising and falling edges of the clock, without affecting the system throughput. The DET technique reduces the clock network system's half-power usage to the bare minimum. Despite the fact that DET circuits are more sophisticated than SET circuits, they have the potential to be more energy efficient [9].

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AIP Conference Proceedings

A secure incentive based waste monitoring system using IoT

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B. J. Praveena, K. Bhagyalaxmi and M. Priyanka

A Secure Incentive Based Waste Monitoring System Using IoT

B.J. Praveena[a)], K. Bhagyalaxmi[b)] and M. Priyanka[c)]

CSE Department, #16-1-486, Saidabad, Matrusri Engineering college, Hyderabad, Telangana, 500059, India

[a)] Corresponding author: bjpraveena@matrusri.edu.in,
[b)]bhagyalaxmi@matrusri.edu.in, and
[c)] priyankaraomadhiraju@matrusri.edu.in

Abstract. The increase of waste generation has been considered a significant challenge to large urban centers worldwide and represents critical issues for countries with accelerated population growth like India. Many initiations have been taken by the government to maintain cleanliness but problem remains the same. Taking the problem into consideration, we propose a Secure Incentive based Waste monitoring system to encourage garbage segregation at the initial level. This waste segregation at initial level will make the recycling process easy and addresses major environmental issues. In this system, a weight detector is placed that checks the weight of the separated garbage thrown and displays the weight. If the weight exceeds the lower-limit then a QR code is being displayed which can be scanned with the Incentive application which can be stored as the rewards to the public. The government should consider these rewards at any government e-payments. This system mainly focuses on encouraging the public to utilize the dustbins than littering on the roadways. Privacy and Security of the public rewards can be maintained using Blockchain Technology.

Keywords: IoT, Waste Segregation, Incentive, Privacy, Security, Blockchain.

INTRODUCTION

We are in 21st century today and can witness a great development in different sectors and living has become easier, happier and healthier. In spite of such improvements there are few weaknesses of every individual which is still pulling us back. One such weakness is littering the garbage on the roadways/sideways than dumping it in the garbage bins. Litter can cause lot of damage to the society like soil pollution, breeding grounds for virus and insects, physical harm to the trash pickers, high clean-up costs. The local governing bodies are taking enough measures to address this situation but the problem remains the same.

This paper mainly focuses on encouraging the individuals to stop littering the dump but use the garbage bins along with governments support. Technology has become a vital part of our lives and has changed a lot over past decade. With the help of Technology, we can make this a quite easy and cheering process and address the problem to the core.

Internet has transformed the entire global workforce. Internet of Things is one of the arising innovations which made connectivity, communication and exchange of data over the internet with ease. A quickly developing segment of IoT gadgets are made for shopper use, including associated vehicles, home computerization, wearable innovation, interface wellbeing and apparatuses with distant checking abilities. Internet of Things has not only made tough tasks simple but also made living very easy.

Our proposed framework can facilitate these significant issues and will have two significant functionalities. Firstly, we get a sophisticated garbage management system, secondly, we vitalize the public to use the dustbins and impart the accountability in them. We build an incentive Dustbin using IoT which accepts the garbage and based on the

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weight a QR scanner displays the code which can be used as the rewards. This application will improve the cleanliness and address many environmental issues related to garbage.

When the data is being absorbed by Sensor embedded devices one of the dangers still prevails which is privacy and security of data. In this paper we address the security issue using Blockchain Technology.

LITERATURE SURVEY

A lot of research has been done earlier on such waste management techniques which truly has a nice scope for removing the issues.

In Efficient Waste Collection System, have designed bins employing RFID, ultrasonic sensors, gas sensors with a central server connected through the Wi-Fi. The worker figures the most limited way for the trash assortment from the receptacles and heightens it to the further assortment measure. The significant weakness here is the Wi-fi limits the execution of such framework to a little region [1].

In “Smart Recycle Bin- An Efficient Garbage Monitoring System” has been introduced, The system's ultra-sonic sensors will detect the trash. This is often smart however, these sensors typically low accuracy. So fundamentally, a GSM modem is implemented to alarm the local bodies, whether the dust reached the edge value, where the ultrasonic sensors is situated at. The main disadvantage is due to the sensor usage, the latency is slow and very low accuracy and no system to inform if the bin if full [2].

In "Smartbin: Smart waste administration framework", has assembled a framework which the information of the completion of the litterbin is gathered by means of sensors and ship off the workers through remote cross section organization. This waste administration framework utilizes an obligation cycle procedure, to lessen power utilization and amplify the operational time. The litter receptacles can be upgraded in a wide range of ways, the litterbin is fundamentally a little module of the Smart Dustbin, it gathers and alarms the mindful specialists when its full [3].

In “Smart Recycle Bin “, have projected a framework that rewards the users by calculative points on the idea of weight and the type of waste embedded in them employing a waste sort detection system. The framework kills the issue of waste isolation on the grounds that the client's focuses are deducted if the sort of waste embedded doesn't coordinate with the sort of canister, however recognizing the kind of the waste and the remunerating framework isn't yet figured [4].

PROPOSED FRAMEWORK

The proposed system improves the current scenario and solves current problems.

The proposed system has mainly three units:

3.1 IoT embedded Dustbin.

3.2 Incentive application.

3.3 Security using Blockchain.

IoT Embedded Dustbin

The dustbin has two passages which allows the user to separate the waste in terms of dry and wet waste. The IoT embedded dustbin is built using four sensors. An RFID sensor RC522 is used to detect the RFID code of the user and opens the door of the Dustbin to collect the waste. An ultra-sensitive sensor HCSR04 is kept to check the margin of the trash dumped, notify the server about the fullness based on the threshold value. A moisture sensor is inserted to ensure the waste is segregated. A load cell PC22 is implemented to measure the quantity of the waste inserted and a LED screen is used to display the weight. Based on the weight a QR code is been generated using Arduino through TFT 128*160 screen. An Arduino Elegoo Uno R3 microcontroller is utilized to peruse the qualities from every one of the sensors and send the information to the backend server.

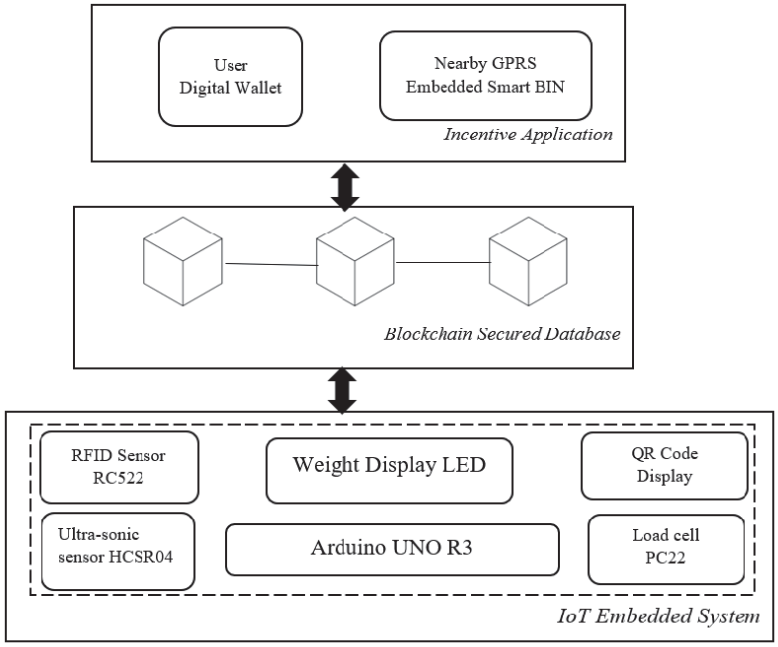

FIGURE 1. System Architecture

Incentive Application

The android application starts with the registration of the user where all the users have to create an account. The application is synchronized with the server with the latest database. It also has the digital wallet to save the rewards and a GPRS which helps to identify the nearby dustbins. The algorithm, based on the readings saved in the server, alerts the local bodies about the fullness of the bin so that they can empty the bin timely and maintain cleanliness. Based on the reading generated by the sensors the algorithm generates a unique QR code using TFT 128*160 screen and the Incentive application will scan it and save the points as the rewards in the user's accounts. The sensors help in validating the waste weather it is well segregated before inserting otherwise the QR code is not displayed. This will help the sorting the waste before inserting so that further processing of the waste will be easy. The points earned by the user based on ruling and regulations can be accepted at any retail store for acquisitions with the government's help.

Security Using Block chain

The server database stores all the private information about each user and primarily the rewards earned by each individual. When these points can be redeemed in retail stores the integrity of the rewards plays an important role. Security can be provide to such exclusive data by using Blockchain Technology. Whenever any user scans the QR code the points earned are appended to the chain based on the "Proof of Stake" method. This not only maintains the integrity of the data but also ensure the government e-payment acceptance have trust on the system.

RESULTS

A Secure Incentive Based Waste Monitoring System Using IoT has been executed with the full setup of the devices. The observations are recorded and observed that it overcomes all the problems observed in the existing system.

FIGURE 2. IoT Embedded Dustbin

FIGURE 3. Display of Weight QR code And Scan with the incentive Applications

In the Fig 2, shows the IoT Embedded Dustbin which accepts the garbage and depending on the segregation and the weight a QR code is displayed and the weight is also displayed on the LED. Every IoT Embedded Dustbin is given a unique ID for the identification, so that the higher authorities can easily figuerout the dustbin, the location it is placed and also empty it accordingly.The Dustbin ID will also help to validated the rewards earned by the public through the respective areas.

Public have to throw the trash inside the bin properly so that the loadcell can weigh the trash correctly and credit the reward points. In the Fig 3, the LED dispaying the weight detected by the loadcell and the TFT Screen displaying the QR code along with the time and date. The displayed QR code should be scanned by the incentive Techbin Application and the reward points will be credited in the respective accounts.

In the Fig 4, A code snippet of QR code has been given which helps to display a unique QR code whenever a new user uses the Dustbin to dump the trash. In the Fig 5, screenshots of the Incentive Techbin Application is given, where all the users need to download the app and get registered. Once registered an account is been created in their name and on the usage reward points keep adding to their account. This application will also help the user to find the nearby dustbin so that utilization will be easy.All the rewards are stored in the block and appended to the blockchain based on the consensus of all the stakeholders of the blockchain on the “Proof of Stake” algorithm to ensure the security.

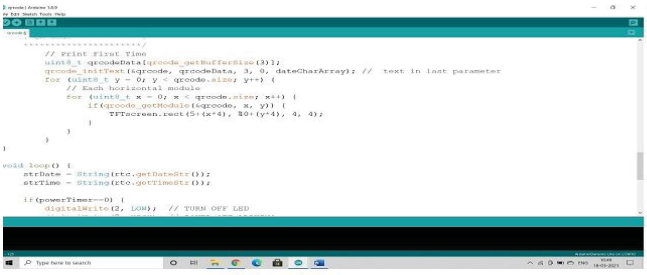

Fig 4: Code for QR Code scanner

FIGURE 4. Code for QR Scanner

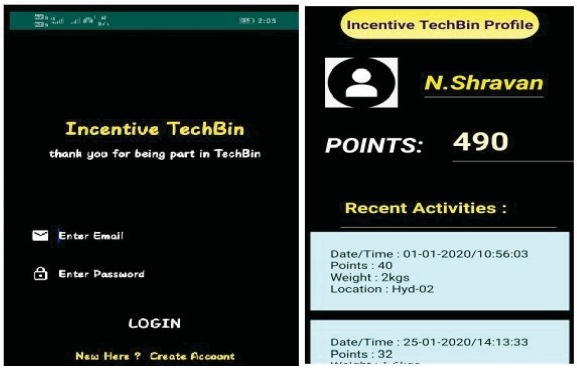

Fig 5: Incentive Techbin Application

FIGURE 5. Incentive Techbin Application

CONCLUSION

We have shown a promising solution to waste management with improved productivity in this paper, such that the massive amounts of investment engaged in garbage management are reduced, and the cycle has made easier for the individuals and the higher authorities. Furthermore, this system will motivate the common man to use the dustbins more rather than spilling it on the roadways and originate of many environmental problems and effecting the hygiene of the public. This problem could be solved by using IoT Embedded Dustbins like this. This method could be used in India, who are struggling with issues like waste management and high healthcare costs.

REFFERENCES

1. Saurabh Dugdhe, Pooja Shelar, Sajuli Jire and Anuja Apte et al."Efficient Waste Collection System", 2016 International Conference on Internet of Things and Applications (IOTA), 22- 24 Jan, 2016.
2. Mohd Helmy Abd Wahab, Aeslina Abdul Kadir, Mohd Razali Tomari, Mohamad Hairol Jabbar et al. "Smart Recycle Bin: A Conceptual Approach of Smart Waste Management with Integrated Web Based System", IT Convergence and Security (ICITCS), 2014 International Conference on 28-30 Oct. 2014.
3. Fachmin Folianto, Yong Sheng Low, Wai Leong Yeow "Smartbin: Smart Waste Management System", 2015 IEEE Tenth International Conference on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP),7-9 April 2015.
4. A. A. K. M. R. T. M. H. J. Mohd Helmy Abd Wahab, "Smart Recycle Bin: A Conceptual Approach of Smart Waste Management with Integrated Web Based System," in International Conference on IT Convergence and Security (ICITCS), Beijing, China, 2014.
5. Y. S. L. W. L. Y. Fachmin Folianto, "Smartbin: Smart waste management sytem," in IEEE Tenth International Conference on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP), Singapore, 2015.
6. S. S. M. P. B. Gopal Kirshna Shyam, "Smart waste management using Internet-of-Things (IoT)," in 2nd International Conference on Computing and Communications Technologies (ICCCT), Chennai, Inida, 2017.
7. K. K. P. Twinkle Sinha, "Smart Dustbin," International Journal of Management and Applied Science (IJMAS), vol. 3, no. 5, pp. 101- 104, 2015.
8. Annepu RK. 2012 Report on sustainable solid waste management in India. Waste-To-Energy Research and Technology Council (WTERT), 1-89.
9. Rana R, Ganguly R, Gupta AK 2015 An Assessment of Solid waste management in chandigarh city India. Electron. J. Geotech. Eng. 20, 1547-1572.
10. P.Suresh, J. Vijay Daniel , R.H. Aswathy, Dr.V.Parthasarathy "A state of the art reviews on The Internet of Things" IOT International Conference on Science, Engineering and Management Research (ICSEMR 2014).
11. Arkady Zaslavsky, Dimitrios Georgakopoulos "Internet of Things: Challenges and State-of-the-art Solutions in Internet-scale Sensor Information Management and Mobile Analytics" 16th IEEE International Conference on Mobile Data Management. 2015.

