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Creation of 802.11 Wireless Network using CRN

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Abstract*: A network is a collection of wireless node hosts forming a temporary network. Each node is considered to be a wireless device for data transmission and reception. Traditional collaborative spectrum sensing (T-CSS) protocol intelligence networks in order to improve their throughput efficiency. In Cognitive Radio Network the data transmission between Honest Secondary Users and (HSUs) and Secondary User Base Station (SUBS). Collaborative spectrum sensing (CSS) has been proposed in which sensing reports from SUs are sent to multi decision making authorities to produce more reliable decisions on spectrum usage. Trust and Reputation Management Systems (TRMSs) have been proposed to combat malicious behaviours in CRNs. An Energy Efficient Collaborative Spectrum Sensing (EE-CSS) protocol, based on Trust Management is proposed to enhance the throughput Efficiency of data Transmission and Reception in Network resources. And produce energy efficient methods for sensing, reporting, data collection, and Data fusion in CRN.
Keywords*: A collection of wireless node, Cognitive Radio Network (CRN), data transmission, Reception, data collection, reporting and data fusion, primary user, secondary user.

I. INTRODUCTION

The telecommunications network allows computers to exchange data. The connections between nodes are established using either cable media or wireless media. Network computer devices that originate, route and terminate the data are called network nodes. Nodes can include hosts such as personal computers, phones, servers as well as networking hardware. Two such devices are said to be networked together when one device is able to exchange information with the other device, whether or not they have a direct connection to each other. Computer networks differ in the transmission media used to carry their signals, the communications protocols to organize network traffic, the network's size, topology and organizational intent. In most cases, communications protocols are layered on (i.e. work using) other more specific or more general communications protocols, except for the physical layer that directly deals with the transmission media network support applications such as access to the World Wide Web, shared use of application and storage servers, printers, and fax machines, and use of email and instant messaging applications

II. COGNITIVE RADIO NETWORK (CRNS)

Cognitive Radio Network is an adaptive, intelligent radio and network technology that can automatically detect available channels in a wireless spectrum and change transmission parameters enabling more communications to run concurrently and also improve radio operating behaviour. In a cognitive Radio Network Communication Devices. Adaptively change their Transmission and Reception characteristics Network. The adaptation is based on the changing network environment e.g., channel fading, user behaviour, network traffic. In Cognitive Radio Networks (CRNs) wireless communication in which the transmission or reception parameters are changed to communicate efficiently without interfering with licensed users. Parameter changes are based on the active monitoring of several factors in the radio environment (e.g. radio frequency spectrum).This approach enabled by software-defined radio.

III. TYPES OF COGNITIVE RADIOS

A. Full cognitive Radio(" Mitola Radio")
B. Spectrum sensing cognitive Radio
C. Licensed Band Cognitive Radio
D. Unlicensed Band Cognitive Radio

An energy efficient CSS protocol, namely EE-CSS, based on a TRMS, and derives expressions for the steady-state average trust value and the steady-state average total number of sensing reports transmitted by the secondary users (SUs) in the CRN in Fig1.1.Energy consumption model for EE-CSS and T-CSS and use the models to show the scenarios in which EE-CSS is more energy efficient then T-CSS.A method to evaluate Qf and Qd is proposed and closed form expressions for Qd and Qf in the case with no MSUs are derived.

The impact of link outages between the FC and the SUs while exchanging sensing reports on the expressions derived.EE-CSS can reduce the number of reports transmitted by HSUs and thus the Energy consumption (Compared with T-CSS Technique).Energy Efficiency is a way of managing and restraining growth in energy Consumption and less energy to provide the service.

IV. FUNCTIONS OF CRNS

A. Spectrum Sensing

In Cognitive Radio the Secondary User (SUs) need to detect the presence of Primary User (PUs) in a licensed spectrum and quit the frequency band as quickly As possible if the corresponding primary radio emerges in order to interference to primary users. This technique is called spectrum sensing.

B. Spectrum Management

It is the process of regulating the use of radio frequencies to promote efficient use And gain a net social benefit. The term radio spectrum typically refers to the full Frequency range from 3 KHz to 300GHz that may be used for wireless communication.

C. Spectrum Mobility

The process where a cognitive radio user exchanges its frequency of operation. Target to use the spectrum in a dynamic manner by allowing the radio terminals to operate in the best available frequency band. Communication requirements during the transition to better spectrum must be maintained.

D. Spectrum Sharing

It occurs whenever multiple wireless systems operate in the same frequency band sharing is a major challenge in open spectrum usage. Spectrum can also be shared in several dimensions. It corresponds to MAC problems in existing systems.