AIP Conference Proceedings

A combined authentication strategy for public cloud using attribute based encryption

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Priyanka Madhiraju, M. Praveen Kumar and B. J. Praveena

A Combined Authentication Strategy for Public Cloud Using Attribute Based Encryption

Priyanka Madhiraju [a)], M. Praveen Kumar [b)], B. J. Praveena [c)]

CSE Department,#16-1-486,*Saidabad*,*Matrusri Engineering* college ,*Hyderabad*, *Telangana 500059*

[a)] Corresponding author: priyankaraomadhiraju@matrusri.edu.in,
[b)]praveenkumar@matrusri.edu.in
[c)]bjpraveena@matrsuri.edu.in

Abstract. Whenever we are deploying data in public cloud, we are doing with semi-reliable cloud servers present outside the data owner's reliable domain. To avoid hazardous service providers trying to access delicate data from data owners we are encrypting that data. In this situation conducting the authentication approach over the data becomes a very tough task. So, by using Attribute -Based encryption we can provide access policies among the attributes which can proved flexibility, secured access controls over the deployed data. But we have a problem with ABE that it does not support the access control mechanisms by combination. Here in this proposed paper, we are applying a scheme where different users who are having different attribute sets can approach the data using collaboration provided if the data owner accepts the combination with that access policy. If the combination is not designed in access policy, then it is considered as conspiracy and request is denied. So, we introduce attribute-based combined authentication strategy through assigning translation nodes in the access format.

Keywords: Public storage, access control policy, Cipher Text Attribute -Based Encryption (CP-ABE), combination

INTRODUCTION

Cloud computing grant the users a means to access data or applications as utilities over the internet. Basically, cloud computing refers to changing or configuring or accessing the applications which are over internet. It also offers online data storage, infrastructure, and applications. The customers of cloud can access the resources in cloud as Pay-as-you-use. The customers can approach the data or applications any time or anywhere. Because of the above advantage the business and individuals are outsourcing their data and utilization into cloud.

Against the more advantages, we have a challenging issue regarding the security of user's data. Generally, the data owner stores their respective data in reliable servers that are monitored by an authorized person. Normally, in public cloud data is usually stored in some remote cloud which is managed by the third-party authorities. So, in public cloud security controlling access for data is very difficult.

In previous period, different researchers are working on the concept of data authentication authority or access authority of the data in public cloud. In those literature's CP-ABE is treated as one of the relevant algorithms because it ensures data owners can directly control their data and administer fine-grained Access authority.

"In previous period, different researches are working on data access authority publicly cloud storage, like "[6]–[10]. In that literature's, CP-ABE is considered one of the best convenient blueprint, thanks to truth that it assure data owners' forthright authority on their data and supply a fine-grained access authority benefit. In CP-ABE, individual user is related to a group of attributes and each cipher text contains access format over some selected attributes. The access format contains precise access authority that should be satisfied to access the data contents. It is considered that user's attribute set elate the access format

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inserted in cipher text and he/she can decode the cipher text. So, by using the access format on the attributes to specific access format.

But the existing CP-ABE algorithm can give the approval to people to access whoever is having their own attributes which satisfy access format. But in several situations the private info will not be gathered by an individual user itself. For example, in many organizations some crucial data or files or information will be shared among different people depending on their responsibilities depending upon their designation. An access to data request may be given only if when distinct users with distinct responsibilities combines. That kind of requirement regarding combination to access private data that has used widely in secret sharing schemes [14] [15], where the data is only penetrated by different participants combined. Sadly, existing secret sharing design are not able to specify access policies in a flexible manner.

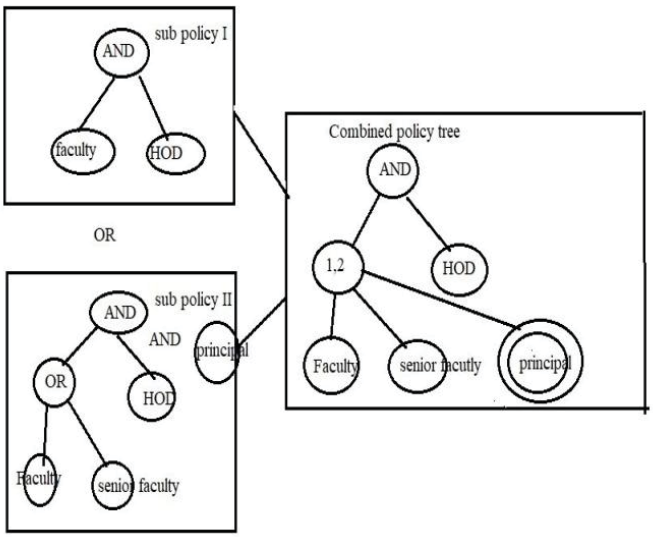

FIGURE 1. An Example for an access policy

In the above example we have three boxes where sub policy-I and sub-Policy-II used for accessing the data. Here we have "OR" in the middle of two boxes which specify that the users will be able contact the data if user entertain either sub policy-I or sub-Policy-II. Here Sub Policy-I denote the condition where the policy tree should be satisfied by autonomous user, and Sub Policy-II specifies a condition where a cipher text can be contacted by combination based on one action that if one of the user contains attribute set which satisfies the tree which is denoted as Sub Policy-II and other user having the attribute 'principal'. Here "AND" indicates that stated two users can be combined to entertain Sub Policy-II. . Here it is not available for individual user to contain both attribute sets {'Faculty'/'senior faculty'}, {'principal'}. So, the sub policy-I and sub policy-II can be conveyed in more adequate way as combined policy tree shown in the of Fig 1. Here node principal has double circles to specify that it is special node which grants combination of access policies to be executed on it.

It isn't correct to construct an applicable system to give permission for the combination ingrained in access format. To handle this issue, Li *et al* [13] has firstly explained the combined issue in contrasting attribute sets,and proposed a Group-Oriented Attribute Based Encryption scheme(GO-ABE). Composed on CP-ABE, OB-ABE further makes users into different groups to combine to access the data. Permitting users in same group to combine is acceptable, since the users working on similar project can combine and access data. But, their proposal allows all attributes within the similar group can be combined, even if the data owners forbid the access of data. Example, consider Fig 1., a person or a user with the set of attributes {'programmer', 'faculty' ,'senior faculty'} can combine with a person or a user with the set of attributes {'senior faculty' ,'programmer'} to get license to approach the data by combining with the attribute 'senior faculty'. This must be treated as wicked act form data owners' point of view. So, it a very challenging deliver to design such kind of mechanism which allows the normal combination in between the authentic users and also parallels continues unwanted collusions among the interested users. The access format in Fig 1. User having attribute set {'HOD', 'Faculty'} or {'HOD','Senior Faculty'} combining with a person or user with an attribute 'principal' is only considered as the correct combination to approach the data.

LITERATURE SURVEY

The motivation for our work is mainly in access authority of the data that is stored in unreliable servers and combined access authority. To address this access authority mechanism many works using cryptographic techniques have been proposed such as the literature [11][20]. However, CP-ABE supports close access authority. CP-ABE is constructed by Bettencourt et al in [12] and also different literature's were also constructed for improving the performance [9], [19], security in [6],[18],[17] and efficiency [16],23]-[25].

Other area linked to our proposed work is collaborative access authority. However existing works [27], [28] "collaborative" indicates multiple legitimate users can combine and will be able to work on similar data, change the data combined. The secret sharing scheme is an efficient solution that supports user's combination which has been adopted in [33].

The work presented in literature [13], and [22] are mostly similar to our work. Compared with [13] we gave data owners, rights to define inside policy tree even if the combination is allowed or not if allowed on whichever nodes it is allowed. We created a translation nodes concepts in [22], and our approach of using translation node is different. Here we acknowledge the combination in between contrasting users to decrypt the cipher text. In extension, in our approach, combination will be allowed among the users of similar group only.

PROPOSED METHODOLOGY

In this paper we propose an attribute-based combined authentication strategy for the public cloud. Especially, like GO-ABE [13], we define user combination in the similar group which coincides with the similar problem or project for the authorized users are answerable. So, we worked in such a way that, for providing data security and combined access control, the persons who are reasonable for the similar project are only given the permission to combine. So, technically the data owners give the permission to the expected combination by assigning some translation nodes in the access format. So, by this procedure, collusion that are irrelevant can be confronted if the set of attributes using which the users will be trying to combine, not coincided to translation nodes. Here, each translation node, an added reading value will be generated and by using this value and also the special key included called translation/reading key in the users' private key , the users from the same group can be combined to entertain the access strategy to get the permission to access the data.

The proposed model defined in Fig 2., comprises 4 different objects: Data Owners , Cloud Servers, Data users in group, Central Authority.

- The **Data Owner** is a person or an object who maintains data in cloud servers. For sharing their data, he create an access structures for data which is specified by an access format on the attributes.
- **Cloud Servers** arranges a floor for the owners of data to maintain and contribute their enciphered data. This data can be accessed by any data users.
- **Data users** is a person or an entity which has the permission to use data which is stored in cloud. In our combined access authority design, each user who is attached with a group concerned with the project for which they are liable. Data user can decipher data under situations: 1) their set of attribute should entertain independently the access format which is inserted inside the enciphered data. 2) If access structure allows combinations, then they can combine with different users who are valid to deciphered data.
- **Central Authority** is a person or an object who is the controller of entire model. It is used to assign secret keys to the users and sets up parameters for the system for implementing an access authority.

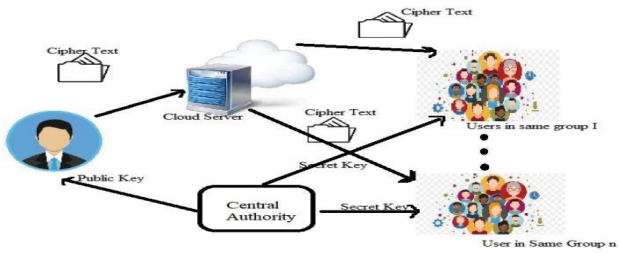

FIGURE 2. System Architecture

The users will be able to combine under the following circumstances: 1) The combined attribute of users has enough set of attributes for satisfying the policy tree 2) Users are from same group 3) The combination is possible on the translation nodes when the owner gives permission for combination.

RESULT

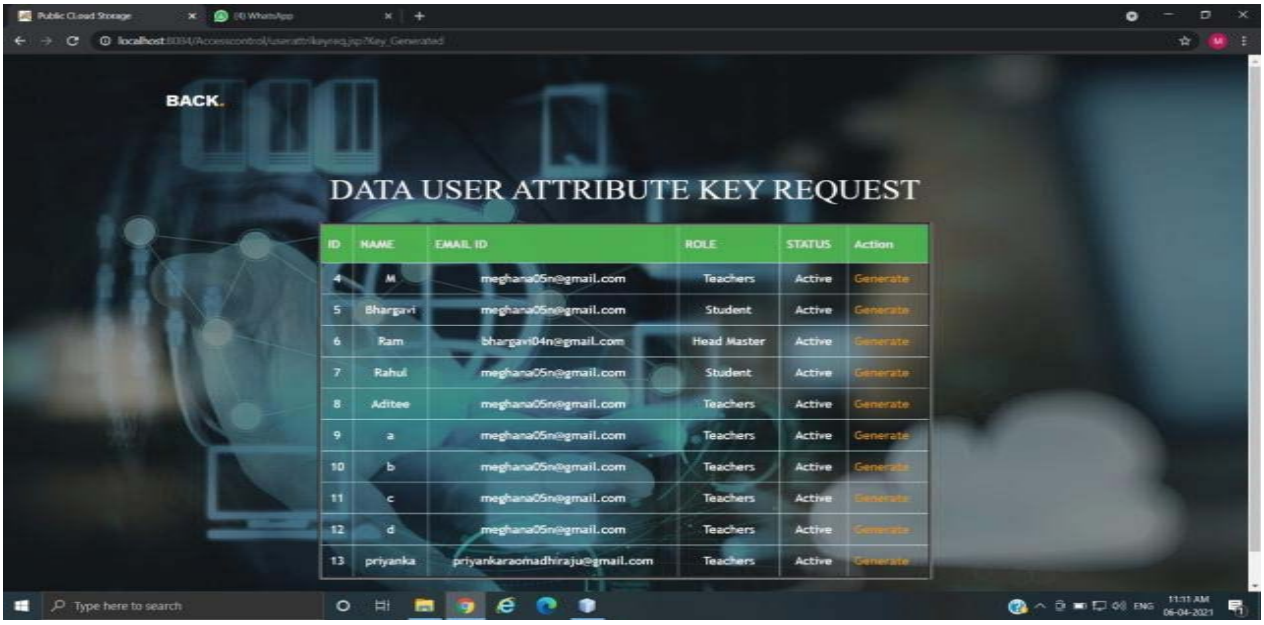

FIGURE 3. Data Users group requesting for data.

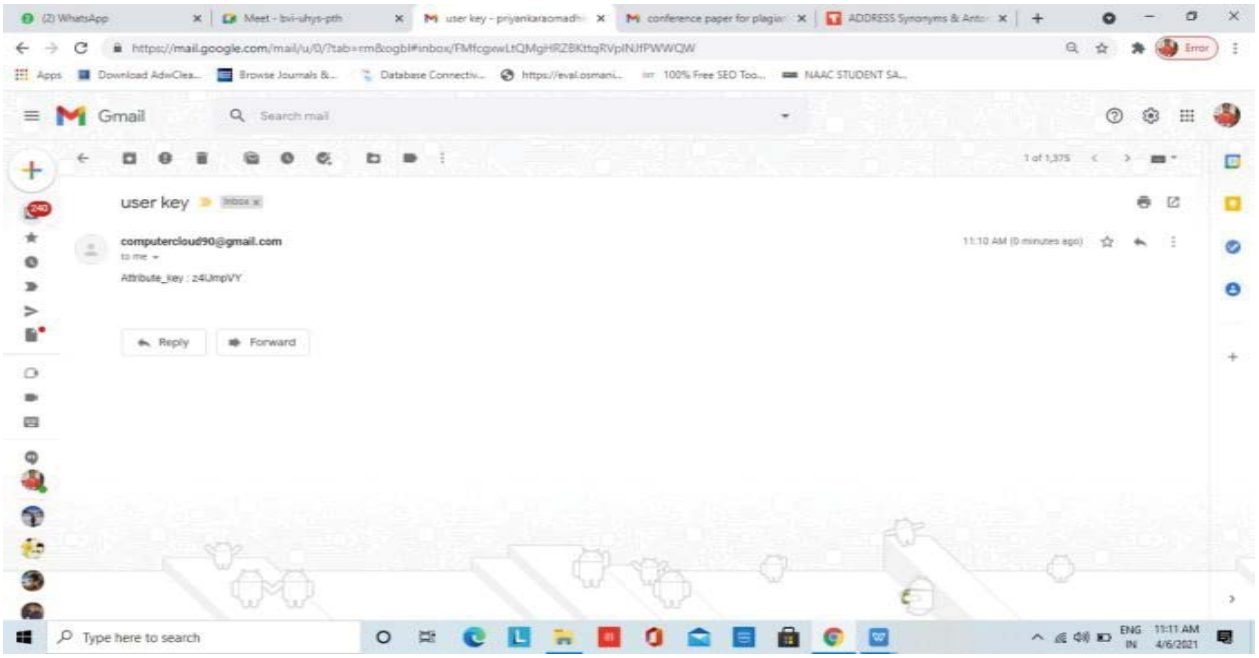

FIGURE 4. Attribute key to User's email

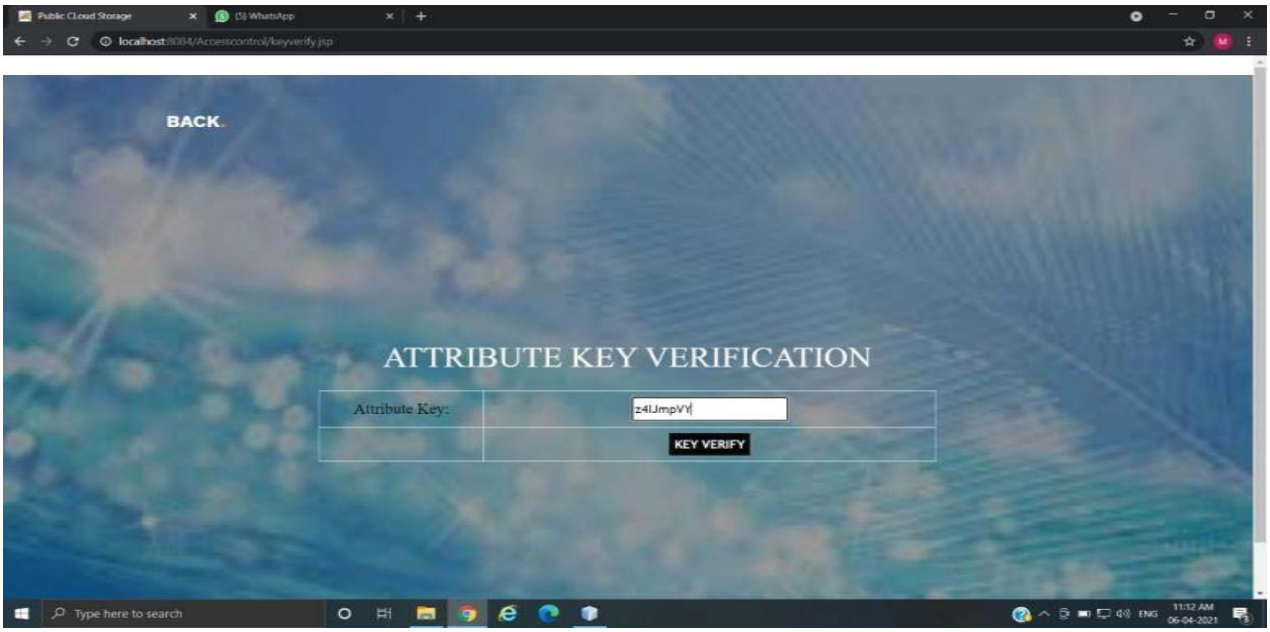

FIGURE 5. Attribute key verification for user

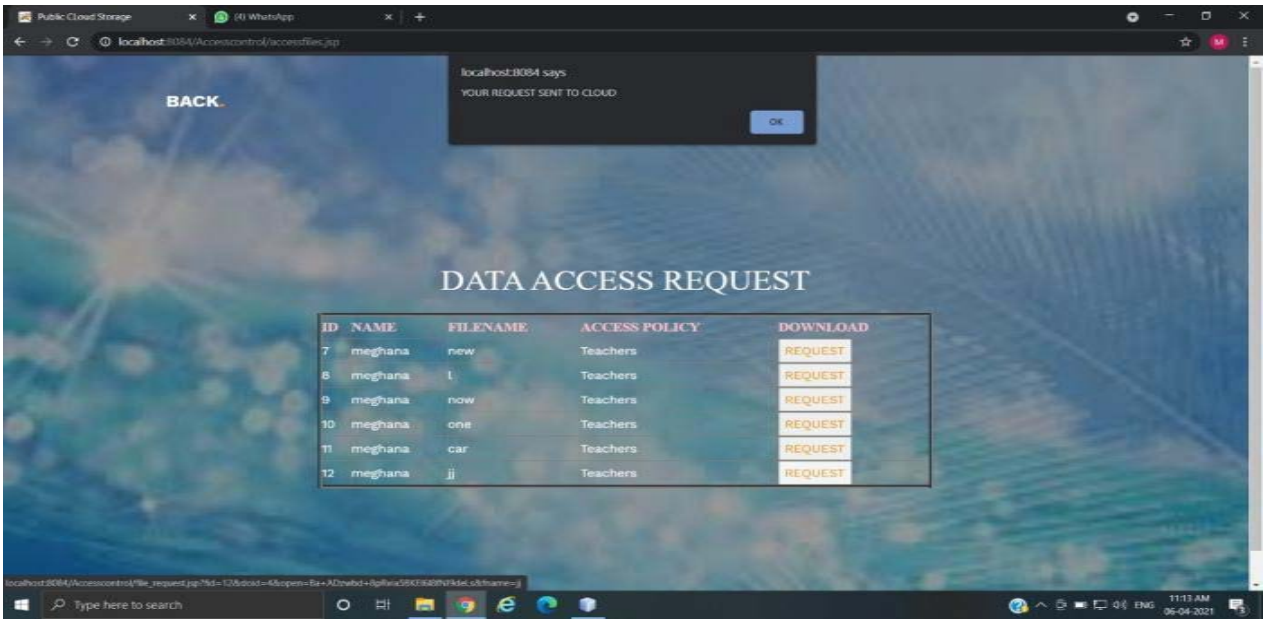

FIGURE 6. Data Access request

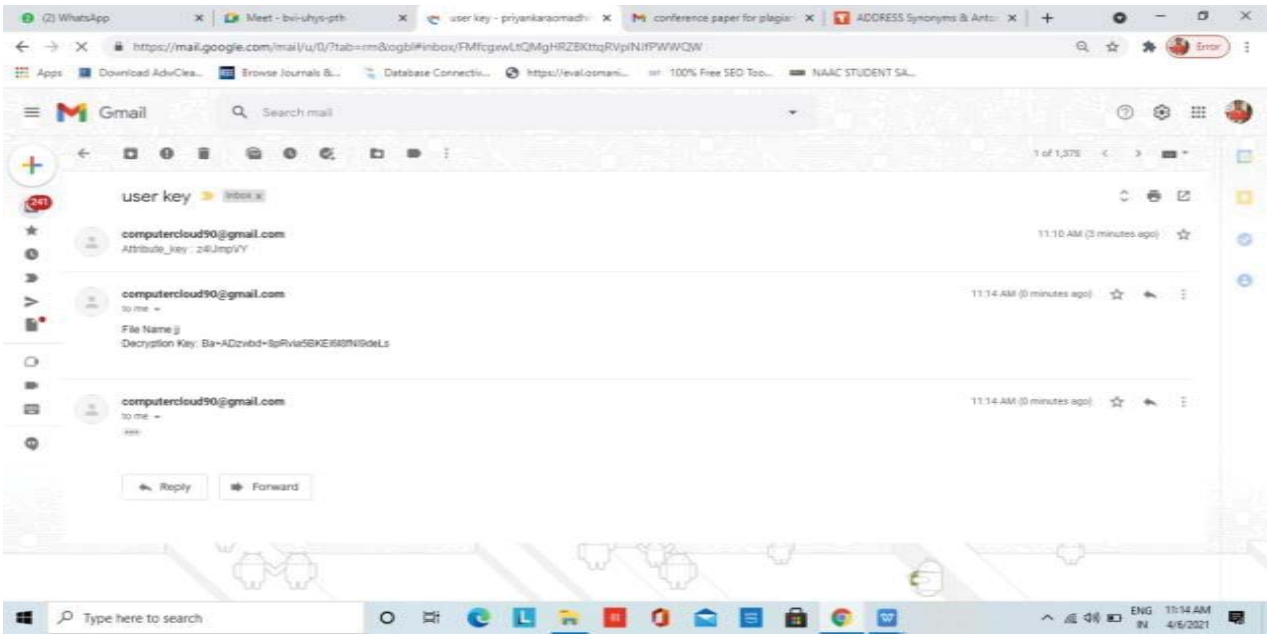

FIGURE 7. Decryption key sent to email.

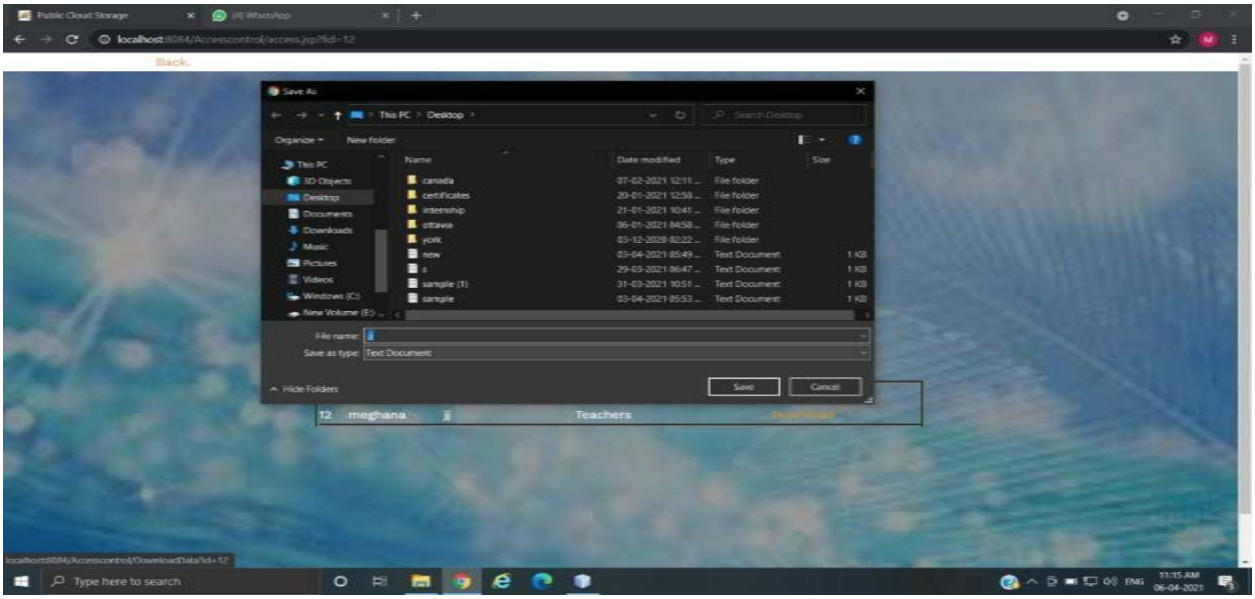

FIGURE 8. Accessing File.

CONCLUSION

In this paper, we have proposed a Combined Authentication Strategy for public cloud using Attribute Based Encryption I, in which the owners of data can nominate some selected users to combine for accessing the data. Upon consideration the efficient scenario we make users to combine within the same group for accessing the data. The data owner can nominate combination by locating translation nodes in the policy tree. Our proposed scheme is very encouraging to provide the fine-grained access control in combination settings in where the data is accessed in more than one (multiple) user.