V. SPECTRUM BASED SHARING

Spectrum sharing cognitive radio networks allows cognitive radio users to share the spectrum bands of the licensed-band users. However, the cognitive radio users have to restrict their transmit power so that the interference caused to the licensed-band users are kept below a certain threshold.

In a cognitive radio network is a device adaptively change their transmission and reception characteristics so as to use scarce network resources. The adaptation is based on the changing network environment E.g., Channel fading, user's behavior and network traffic. The radio spectrum bands allocated to (Licensed) primary users (PUs) for their exclusive use are greatly under-Utilized.

A. Primary User

A user who has higher priority or legacy rights on the usage of a specific part of the spectrum. Licensed-Band Cognitive Radio, capable of using bands assigned to licensed users (except for unlicensed bands, such as the U-NII band or the ISM band. The IEEE 802.22 working group is developing a standard for Wireless Regional Area Network (WRAN), which will operate on unused television Channel.

B. Secondary User

A user who has a lower priority and therefore exploits the spectrum in such a way that it does not cause interference to primary users. Unlicensed-Band Cognitive Radio, which can only utilize unlicensed parts of the Radio Frequency (RF) spectrum. One such system is described in the IEEE 802.15 Task Group Specifications, which focus on the coexistence of IEEE 802.11 and Bluetooth. In a CR network (CRN), (unlicensed) secondary users (SUs) can access unused licensed spectrum bands (spectrum holes).

C. Spectrum Holes

The CR enables the usage of temporally unused frequency bands which are commonly known as Spectrum Holes. An important activity in a CRN is to monitor the spectrum and to allocate the spectrum holes without causing interference to PUs. The CRN should utilize the spectrum holes in a manner that is largely transparent to the PU network.

Collaborative Spectrum Sensing (CSS) has been proposed in which sensing reports from SUs are sent to one or more decision making authorities to produce more reliable decisions on the State of the spectrum usage. However, in the presence of misbehaving or Malicious SUs (MSUs), the integrity of the reports sent by SUs needs to be assessed to avoid interference with PUs and to improve spectrum utilization. Trust And Reputation Management Systems (TRMSs) have been proposed to combat malicious behaviours in CRNs. The aim is to study energy efficient methods for sensing, reporting, data collection, data fusion.

VI. TRUST AND REPUTATION MANAGEMENT

The trust aware model to authenticate the secondary users in CRN, which provide the reliable technique to establish to Trust for CRN. Trust throughput mechanism to measure throughput in CRN. Trust and Reputation Management is a Distributed System. Distributed systems are Group of Network, Independent Network and Physically separator computationally using Software to produce on node integrated and computing facility.

A. Methods

1) *Sensing:* Sensing the detection of a physical presence and the conversion of that data into a signal that can be read by an Observer or an Instrument
2) *Reporting:* A report is a informational work made with the specific intention of replaying information or recounting certain events in a widely presentable form. Reports are often conveyed in writing speech television and film.
3) *Data Collection:* A sensor in wireless sensor Network periodically produces data as it monitors its vicinity the Basic operation in such a Network is the Systematic gathering (with or without in Network Aggregation). Transmission of sensed data to a base station further processing.
4) *Data Fusion:* Merging the results retrieval results of multiple systems. A DF algorithm accept 2 or more ranked lists and merges these lists into a single ranked list with the aim of providing better effectiveness than all system used for data fusion.

VII. EE-CSS PROTOCOL

The two main components of the proposed EE-CSS are the media access control (MAC) protocol and the trust model. Use a contention-free MAC protocol and a trust-weighted data fusion scheme at the FC.

A. MAC protocol

EE-CSS attempts to reduce the number of transmitted reports from HSUs based on the observation that HSU's agree on the spectrum usage more often then they disagree.

B. Trust Model

The information contained in the BSM can be used to evaluate a trust value for each SU based on its reporting accuracy in previous time slot. Classical binomial beta framework is adapted to estimate reputation and trust values for reporting nodes in distributed system. Malicious Secondary User an MSU has all the capabilities of an HSU including sensing and detecting the state of a bands and reporting its decision about the state to the FC in addition an MSU can manipulate its report to benefit unfairly from or to disrupt the CRN.

C. Explicit Report in EE-CSS

The FC can receive an explicit sensing report or agreement /disagreement from each SU during its mini time slot. The three cases in which the FC may receive an explicit sensing report.