REFERENCES

1. M. Li, S. Yu, Y. Zheng, K. Ren, and W. Lou, "Scalable and secure sharing of personal health records in cloud computing using attribute based encryption," IEEE Trans. Parallel Distrib. Syst., vol. 24, no. 1, pp. 131–143, Jan. 2013.
2. K. Yang, X. Jia, K. Ren, and B. Zhang, "DAC-MACS: Effective data access control for multi-authority cloud storage systems," in Proc. IEEE INFOCOM. Apr. 2013, pp. 2895–2903.
3. K. Xue and P. Hong, "A dynamic secure group sharing framework in public cloud computing," IEEE Trans. Cloud Compute., vol. 2, no. 4, pp. 459–470, Dec. 2014.
4. M. Du, Q. Wang, M. He, and J. Weng, "Privacy-preserving indexing and query processing for secure dynamic cloud storage," IEEE Trans. Inf. Forensics Security, vol. 13, no. 9, pp. 2320–2332, Sep. 2018.
5. M. Armbrust et al., "A view of cloud computing," Commun. ACM, vol. 53, no. 4, pp. 50–58, 2010.
6. K. Xue, W. Chen, W. Li, J. Hong, and P. Hong, "Combining data ownerside and cloud-side access control for encrypted cloud storage," IEEE Trans. Inf. Forensics Security, vol. 13, no. 8, pp. 2062–2074, Aug. 2018.
7. W. Li, K. Xue, Y. Xue, and J. Hong, "TMACS: A robust and verifiable threshold multi-authority access control system in public cloud storage," IEEE Trans. Parallel Distrib. Syst., vol. 27, no. 5, pp. 1484–1496, May 2016.
8. K. Xue et al., "RAAC: Robust and auditable access control with multiple attribute authorities for public cloud storage," IEEE Trans. Inf. Forensics Security, vol. 12, no. 4, pp. 953–967, Apr. 2017.
9. J. Hong et al., "TAFC: Time and attribute factors combined access control for time-sensitive data in public cloud," IEEE Trans. Serv. Comput., to be published. doi: 10.1109/TSC.2017.2682090.
10. Y. Wu, Z. Wei, and R. H. Deng, "Attribute-based access to scalable media in cloud-assisted content sharing networks," IEEE Trans. Multimedia, vol. 15, no. 4, pp. 778–788, Jun. 2013.
11. M. Kallahalla, E. Riedel, R. Swaminathan, Q. Wang, and K. Fu, "Plutus: Scalable secure file sharing on untrusted storage," in Proc. 2nd USENIX Conf. File Storage Technol., vol. 3, Mar. 2003, pp. 29–42.
12. J. Bethencourt, A. Sahai, and B. Waters, "Ciphertext-policy attributebased encryption," in Proc. IEEE Symp. Secur. Privacy., May 2007, pp. 321–334.
13. M. Li, X. Huang, J. K. Liu, and L. Xu, "GO-ABE: Group-oriented attribute-based encryption," in Proc. Int. Conf. Netw. Syst. Secur., Springer, Cham, Nov. 2015, pp. 260–270.
14. T. Tassa, "Hierarchical threshold secret sharing," J. Cryptol., vol. 20, no. 2, pp. 237–264, 2007.
15. A. Shamir, "How to share a secret," Commun. ACM, vol. 22, no. 11, pp. 612–613, 1979.
16. M. Green, S. Hohenberger, and B. Waters, "Outsourcing the decryption of ABE ciphertexts," in Proc. USENIX Secur. Symp., vol. 3, Aug. 2011, pp. 1–16.
17. J. Hur and D. K. Noh, "Attribute-based access control with efficient revocation in data outsourcing systems," IEEE Trans. Parallel Distrib. Syst., vol. 22, no. 7, pp. 1214–1221, Jul. 2011.
18. B. Waters, "Ciphertext-policy attribute-based encryption: An expressive, efficient, and provably secure realization," in Proc. Int. Workshop Public Key Cryptography. Springer, Mar. 2011, pp. 53–70.
19. K. Xue, J. Hong, Y. Xue, D. S. Wei, N. Yu, and P. Hong, "CABE: A new comparable attribute-based encryption construction with 0-encoding and 1-encoding," IEEE Trans. Comput., vol. 66, no. 9, pp. 1491–1503, Sep. 2017.
20. E.-J. Goh, H. Shacham, N. Modadugu, and D. Boneh, "SiRiUS: Securing remote untrusted storage," in Proc. Internet Soc. (ISOC) Net Distrib. Syst. Secur. (NDSS), vol. 3, 2003, pp. 131–145.
21. Z. Wan, J. Liu, and R. H. Deng, "HASBE: A hierarchical attributebased solution for flexible and scalable access control in cloud computing," IEEE Trans. Inf. Forensics Security, vol. 7, no. 2, pp. 743–754, Apr. 2012.
22. R. Bobba, H. Khurana, and M. Prabhakaran, "Attribute-sets: A practically motivated enhancement to attribute-based encryption," in Proc. Eur. Symp. Res. Comput. Secur. Oakland, CA, USA: Springer, 2009, pp. 587–604.
23. S. Hohenberger and B. Waters, "Online/offline attribute-based encryption," in Proc. Int. Workshop Public Key Cryptography. Buenos Aires, Argentina: Springer, 2014, pp. 293–310.
24. J. Li, X. Huang, J. Li, X. Chen, and Y. Xiang, "Securely outsourcing attribute-based encryption with checkability," IEEE Trans. Parallel Distrib. Syst., vol. 25, no. 8, pp. 2201–2210, Aug. 2014.
25. J. Shao, R. Lu, and X. Lin, "Fine-grained data sharing in cloud computing for mobile devices," in Proc. IEEE Conf. Comput. Commun. (INFOCOM). May 2015, pp. 2677–2685.

26. P. Ilia, B. Carminati, E. Ferrari, P. Fragopoulou, and S. Ioannidis, “SAMPAC: Socially-aware collaborative multi-party access control,” in Proc. 7th ACM Conf. Data Appl. Secur. Privacy (CODASPY). New York, NY, USA: ACM, Mar. 2017, pp. 71–82.
27. R. K. Thomas, “Team-based access control (TMAC): A primitive for applying role-based access controls in collaborative environments,” in Proc. 2nd ACM Workshop Role-Based Access Control. New York, NY, USA: ACM, Nov. 1997, pp. 13–19.
28. S.-C. Yeh, M.-Y. Su, H.-H. Chen, and C.-Y. Lin, “An efficient and secure approach for a cloud collaborative editing,” J. Netw. Comput. Appl., vol. 36, no. 6, pp. 1632–1641, 2013.
29. J. M. M. Pérez, G. M. Pérez, and A. F. Skarmeta Gomez, “SecRBAC: Secure data in the clouds,” IEEE Trans. Serv. Comput., vol. 10, no. 5, pp. 726–740, Sep. 2017.
30. A. Lewko and B. Waters, “Decentralizing attribute-based encryption,” in Proc. Annu. Int. Conf. Theory Appl. Cryptographic Techn., Springer, 2011, pp. 568–588
31. D. Boneh and M. Franklin, “Identity-based encryption from the Weil pairing,” in Proc. Annu. Int. Cryptol. Conf. Santa Barbara, CA, USA: Springer, 2001, pp. 213–229.
32. L. Harn and F. Miao, “Weighted secret sharing based on the chinese remainder theorem,” Int. J. Netw. Secur., vol. 16, no. 6, pp. 420–426, Nov. 2014.
33. G. R. Blakley, “Safeguarding cryptographic keys,” in Proc. AFIPS Nat.Comput. Conf., vol. 48, 1979, pp. 313–317.
34. C. Hu, W. Li, X. Cheng, J. Yu, S. Wang, and R. Bie, “A secure and verifiable access control scheme for big data storage in clouds,” IEEE Trans. Big Data, vol. 3, no. 4, pp. 341–355, Sep. 2018.

AIP Conference Proceedings

A secure incentive based waste monitoring system using IoT

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B. J. Praveena, K. Bhagyalaxmi and M. Priyanka

A Secure Incentive Based Waste Monitoring System Using IoT

B.J. Praveena[a)], K. Bhagyalaxmi[b)] and M. Priyanka[c)]

CSE Department, #16-1-486, Saidabad, Matrusri Engineering college, Hyderabad, Telangana, 500059, India

[a)] Corresponding author: bjpraveena@matrusri.edu.in,
[b)]bhagyalaxmi@matrusri.edu.in, and
[c)] priyankaraomadhiraju@matrusri.edu.in

Abstract. The increase of waste generation has been considered a significant challenge to large urban centers worldwide and represents critical issues for countries with accelerated population growth like India. Many initiations have been taken by the government to maintain cleanliness but problem remains the same. Taking the problem into consideration, we propose a Secure Incentive based Waste monitoring system to encourage garbage segregation at the initial level. This waste segregation at initial level will make the recycling process easy and addresses major environmental issues. In this system, a weight detector is placed that checks the weight of the separated garbage thrown and displays the weight. If the weight exceeds the lower-limit then a QR code is being displayed which can be scanned with the Incentive application which can be stored as the rewards to the public. The government should consider these rewards at any government e-payments. This system mainly focuses on encouraging the public to utilize the dustbins than littering on the roadways. Privacy and Security of the public rewards can be maintained using Blockchain Technology.

Keywords: IoT, Waste Segregation, Incentive, Privacy, Security, Blockchain.

INTRODUCTION

We are in 21st century today and can witness a great development in different sectors and living has become easier, happier and healthier. In spite of such improvements there are few weaknesses of every individual which is still pulling us back. One such weakness is littering the garbage on the roadways/sideways than dumping it in the garbage bins. Litter can cause lot of damage to the society like soil pollution, breeding grounds for virus and insects, physical harm to the trash pickers, high clean-up costs. The local governing bodies are taking enough measures to address this situation but the problem remains the same.

This paper mainly focuses on encouraging the individuals to stop littering the dump but use the garbage bins along with governments support. Technology has become a vital part of our lives and has changed a lot over past decade. With the help of Technology, we can make this a quite easy and cheering process and address the problem to the core.

Internet has transformed the entire global workforce. Internet of Things is one of the arising innovations which made connectivity, communication and exchange of data over the internet with ease. A quickly developing segment of IoT gadgets are made for shopper use, including associated vehicles, home computerization, wearable innovation, interface wellbeing and apparatuses with distant checking abilities. Internet of Things has not only made tough tasks simple but also made living very easy.

Our proposed framework can facilitate these significant issues and will have two significant functionalities. Firstly, we get a sophisticated garbage management system, secondly, we vitalize the public to use the dustbins and impart the accountability in them. We build an incentive Dustbin using IoT which accepts the garbage and based on the

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weight a QR scanner displays the code which can be used as the rewards. This application will improve the cleanliness and address many environmental issues related to garbage.

When the data is being absorbed by Sensor embedded devices one of the dangers still prevails which is privacy and security of data. In this paper we address the security issue using Blockchain Technology.

LITERATURE SURVEY

A lot of research has been done earlier on such waste management techniques which truly has a nice scope for removing the issues.

In Efficient Waste Collection System, have designed bins employing RFID, ultrasonic sensors, gas sensors with a central server connected through the Wi-Fi. The worker figures the most limited way for the trash assortment from the receptacles and heightens it to the further assortment measure. The significant weakness here is the Wi-fi limits the execution of such framework to a little region [1].

In “Smart Recycle Bin- An Efficient Garbage Monitoring System” has been introduced, The system's ultra-sonic sensors will detect the trash. This is often smart however, these sensors typically low accuracy. So fundamentally, a GSM modem is implemented to alarm the local bodies, whether the dust reached the edge value, where the ultrasonic sensors is situated at. The main disadvantage is due to the sensor usage, the latency is slow and very low accuracy and no system to inform if the bin if full [2].

In "Smartbin: Smart waste administration framework", has assembled a framework which the information of the completion of the litterbin is gathered by means of sensors and ship off the workers through remote cross section organization. This waste administration framework utilizes an obligation cycle procedure, to lessen power utilization and amplify the operational time. The litter receptacles can be upgraded in a wide range of ways, the litterbin is fundamentally a little module of the Smart Dustbin, it gathers and alarms the mindful specialists when its full [3].

In “Smart Recycle Bin “, have projected a framework that rewards the users by calculative points on the idea of weight and the type of waste embedded in them employing a waste sort detection system. The framework kills the issue of waste isolation on the grounds that the client's focuses are deducted if the sort of waste embedded doesn't coordinate with the sort of canister, however recognizing the kind of the waste and the remunerating framework isn't yet figured [4].

PROPOSED FRAMEWORK

The proposed system improves the current scenario and solves current problems.

The proposed system has mainly three units:

3.1 IoT embedded Dustbin.

3.2 Incentive application.

3.3 Security using Blockchain.

IoT Embedded Dustbin

The dustbin has two passages which allows the user to separate the waste in terms of dry and wet waste. The IoT embedded dustbin is built using four sensors. An RFID sensor RC522 is used to detect the RFID code of the user and opens the door of the Dustbin to collect the waste. An ultra-sensitive sensor HCSR04 is kept to check the margin of the trash dumped, notify the server about the fullness based on the threshold value. A moisture sensor is inserted to ensure the waste is segregated. A load cell PC22 is implemented to measure the quantity of the waste inserted and a LED screen is used to display the weight. Based on the weight a QR code is been generated using Arduino through TFT 128*160 screen. An Arduino Elegoo Uno R3 microcontroller is utilized to peruse the qualities from every one of the sensors and send the information to the backend server.

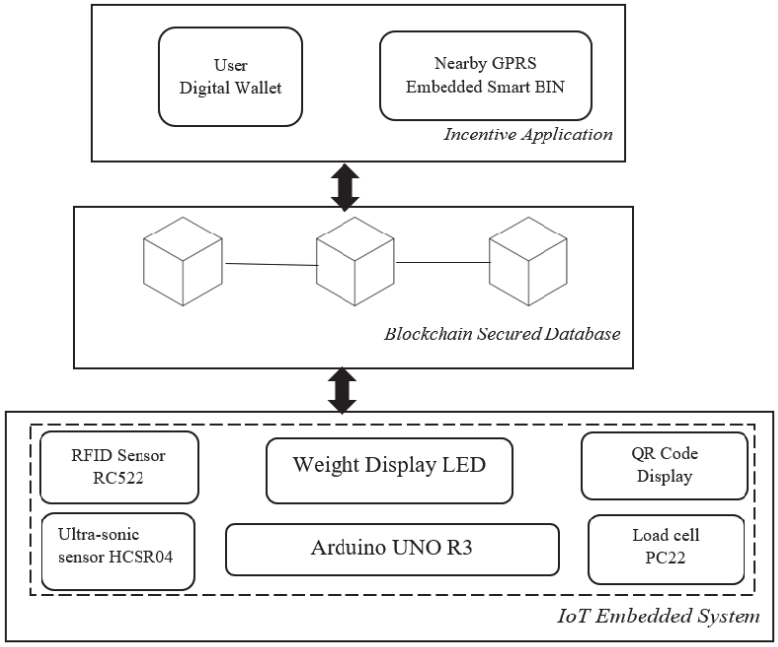

FIGURE 1. System Architecture

Incentive Application

The android application starts with the registration of the user where all the users have to create an account. The application is synchronized with the server with the latest database. It also has the digital wallet to save the rewards and a GPRS which helps to identify the nearby dustbins. The algorithm, based on the readings saved in the server, alerts the local bodies about the fullness of the bin so that they can empty the bin timely and maintain cleanliness. Based on the reading generated by the sensors the algorithm generates a unique QR code using TFT 128*160 screen and the Incentive application will scan it and save the points as the rewards in the user's accounts. The sensors help in validating the waste weather it is well segregated before inserting otherwise the QR code is not displayed. This will help the sorting the waste before inserting so that further processing of the waste will be easy. The points earned by the user based on ruling and regulations can be accepted at any retail store for acquisitions with the government's help.

Security Using Block chain

The server database stores all the private information about each user and primarily the rewards earned by each individual. When these points can be redeemed in retail stores the integrity of the rewards plays an important role. Security can be provide to such exclusive data by using Blockchain Technology. Whenever any user scans the QR code the points earned are appended to the chain based on the "Proof of Stake" method. This not only maintains the integrity of the data but also ensure the government e-payment acceptance have trust on the system.

RESULTS

A Secure Incentive Based Waste Monitoring System Using IoT has been executed with the full setup of the devices. The observations are recorded and observed that it overcomes all the problems observed in the existing system.

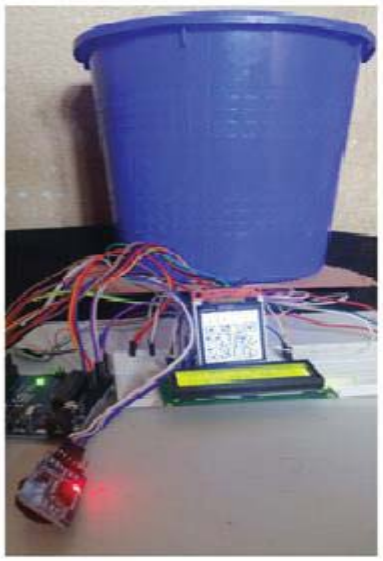

FIGURE 2. IoT Embedded Dustbin

FIGURE 3. Display of Weight QR code And Scan with the incentive Applications

In the Fig 2, shows the IoT Embedded Dustbin which accepts the garbage and depending on the segregation and the weight a QR code is displayed and the weight is also displayed on the LED. Every IoT Embedded Dustbin is given a unique ID for the identification, so that the higher authorities can easily figuerout the dustbin, the location it is placed and also empty it accordingly.The Dustbin ID will also help to validated the rewards earned by the public through the respective areas.

Public have to throw the trash inside the bin properly so that the loadcell can weigh the trash correctly and credit the reward points. In the Fig 3, the LED dispaying the weight detected by the loadcell and the TFT Screen displaying the QR code along with the time and date. The displayed QR code should be scanned by the incentive Techbin Application and the reward points will be credited in the respective accounts.

In the Fig 4, A code snippet of QR code has been given which helps to display a unique QR code whenever a new user uses the Dustbin to dump the trash. In the Fig 5, screenshots of the Incentive Techbin Application is given, where all the users need to download the app and get registered. Once registered an account is been created in their name and on the usage reward points keep adding to their account. This application will also help the user to find the nearby dustbin so that utilization will be easy.All the rewards are stored in the block and appended to the blockchain based on the consensus of all the stakeholders of the blockchain on the “Proof of Stake” algorithm to ensure the security.

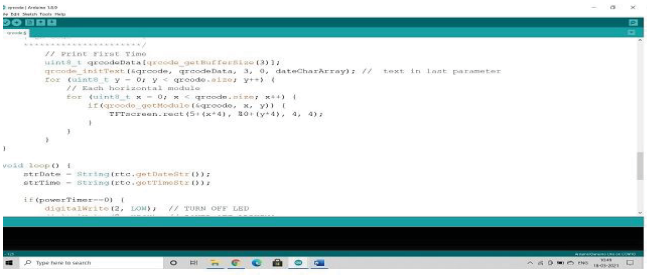

Fig 4: Code for QR Code scanner

FIGURE 4. Code for QR Scanner

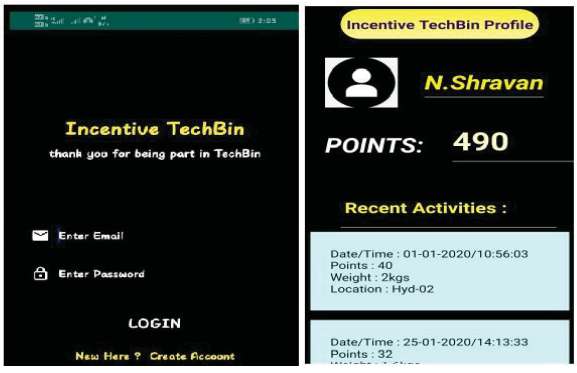

Fig 5: Incentive Techbin Application

FIGURE 5. Incentive Techbin Application

CONCLUSION

We have shown a promising solution to waste management with improved productivity in this paper, such that the massive amounts of investment engaged in garbage management are reduced, and the cycle has made easier for the individuals and the higher authorities. Furthermore, this system will motivate the common man to use the dustbins more rather than spilling it on the roadways and originate of many environmental problems and effecting the hygiene of the public. This problem could be solved by using IoT Embedded Dustbins like this. This method could be used in India, who are struggling with issues like waste management and high healthcare costs.

REFFERENCES

1. Saurabh Dugdhe, Pooja Shelar, Sajuli Jire and Anuja Apte et al."Efficient Waste Collection System", 2016 International Conference on Internet of Things and Applications (IOTA), 22- 24 Jan, 2016.
2. Mohd Helmy Abd Wahab, Aeslina Abdul Kadir, Mohd Razali Tomari, Mohamad Hairol Jabbar et al. "Smart Recycle Bin: A Conceptual Approach of Smart Waste Management with Integrated Web Based System", IT Convergence and Security (ICITCS), 2014 International Conference on 28-30 Oct. 2014.
3. Fachmin Folianto, Yong Sheng Low, Wai Leong Yeow "Smartbin: Smart Waste Management System", 2015 IEEE Tenth International Conference on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP),7-9 April 2015.
4. A. A. K. M. R. T. M. H. J. Mohd Helmy Abd Wahab, "Smart Recycle Bin: A Conceptual Approach of Smart Waste Management with Integrated Web Based System," in International Conference on IT Convergence and Security (ICITCS), Beijing, China, 2014.
5. Y. S. L. W. L. Y. Fachmin Folianto, "Smartbin: Smart waste management sytem," in IEEE Tenth International Conference on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP), Singapore, 2015.
6. S. S. M. P. B. Gopal Kirshna Shyam, "Smart waste management using Internet-of-Things (IoT)," in 2nd International Conference on Computing and Communications Technologies (ICCCT), Chennai, Inida, 2017.
7. K. K. P. Twinkle Sinha, "Smart Dustbin," International Journal of Management and Applied Science (IJMAS), vol. 3, no. 5, pp. 101- 104, 2015.
8. Annepu RK. 2012 Report on sustainable solid waste management in India. Waste-To-Energy Research and Technology Council (WTERT), 1-89.
9. Rana R, Ganguly R, Gupta AK 2015 An Assessment of Solid waste management in chandigarh city India. Electron. J. Geotech. Eng. 20, 1547-1572.
10. P.Suresh, J. Vijay Daniel , R.H. Aswathy, Dr.V.Parthasarathy "A state of the art reviews on The Internet of Things" IOT International Conference on Science, Engineering and Management Research (ICSEMR 2014).
11. Arkady Zaslavsky, Dimitrios Georgakopoulos "Internet of Things: Challenges and State-of-the-art Solutions in Internet-scale Sensor Information Management and Mobile Analytics" 16th IEEE International Conference on Mobile Data Management. 2015.

A combined authentication strategy for public cloud using attribute based encryption

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Priyanka Madhiraju, M. Praveen Kumar and B. J. Praveena

A Combined Authentication Strategy for Public Cloud Using Attribute Based Encryption

Priyanka Madhiraju [a)], M. Praveen Kumar [b)], B. J. Praveena [c)]

CSE Department,#16-1-486,*Saidabad*,*Matrusri Engineering* college ,*Hyderabad*, *Telangana 500059*

[a)] Corresponding author: priyankaraomadhiraju@matrusri.edu.in,
[b)]praveenkumar@matrusri.edu.in
[c)]bjpraveena@matrsuri.edu.in

Abstract. Whenever we are deploying data in public cloud, we are doing with semi-reliable cloud servers present outside the data owner's reliable domain. To avoid hazardous service providers trying to access delicate data from data owners we are encrypting that data. In this situation conducting the authentication approach over the data becomes a very tough task. So, by using Attribute -Based encryption we can provide access policies among the attributes which can proved flexibility, secured access controls over the deployed data. But we have a problem with ABE that it does not support the access control mechanisms by combination. Here in this proposed paper, we are applying a scheme where different users who are having different attribute sets can approach the data using collaboration provided if the data owner accepts the combination with that access policy. If the combination is not designed in access policy, then it is considered as conspiracy and request is denied. So, we introduce attribute-based combined authentication strategy through assigning translation nodes in the access format.

Keywords: Public storage, access control policy, Cipher Text Attribute -Based Encryption (CP-ABE), combination

INTRODUCTION

Cloud computing grant the users a means to access data or applications as utilities over the internet. Basically, cloud computing refers to changing or configuring or accessing the applications which are over internet. It also offers online data storage, infrastructure, and applications. The customers of cloud can access the resources in cloud as Pay-as-you-use. The customers can approach the data or applications any time or anywhere. Because of the above advantage the business and individuals are outsourcing their data and utilization into cloud.

Against the more advantages, we have a challenging issue regarding the security of user's data. Generally, the data owner stores their respective data in reliable servers that are monitored by an authorized person. Normally, in public cloud data is usually stored in some remote cloud which is managed by the third-party authorities. So, in public cloud security controlling access for data is very difficult.

In previous period, different researchers are working on the concept of data authentication authority or access authority of the data in public cloud. In those literature's CP-ABE is treated as one of the relevant algorithms because it ensures data owners can directly control their data and administer fine-grained Access authority.

"In previous period, different researches are working on data access authority publicly cloud storage, like "[6]–[10]. In that literature's, CP-ABE is considered one of the best convenient blueprint, thanks to truth that it assure data owners' forthright authority on their data and supply a fine-grained access authority benefit. In CP-ABE, individual user is related to a group of attributes and each cipher text contains access format over some selected attributes. The access format contains precise access authority that should be satisfied to access the data contents. It is considered that user's attribute set elate the access format

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inserted in cipher text and he/she can decode the cipher text. So, by using the access format on the attributes to specific access format.

But the existing CP-ABE algorithm can give the approval to people to access whoever is having their own attributes which satisfy access format. But in several situations the private info will not be gathered by an individual user itself. For example, in many organizations some crucial data or files or information will be shared among different people depending on their responsibilities depending upon their designation. An access to data request may be given only if when distinct users with distinct responsibilities combines. That kind of requirement regarding combination to access private data that has used widely in secret sharing schemes [14] [15], where the data is only penetrated by different participants combined. Sadly, existing secret sharing design are not able to specify access policies in a flexible manner.

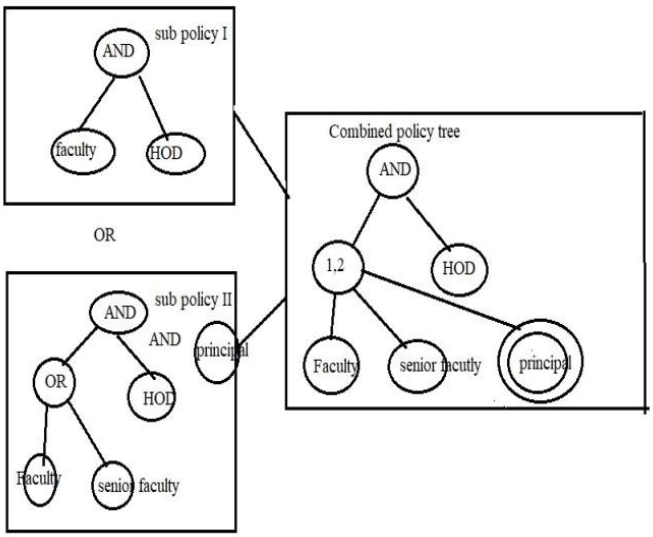

FIGURE 1. An Example for an access policy

In the above example we have three boxes where sub policy-I and sub-Policy-II used for accessing the data. Here we have "OR" in the middle of two boxes which specify that the users will be able contact the data if user entertain either sub policy-I or sub-Policy-II. Here Sub Policy-I denote the condition where the policy tree should be satisfied by autonomous user, and Sub Policy-II specifies a condition where a cipher text can be contacted by combination based on one action that if one of the user contains attribute set which satisfies the tree which is denoted as Sub Policy-II and other user having the attribute 'principal'. Here "AND" indicates that stated two users can be combined to entertain Sub Policy-II. . Here it is not available for individual user to contain both attribute sets {'Faculty'/'senior faculty'}, {'principal'}. So, the sub policy-I and sub policy-II can be conveyed in more adequate way as combined policy tree shown in the of Fig 1. Here node principal has double circles to specify that it is special node which grants combination of access policies to be executed on it.

It isn't correct to construct an applicable system to give permission for the combination ingrained in access format. To handle this issue, Li *et al* [13] has firstly explained the combined issue in contrasting attribute sets,and proposed a Group-Oriented Attribute Based Encryption scheme(GO-ABE). Composed on CP-ABE, OB-ABE further makes users into different groups to combine to access the data. Permitting users in same group to combine is acceptable, since the users working on similar project can combine and access data. But, their proposal allows all attributes within the similar group can be combined, even if the data owners forbid the access of data. Example, consider Fig 1., a person or a user with the set of attributes {'programmer', 'faculty' ,'senior faculty'} can combine with a person or a user with the set of attributes {'senior faculty' ,'programmer'} to get license to approach the data by combining with the attribute 'senior faculty'. This must be treated as wicked act form data owners' point of view. So, it a very challenging deliver to design such kind of mechanism which allows the normal combination in between the authentic users and also parallels continues unwanted collusions among the interested users. The access format in Fig 1. User having attribute set {'HOD', 'Faculty'} or {'HOD','Senior Faculty'} combining with a person or user with an attribute 'principal' is only considered as the correct combination to approach the data.

LITERATURE SURVEY

The motivation for our work is mainly in access authority of the data that is stored in unreliable servers and combined access authority. To address this access authority mechanism many works using cryptographic techniques have been proposed such as the literature [11][20]. However, CP-ABE supports close access authority. CP-ABE is constructed by Bettencourt et al in [12] and also different literature's were also constructed for improving the performance [9], [19], security in [6],[18],[17] and efficiency [16],23]-[25].

Other area linked to our proposed work is collaborative access authority. However existing works [27], [28] "collaborative" indicates multiple legitimate users can combine and will be able to work on similar data, change the data combined. The secret sharing scheme is an efficient solution that supports user's combination which has been adopted in [33].