D. Link Outage in EE-CSS

An outage occurs when the received signal at the FC or SUs does not satisfy a minimum SNR requirement. The link Outage can occur due to low channel gain or interference from other users in the network. The ever increasing demand for higher data rates in wireless communications in the face of limited or under-utilized spectral resources has motivated the introduction of cognitive radio. Traditionally, licensed spectrum is allocated over relatively long time periods, and is intended to be used only by licensees. Various measurements of spectrum utilization have shown substantial unused resources in frequency, time and space. The concept behind cognitive radio is to exploit these under-utilized spectral resources by reusing unused spectrum in an

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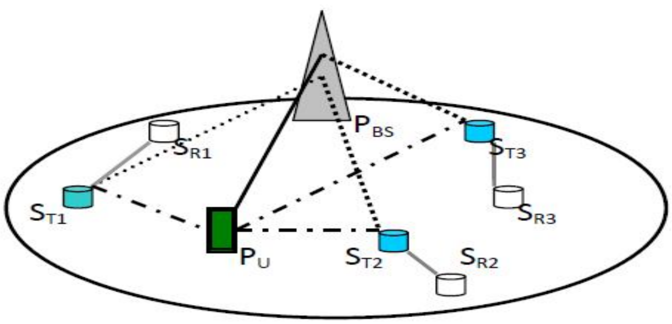
opportunistic manner. The phrase "cognitive radio" is usually attributed to Mitola, but the idea of using learning and sensing machines to probe the radio spectrum was envisioned several decades earlier. Cognitive Radio systems typically involve primary users of the spectrum, who are incumbent licensees and Secondary users who seek to opportunistically use the spectrum when the primary users are idle1. The introduction of cognitive radios inevitably creates increased interference and thus can degrade the quality of- service of the primary system. The impact on the primary system, for Example in terms of increased interference must be kept at a minimal level. Therefore, cognitive Radios must sense the spectrum to detect whether it is available or not, and must be able to detect very weak primary user signals. Thus spectrum sensing is one of the most essential components of cognitive radio.

VIII. EXPERIMENTAL METHODS

A. Cognitive Radio Network

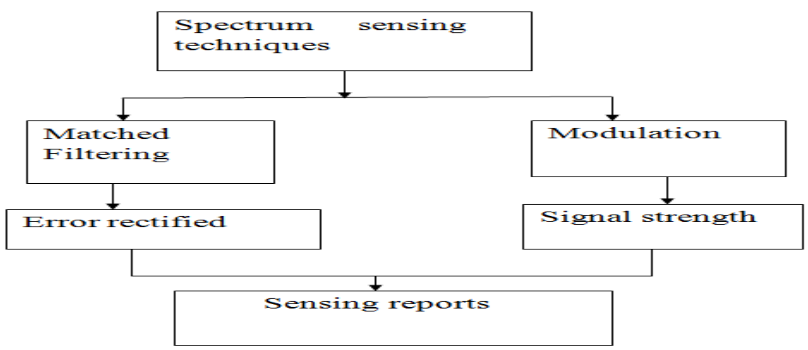
Cognitive techniques have been used in wireless networks to circumvent the limitations imposed by conventional WSNs. Cognitive radio (CR) is a candidate for the next generation of wireless communications system. The cognitive technique is the process of knowing through perception, planning, reasoning, acting, and continuously updating and upgrading with a history of learning. If cognitive radio can be integrated with wireless sensors. CR has the ability to know the unutilized spectrum in a license and unlicensed spectrum band, and utilize the unused spectrum opportunistically. The incumbents or primary users (PU) have the right to use the spectrum anytime, whereas secondary users (SU) can utilize the spectrum only when the PU is not using it.



Cognitive radio Network

B. Collaborative Spectrum Sensing Technique

In this spectrum is used to detect spectrum band for transformation and reception. The matched filter detection technique requires a demodulation of the PU's information signal, such as the modulation type and order, pulse shaping, packet format, operating frequency, bandwidth, etc. CR Network sensing receive information from the PU's pilots, preambles, synchronization words or spreading codes etc in figure 4.4. The advantage of the matched filter method is that it takes a short time and requires fewer samples of the received signal. Sensing reports provided by SUs for a given licensed band may differ due to differences in channel fading gains, locations of SUs and primary network transmitters, number of signal energy quantization levels used at the sensing SU, and sensing errors.