The work presented in literature [13], and [22] are mostly similar to our work. Compared with [13] we gave data owners, rights to define inside policy tree even if the combination is allowed or not if allowed on whichever nodes it is allowed. We created a translation nodes concepts in [22], and our approach of using translation node is different. Here we acknowledge the combination in between contrasting users to decrypt the cipher text. In extension, in our approach, combination will be allowed among the users of similar group only.

PROPOSED METHODOLOGY

In this paper we propose an attribute-based combined authentication strategy for the public cloud. Especially, like GO-ABE [13], we define user combination in the similar group which coincides with the similar problem or project for the authorized users are answerable. So, we worked in such a way that, for providing data security and combined access control, the persons who are reasonable for the similar project are only given the permission to combine. So, technically the data owners give the permission to the expected combination by assigning some translation nodes in the access format. So, by this procedure, collusion that are irrelevant can be confronted if the set of attributes using which the users will be trying to combine, not coincided to translation nodes. Here, each translation node, an added reading value will be generated and by using this value and also the special key included called translation/reading key in the users' private key , the users from the same group can be combined to entertain the access strategy to get the permission to access the data.

The proposed model defined in Fig 2., comprises 4 different objects: Data Owners , Cloud Servers, Data users in group, Central Authority.

- The **Data Owner** is a person or an object who maintains data in cloud servers. For sharing their data, he create an access structures for data which is specified by an access format on the attributes.
- **Cloud Servers** arranges a floor for the owners of data to maintain and contribute their enciphered data. This data can be accessed by any data users.
- **Data users** is a person or an entity which has the permission to use data which is stored in cloud. In our combined access authority design, each user who is attached with a group concerned with the project for which they are liable. Data user can decipher data under situations: 1) their set of attribute should entertain independently the access format which is inserted inside the enciphered data. 2) If access structure allows combinations, then they can combine with different users who are valid to deciphered data.
- **Central Authority** is a person or an object who is the controller of entire model. It is used to assign secret keys to the users and sets up parameters for the system for implementing an access authority.

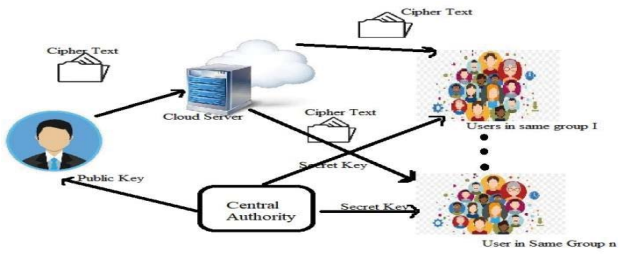

FIGURE 2. System Architecture

The users will be able to combine under the following circumstances: 1) The combined attribute of users has enough set of attributes for satisfying the policy tree 2) Users are from same group 3) The combination is possible on the translation nodes when the owner gives permission for combination.

RESULT

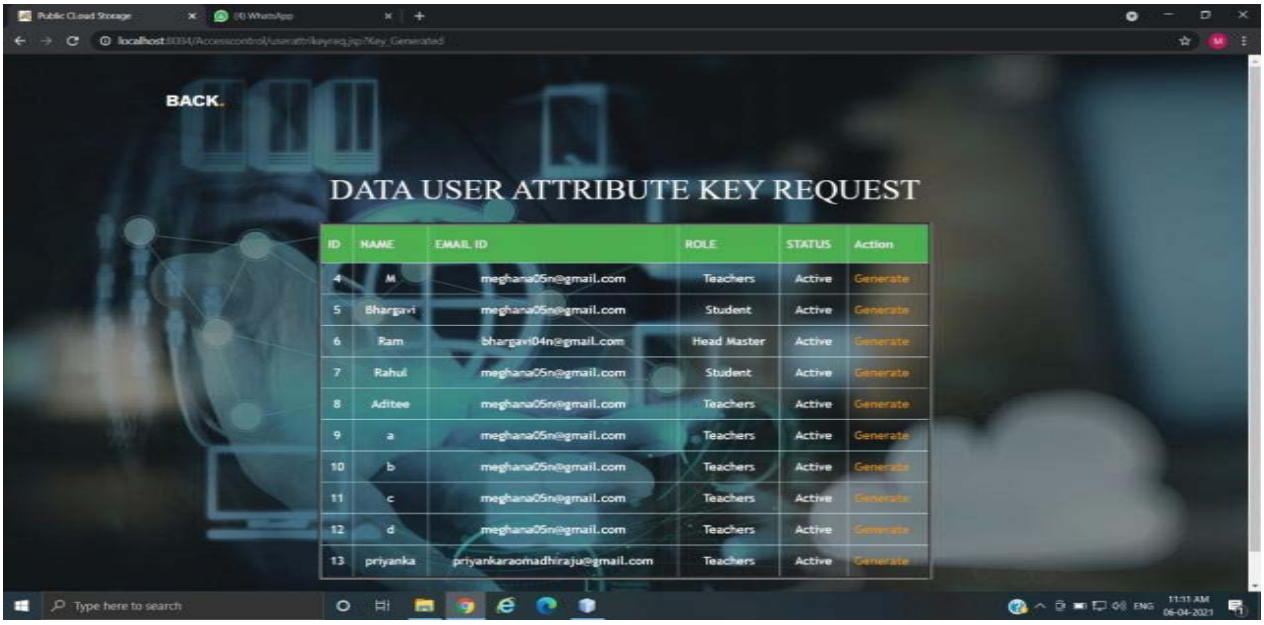

FIGURE 3. Data Users group requesting for data.

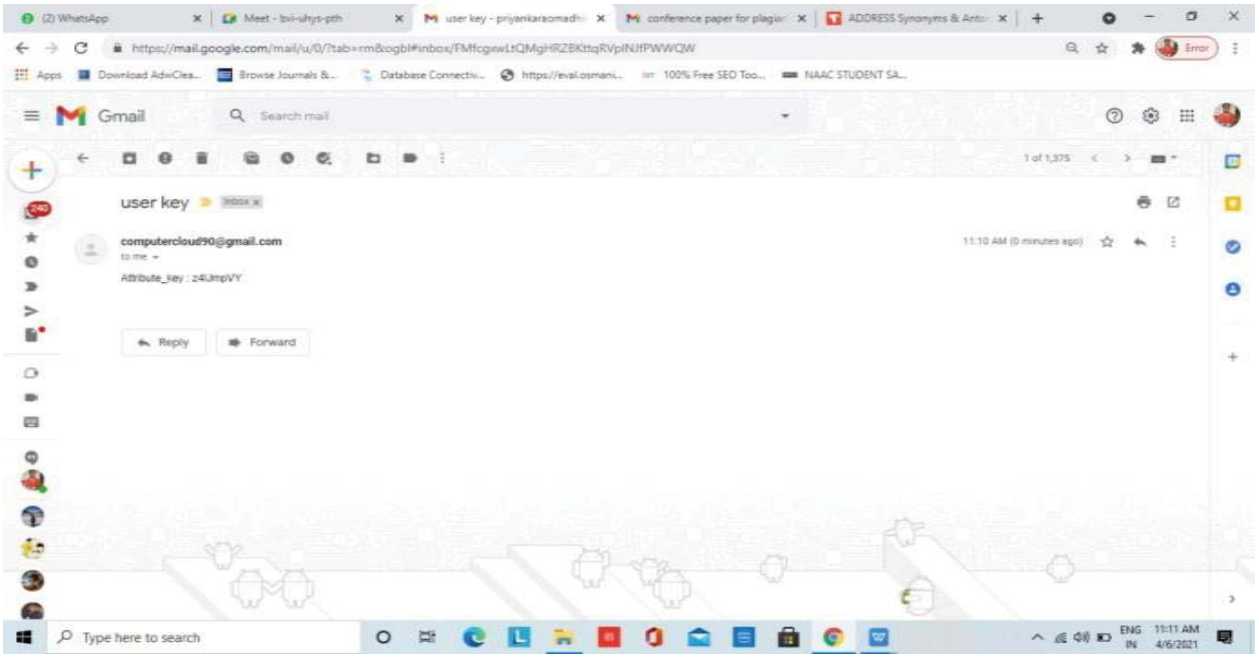

FIGURE 4. Attribute key to User's email

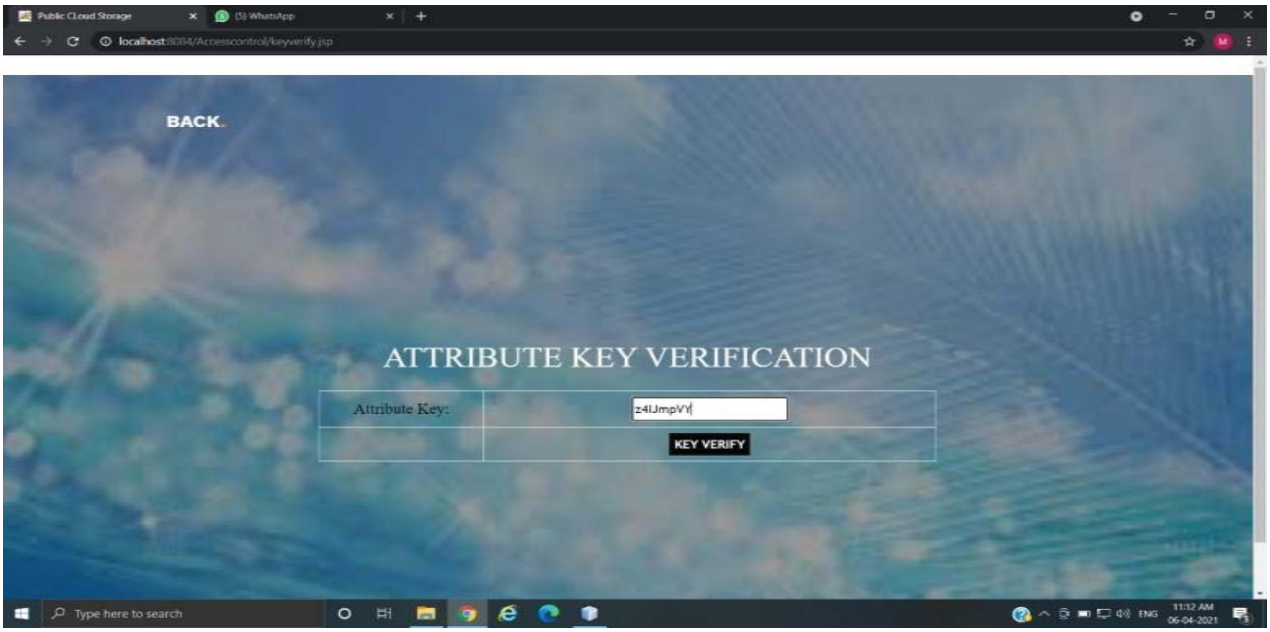

FIGURE 5. Attribute key verification for user

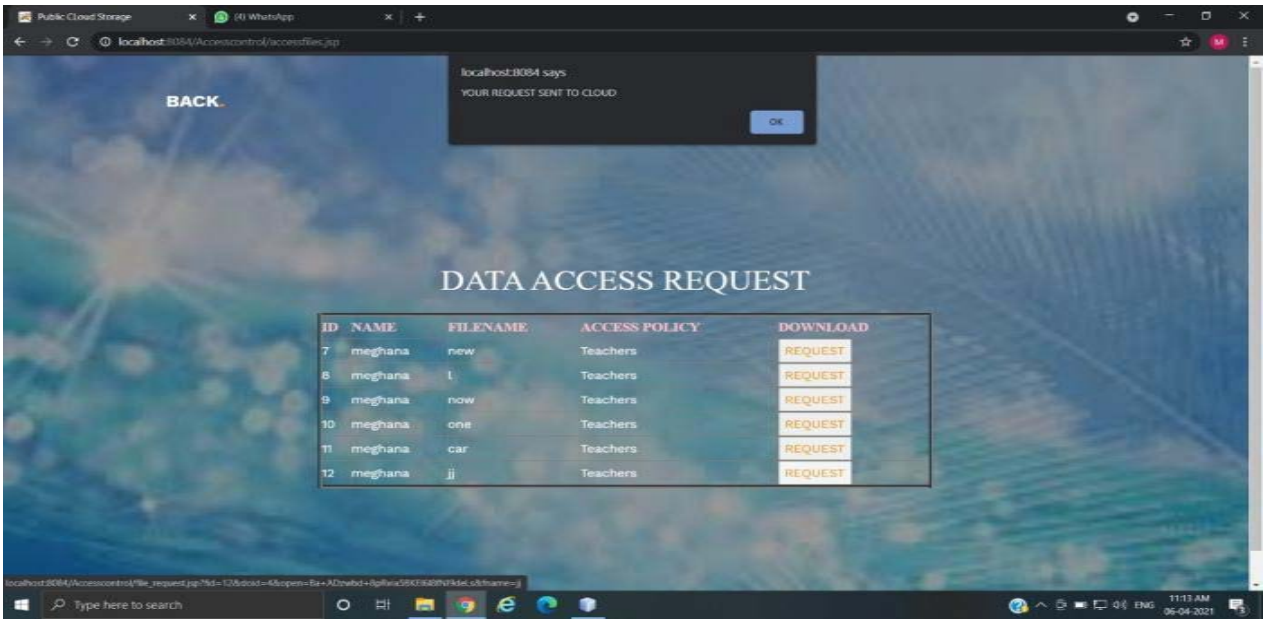

FIGURE 6. Data Access request

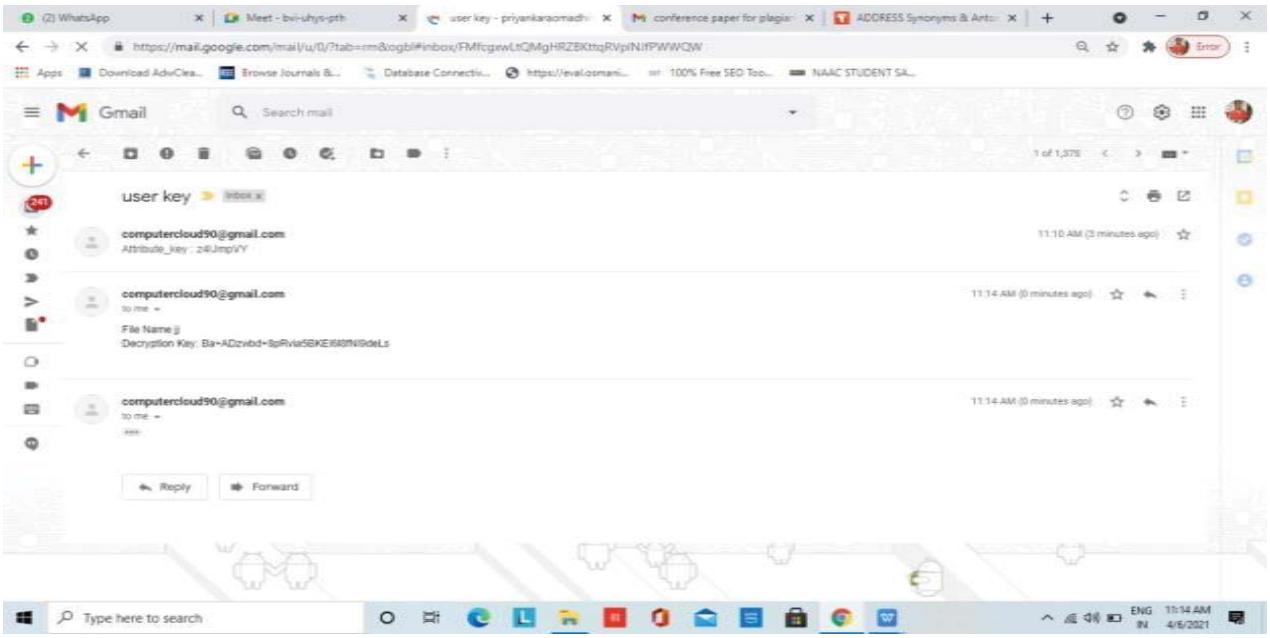

FIGURE 7. Decryption key sent to email.

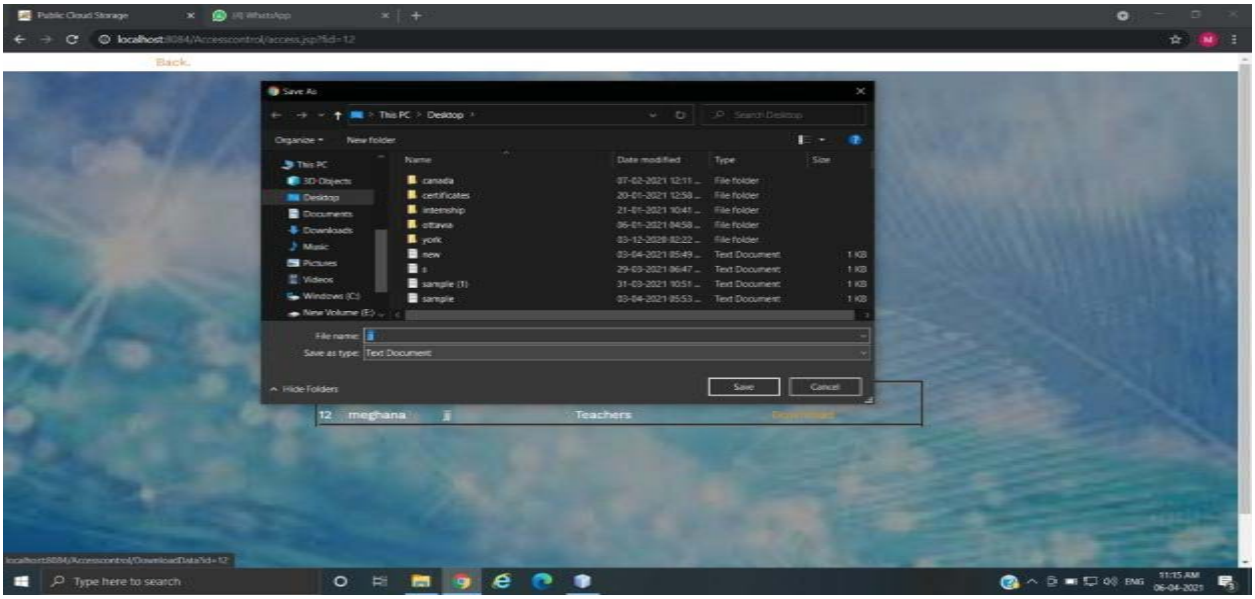

FIGURE 8. Accessing File.

CONCLUSION

In this paper, we have proposed a Combined Authentication Strategy for public cloud using Attribute Based Encryption I, in which the owners of data can nominate some selected users to combine for accessing the data. Upon consideration the efficient scenario we make users to combine within the same group for accessing the data. The data owner can nominate combination by locating translation nodes in the policy tree. Our proposed scheme is very encouraging to provide the fine-grained access control in combination settings in where the data is accessed in more than one (multiple) user.

REFERENCES

1. M. Li, S. Yu, Y. Zheng, K. Ren, and W. Lou, "Scalable and secure sharing of personal health records in cloud computing using attribute based encryption," IEEE Trans. Parallel Distrib. Syst., vol. 24, no. 1, pp. 131–143, Jan. 2013.
2. K. Yang, X. Jia, K. Ren, and B. Zhang, "DAC-MACS: Effective data access control for multi-authority cloud storage systems," in Proc. IEEE INFOCOM. Apr. 2013, pp. 2895–2903.
3. K. Xue and P. Hong, "A dynamic secure group sharing framework in public cloud computing," IEEE Trans. Cloud Compute., vol. 2, no. 4, pp. 459–470, Dec. 2014.
4. M. Du, Q. Wang, M. He, and J. Weng, "Privacy-preserving indexing and query processing for secure dynamic cloud storage," IEEE Trans. Inf. Forensics Security, vol. 13, no. 9, pp. 2320–2332, Sep. 2018.
5. M. Armbrust et al., "A view of cloud computing," Commun. ACM, vol. 53, no. 4, pp. 50–58, 2010.
6. K. Xue, W. Chen, W. Li, J. Hong, and P. Hong, "Combining data ownerside and cloud-side access control for encrypted cloud storage," IEEE Trans. Inf. Forensics Security, vol. 13, no. 8, pp. 2062–2074, Aug. 2018.
7. W. Li, K. Xue, Y. Xue, and J. Hong, "TMACS: A robust and verifiable threshold multi-authority access control system in public cloud storage," IEEE Trans. Parallel Distrib. Syst., vol. 27, no. 5, pp. 1484–1496, May 2016.
8. K. Xue et al., "RAAC: Robust and auditable access control with multiple attribute authorities for public cloud storage," IEEE Trans. Inf. Forensics Security, vol. 12, no. 4, pp. 953–967, Apr. 2017.
9. J. Hong et al., "TAFC: Time and attribute factors combined access control for time-sensitive data in public cloud," IEEE Trans. Serv. Comput., to be published. doi: 10.1109/TSC.2017.2682090.
10. Y. Wu, Z. Wei, and R. H. Deng, "Attribute-based access to scalable media in cloud-assisted content sharing networks," IEEE Trans. Multimedia, vol. 15, no. 4, pp. 778–788, Jun. 2013.
11. M. Kallahalla, E. Riedel, R. Swaminathan, Q. Wang, and K. Fu, "Plutus: Scalable secure file sharing on untrusted storage," in Proc. 2nd USENIX Conf. File Storage Technol., vol. 3, Mar. 2003, pp. 29–42.
12. J. Bethencourt, A. Sahai, and B. Waters, "Ciphertext-policy attributebased encryption," in Proc. IEEE Symp. Secur. Privacy., May 2007, pp. 321–334.
13. M. Li, X. Huang, J. K. Liu, and L. Xu, "GO-ABE: Group-oriented attribute-based encryption," in Proc. Int. Conf. Netw. Syst. Secur., Springer, Cham, Nov. 2015, pp. 260–270.
14. T. Tassa, "Hierarchical threshold secret sharing," J. Cryptol., vol. 20, no. 2, pp. 237–264, 2007.
15. A. Shamir, "How to share a secret," Commun. ACM, vol. 22, no. 11, pp. 612–613, 1979.
16. M. Green, S. Hohenberger, and B. Waters, "Outsourcing the decryption of ABE ciphertexts," in Proc. USENIX Secur. Symp., vol. 3, Aug. 2011, pp. 1–16.
17. J. Hur and D. K. Noh, "Attribute-based access control with efficient revocation in data outsourcing systems," IEEE Trans. Parallel Distrib. Syst., vol. 22, no. 7, pp. 1214–1221, Jul. 2011.
18. B. Waters, "Ciphertext-policy attribute-based encryption: An expressive, efficient, and provably secure realization," in Proc. Int. Workshop Public Key Cryptography. Springer, Mar. 2011, pp. 53–70.
19. K. Xue, J. Hong, Y. Xue, D. S. Wei, N. Yu, and P. Hong, "CABE: A new comparable attribute-based encryption construction with 0-encoding and 1-encoding," IEEE Trans. Comput., vol. 66, no. 9, pp. 1491–1503, Sep. 2017.
20. E.-J. Goh, H. Shacham, N. Modadugu, and D. Boneh, "SiRiUS: Securing remote untrusted storage," in Proc. Internet Soc. (ISOC) Net Distrib. Syst. Secur. (NDSS), vol. 3, 2003, pp. 131–145.
21. Z. Wan, J. Liu, and R. H. Deng, "HASBE: A hierarchical attributebased solution for flexible and scalable access control in cloud computing," IEEE Trans. Inf. Forensics Security, vol. 7, no. 2, pp. 743–754, Apr. 2012.
22. R. Bobba, H. Khurana, and M. Prabhakaran, "Attribute-sets: A practically motivated enhancement to attribute-based encryption," in Proc. Eur. Symp. Res. Comput. Secur. Oakland, CA, USA: Springer, 2009, pp. 587–604.
23. S. Hohenberger and B. Waters, "Online/offline attribute-based encryption," in Proc. Int. Workshop Public Key Cryptography. Buenos Aires, Argentina: Springer, 2014, pp. 293–310.
24. J. Li, X. Huang, J. Li, X. Chen, and Y. Xiang, "Securely outsourcing attribute-based encryption with checkability," IEEE Trans. Parallel Distrib. Syst., vol. 25, no. 8, pp. 2201–2210, Aug. 2014.
25. J. Shao, R. Lu, and X. Lin, "Fine-grained data sharing in cloud computing for mobile devices," in Proc. IEEE Conf. Comput. Commun. (INFOCOM). May 2015, pp. 2677–2685.

26. P. Ilia, B. Carminati, E. Ferrari, P. Fragopoulou, and S. Ioannidis, “SAMPAC: Socially-aware collaborative multi-party access control,” in Proc. 7th ACM Conf. Data Appl. Secur. Privacy (CODASPY). New York, NY, USA: ACM, Mar. 2017, pp. 71–82.
27. R. K. Thomas, “Team-based access control (TMAC): A primitive for applying role-based access controls in collaborative environments,” in Proc. 2nd ACM Workshop Role-Based Access Control. New York, NY, USA: ACM, Nov. 1997, pp. 13–19.
28. S.-C. Yeh, M.-Y. Su, H.-H. Chen, and C.-Y. Lin, “An efficient and secure approach for a cloud collaborative editing,” J. Netw. Comput. Appl., vol. 36, no. 6, pp. 1632–1641, 2013.
29. J. M. M. Pérez, G. M. Pérez, and A. F. Skarmeta Gomez, “SecRBAC: Secure data in the clouds,” IEEE Trans. Serv. Comput., vol. 10, no. 5, pp. 726–740, Sep. 2017.
30. A. Lewko and B. Waters, “Decentralizing attribute-based encryption,” in Proc. Annu. Int. Conf. Theory Appl. Cryptographic Techn., Springer, 2011, pp. 568–588
31. D. Boneh and M. Franklin, “Identity-based encryption from the Weil pairing,” in Proc. Annu. Int. Cryptol. Conf. Santa Barbara, CA, USA: Springer, 2001, pp. 213–229.
32. L. Harn and F. Miao, “Weighted secret sharing based on the chinese remainder theorem,” Int. J. Netw. Secur., vol. 16, no. 6, pp. 420–426, Nov. 2014.
33. G. R. Blakley, “Safeguarding cryptographic keys,” in Proc. AFIPS Nat.Comput. Conf., vol. 48, 1979, pp. 313–317.
34. C. Hu, W. Li, X. Cheng, J. Yu, S. Wang, and R. Bie, “A secure and verifiable access control scheme for big data storage in clouds,” IEEE Trans. Big Data, vol. 3, no. 4, pp. 341–355, Sep. 2018.

AIP Conference Proceedings

A secure incentive based waste monitoring system using IoT

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B. J. Praveena, K. Bhagyalaxmi and M. Priyanka

A Secure Incentive Based Waste Monitoring System Using IoT

B.J. Praveena[a)], K. Bhagyalaxmi[b)] and M. Priyanka[c)]

CSE Department, #16-1-486, Saidabad, Matrusri Engineering college, Hyderabad, Telangana, 500059, India

[a)] Corresponding author: bjpraveena@matrusri.edu.in,
[b)]bhagyalaxmi@matrusri.edu.in, and
[c)] priyankaraomadhiraju@matrusri.edu.in

Abstract. The increase of waste generation has been considered a significant challenge to large urban centers worldwide and represents critical issues for countries with accelerated population growth like India. Many initiations have been taken by the government to maintain cleanliness but problem remains the same. Taking the problem into consideration, we propose a Secure Incentive based Waste monitoring system to encourage garbage segregation at the initial level. This waste segregation at initial level will make the recycling process easy and addresses major environmental issues. In this system, a weight detector is placed that checks the weight of the separated garbage thrown and displays the weight. If the weight exceeds the lower-limit then a QR code is being displayed which can be scanned with the Incentive application which can be stored as the rewards to the public. The government should consider these rewards at any government e-payments. This system mainly focuses on encouraging the public to utilize the dustbins than littering on the roadways. Privacy and Security of the public rewards can be maintained using Blockchain Technology.

Keywords: IoT, Waste Segregation, Incentive, Privacy, Security, Blockchain.

INTRODUCTION

We are in 21st century today and can witness a great development in different sectors and living has become easier, happier and healthier. In spite of such improvements there are few weaknesses of every individual which is still pulling us back. One such weakness is littering the garbage on the roadways/sideways than dumping it in the garbage bins. Litter can cause lot of damage to the society like soil pollution, breeding grounds for virus and insects, physical harm to the trash pickers, high clean-up costs. The local governing bodies are taking enough measures to address this situation but the problem remains the same.

This paper mainly focuses on encouraging the individuals to stop littering the dump but use the garbage bins along with governments support. Technology has become a vital part of our lives and has changed a lot over past decade. With the help of Technology, we can make this a quite easy and cheering process and address the problem to the core.

Internet has transformed the entire global workforce. Internet of Things is one of the arising innovations which made connectivity, communication and exchange of data over the internet with ease. A quickly developing segment of IoT gadgets are made for shopper use, including associated vehicles, home computerization, wearable innovation, interface wellbeing and apparatuses with distant checking abilities. Internet of Things has not only made tough tasks simple but also made living very easy.

Our proposed framework can facilitate these significant issues and will have two significant functionalities. Firstly, we get a sophisticated garbage management system, secondly, we vitalize the public to use the dustbins and impart the accountability in them. We build an incentive Dustbin using IoT which accepts the garbage and based on the

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weight a QR scanner displays the code which can be used as the rewards. This application will improve the cleanliness and address many environmental issues related to garbage.

When the data is being absorbed by Sensor embedded devices one of the dangers still prevails which is privacy and security of data. In this paper we address the security issue using Blockchain Technology.

LITERATURE SURVEY

A lot of research has been done earlier on such waste management techniques which truly has a nice scope for removing the issues.

In Efficient Waste Collection System, have designed bins employing RFID, ultrasonic sensors, gas sensors with a central server connected through the Wi-Fi. The worker figures the most limited way for the trash assortment from the receptacles and heightens it to the further assortment measure. The significant weakness here is the Wi-fi limits the execution of such framework to a little region [1].

In “Smart Recycle Bin- An Efficient Garbage Monitoring System” has been introduced, The system's ultra-sonic sensors will detect the trash. This is often smart however, these sensors typically low accuracy. So fundamentally, a GSM modem is implemented to alarm the local bodies, whether the dust reached the edge value, where the ultrasonic sensors is situated at. The main disadvantage is due to the sensor usage, the latency is slow and very low accuracy and no system to inform if the bin if full [2].

In "Smartbin: Smart waste administration framework", has assembled a framework which the information of the completion of the litterbin is gathered by means of sensors and ship off the workers through remote cross section organization. This waste administration framework utilizes an obligation cycle procedure, to lessen power utilization and amplify the operational time. The litter receptacles can be upgraded in a wide range of ways, the litterbin is fundamentally a little module of the Smart Dustbin, it gathers and alarms the mindful specialists when its full [3].

In “Smart Recycle Bin “, have projected a framework that rewards the users by calculative points on the idea of weight and the type of waste embedded in them employing a waste sort detection system. The framework kills the issue of waste isolation on the grounds that the client's focuses are deducted if the sort of waste embedded doesn't coordinate with the sort of canister, however recognizing the kind of the waste and the remunerating framework isn't yet figured [4].

PROPOSED FRAMEWORK

The proposed system improves the current scenario and solves current problems.

The proposed system has mainly three units:

3.1 IoT embedded Dustbin.

3.2 Incentive application.

3.3 Security using Blockchain.

IoT Embedded Dustbin

The dustbin has two passages which allows the user to separate the waste in terms of dry and wet waste. The IoT embedded dustbin is built using four sensors. An RFID sensor RC522 is used to detect the RFID code of the user and opens the door of the Dustbin to collect the waste. An ultra-sensitive sensor HCSR04 is kept to check the margin of the trash dumped, notify the server about the fullness based on the threshold value. A moisture sensor is inserted to ensure the waste is segregated. A load cell PC22 is implemented to measure the quantity of the waste inserted and a LED screen is used to display the weight. Based on the weight a QR code is been generated using Arduino through TFT 128*160 screen. An Arduino Elegoo Uno R3 microcontroller is utilized to peruse the qualities from every one of the sensors and send the information to the backend server.

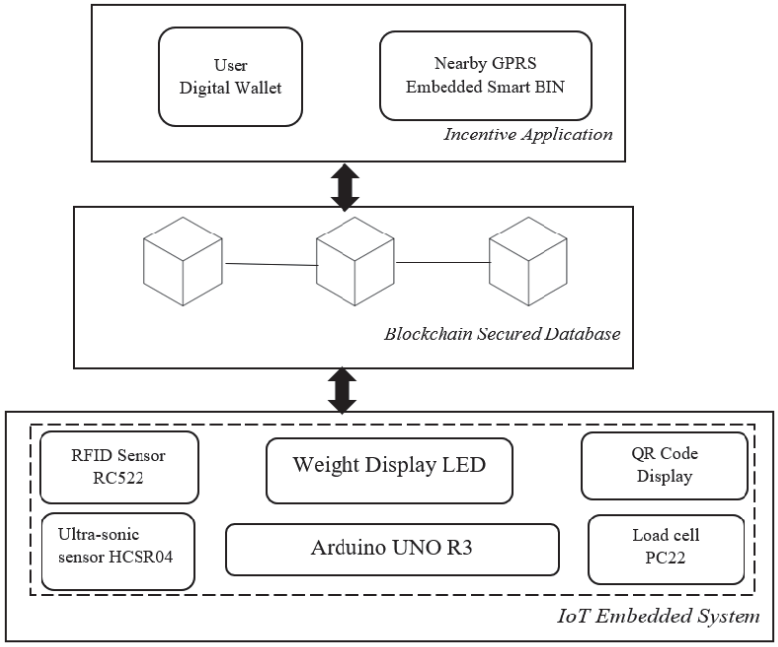

FIGURE 1. System Architecture

Incentive Application

The android application starts with the registration of the user where all the users have to create an account. The application is synchronized with the server with the latest database. It also has the digital wallet to save the rewards and a GPRS which helps to identify the nearby dustbins. The algorithm, based on the readings saved in the server, alerts the local bodies about the fullness of the bin so that they can empty the bin timely and maintain cleanliness. Based on the reading generated by the sensors the algorithm generates a unique QR code using TFT 128*160 screen and the Incentive application will scan it and save the points as the rewards in the user's accounts. The sensors help in validating the waste weather it is well segregated before inserting otherwise the QR code is not displayed. This will help the sorting the waste before inserting so that further processing of the waste will be easy. The points earned by the user based on ruling and regulations can be accepted at any retail store for acquisitions with the government's help.

Security Using Block chain

The server database stores all the private information about each user and primarily the rewards earned by each individual. When these points can be redeemed in retail stores the integrity of the rewards plays an important role. Security can be provide to such exclusive data by using Blockchain Technology. Whenever any user scans the QR code the points earned are appended to the chain based on the "Proof of Stake" method. This not only maintains the integrity of the data but also ensure the government e-payment acceptance have trust on the system.

RESULTS

A Secure Incentive Based Waste Monitoring System Using IoT has been executed with the full setup of the devices. The observations are recorded and observed that it overcomes all the problems observed in the existing system.

FIGURE 2. IoT Embedded Dustbin

FIGURE 3. Display of Weight QR code And Scan with the incentive Applications

In the Fig 2, shows the IoT Embedded Dustbin which accepts the garbage and depending on the segregation and the weight a QR code is displayed and the weight is also displayed on the LED. Every IoT Embedded Dustbin is given a unique ID for the identification, so that the higher authorities can easily figuerout the dustbin, the location it is placed and also empty it accordingly.The Dustbin ID will also help to validated the rewards earned by the public through the respective areas.

Public have to throw the trash inside the bin properly so that the loadcell can weigh the trash correctly and credit the reward points. In the Fig 3, the LED dispaying the weight detected by the loadcell and the TFT Screen displaying the QR code along with the time and date. The displayed QR code should be scanned by the incentive Techbin Application and the reward points will be credited in the respective accounts.

In the Fig 4, A code snippet of QR code has been given which helps to display a unique QR code whenever a new user uses the Dustbin to dump the trash. In the Fig 5, screenshots of the Incentive Techbin Application is given, where all the users need to download the app and get registered. Once registered an account is been created in their name and on the usage reward points keep adding to their account. This application will also help the user to find the nearby dustbin so that utilization will be easy.All the rewards are stored in the block and appended to the blockchain based on the consensus of all the stakeholders of the blockchain on the “Proof of Stake” algorithm to ensure the security.

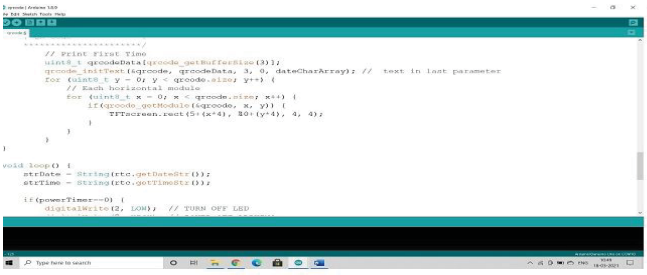

Fig 4: Code for QR Code scanner

FIGURE 4. Code for QR Scanner

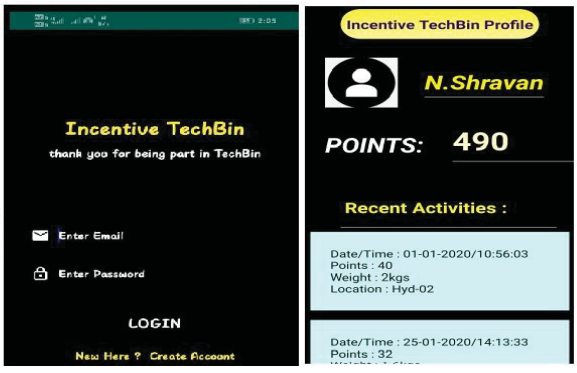

Fig 5: Incentive Techbin Application

FIGURE 5. Incentive Techbin Application

CONCLUSION

We have shown a promising solution to waste management with improved productivity in this paper, such that the massive amounts of investment engaged in garbage management are reduced, and the cycle has made easier for the individuals and the higher authorities. Furthermore, this system will motivate the common man to use the dustbins more rather than spilling it on the roadways and originate of many environmental problems and effecting the hygiene of the public. This problem could be solved by using IoT Embedded Dustbins like this. This method could be used in India, who are struggling with issues like waste management and high healthcare costs.

REFFERENCES

1. Saurabh Dugdhe, Pooja Shelar, Sajuli Jire and Anuja Apte et al."Efficient Waste Collection System", 2016 International Conference on Internet of Things and Applications (IOTA), 22- 24 Jan, 2016.
2. Mohd Helmy Abd Wahab, Aeslina Abdul Kadir, Mohd Razali Tomari, Mohamad Hairol Jabbar et al. "Smart Recycle Bin: A Conceptual Approach of Smart Waste Management with Integrated Web Based System", IT Convergence and Security (ICITCS), 2014 International Conference on 28-30 Oct. 2014.
3. Fachmin Folianto, Yong Sheng Low, Wai Leong Yeow "Smartbin: Smart Waste Management System", 2015 IEEE Tenth International Conference on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP),7-9 April 2015.
4. A. A. K. M. R. T. M. H. J. Mohd Helmy Abd Wahab, "Smart Recycle Bin: A Conceptual Approach of Smart Waste Management with Integrated Web Based System," in International Conference on IT Convergence and Security (ICITCS), Beijing, China, 2014.
5. Y. S. L. W. L. Y. Fachmin Folianto, "Smartbin: Smart waste management sytem," in IEEE Tenth International Conference on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP), Singapore, 2015.
6. S. S. M. P. B. Gopal Kirshna Shyam, "Smart waste management using Internet-of-Things (IoT)," in 2nd International Conference on Computing and Communications Technologies (ICCCT), Chennai, Inida, 2017.
7. K. K. P. Twinkle Sinha, "Smart Dustbin," International Journal of Management and Applied Science (IJMAS), vol. 3, no. 5, pp. 101- 104, 2015.
8. Annepu RK. 2012 Report on sustainable solid waste management in India. Waste-To-Energy Research and Technology Council (WTERT), 1-89.
9. Rana R, Ganguly R, Gupta AK 2015 An Assessment of Solid waste management in chandigarh city India. Electron. J. Geotech. Eng. 20, 1547-1572.
10. P.Suresh, J. Vijay Daniel , R.H. Aswathy, Dr.V.Parthasarathy "A state of the art reviews on The Internet of Things" IOT International Conference on Science, Engineering and Management Research (ICSEMR 2014).
11. Arkady Zaslavsky, Dimitrios Georgakopoulos "Internet of Things: Challenges and State-of-the-art Solutions in Internet-scale Sensor Information Management and Mobile Analytics" 16th IEEE International Conference on Mobile Data Management. 2015.

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Effect of Evaporator Temperature on Closed Loop Pulsating Heat Pipe

[1]N Santhi Sree, [2]N V V S Sudheer, [3]P.Bhramara
[1]Associate Professor, Matrusri Engineering College, Saidabad, Hyderabad, Telangana.
[2]RVR and JC College of Engineering, Mechanical Engineering, Guntur, Andhra Pradesh, India-19
[3]JNTUH, Mechanical Engineering, Hyderabad, Telangana, India-500085
[1]santhinerella@matrusri.edu.in [2]nerellasanthi@gmail.com

Abstract: A Closed loop pulsating heat pipe (CLPHP) filled with working fluids (base fluids) is experimentally investigated at different orientations . The experimental setup is made up of copper tube with 2mm and 3.1mm capillary dimensions and is turned into a serpentine manner with eight U-turns .The experiments are carried for different working fluids viz. water, ethanol, methanol and acetone at different inclination positions such as 0-degee, 45-degree and 90-degree and at a fill ratios of 50%.Different thermocouples are placed at different positions of test rig and temperatures are recorded through data logger. The present paper describes the variation of temperature with time at evaporator at 50% fill ratio for different positions of CLPHP. Based on these temperature data the performance of CLPHP has been analysed. Graphical representation of variation of temperature with time is analysed for different operating conditions for different working fluids .Comparative conclusions are presented for different orientations.

Keywords: Closed Loop pulsating Heat Pipe (CLPHP), Fill ratio, Heat input, Orientation, Temperature, Working fluid.

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