Collaborative spectrum sensing technique

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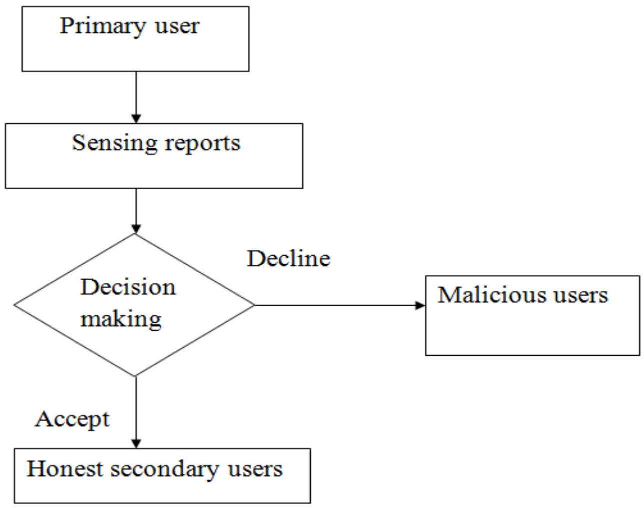
C. Cooperative Trust Management and Avoid Malicious Behaviour

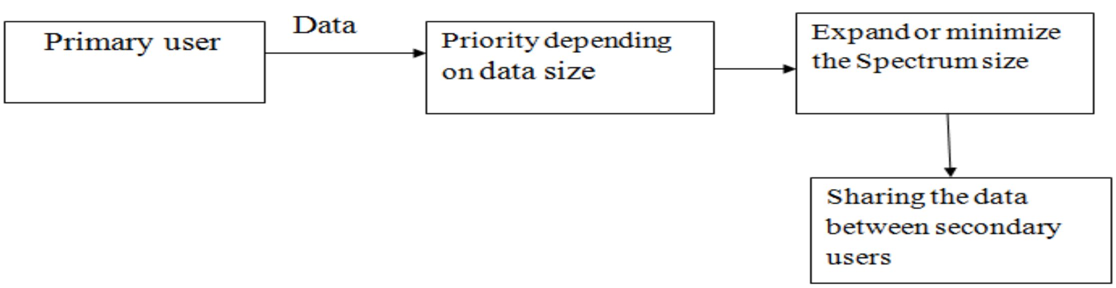
CR Network sensors may encounter incorrect judgments because radio-wave propagation through the wireless channels has adverse factors, such as multi-path fading, shadowing, and building penetration. In addition, CR wireless sensors are hardware constraints and cannot sense multiple channels simultaneously. It has a malicious behaviour to intermediate the signal spectrum. TRMSs record the accuracy of previous sensing reports sent by SUs and compute a trust value for each SU which is taken as the trustworthiness of its future sensing reports. And encounter the reports from SUs may be required to mitigate against the effects of malicious behaviour of MSUs in figure 4.5. Therefore, CR wireless sensors cooperate and share their sensing information with each other to improve the sensing performance and accuracy.



Cooperative Trust Management and avoid malicious behaviour

D. Priority Based Spectrum Transformation

In Cognitive Radio network the users are classified into Licensed Primary Users and Unlicensed Secondary Users and there is no dedicated channel to send data, sensors need to negotiate with the neighbours and select a channel for data communication in CR-WSNs in figure 4.6. This is a very challenging issue, because there is no cooperation between the PUs and SUs. PUs may arrive on the channel any time. If the PU claims the channel, the SUs have to leave the channel immediately. CRN is implemented for short range wireless applications such as wireless sensor networks (WSNs) such wireless and Bluetooth, where the transmission distance is usually small (e.g., tens of meters the steady-state average total number of sensing reports transmitted for each band And assume that the packets transmitted from the FC and SUs are of equal length in both EE-CSS and T-CSS.



Priority based spectrum Transformation

E. Algorithm

Decision making is regarded as the cognitive process of identifying and choosing alternatives based on the values and preferences of the decision maker. Priority scheduling algorithm select the process with highest priority based some attribute of the process.

F. Example

1) Time limits
2) Memory requirements
3) Data size
4) Owner of the process etc.,

G. Applications of Cognitive Radio Network

1) Military network
2) CR mesh network
3) Multimedia
4) Cellular network

H. Combinationarial Optimization Identification Algorithm (COI)

The COI (Combinationarial Optimization Identification Algorithm) to defend against such attacks .Cooperative Spectrum sensing has been shown good performance in improving the accuracy of primary user detection .zhenquiri et al., 2013 proposed a modified Design an attack model, called cooperative attack in which an attacker injects self-consistent false data to multiple sensors simultaneously. A theorem that the center node of a cognitive radio network may face uncertainties under a cooperative attack, especially in the case when a large portion of sensors are compromised. A modified COI algorithm to deal with cooperative attacks. Our algorithm is a good scheme to complement IRIS for cooperative attacks, and can be flexibly adjusted to fulfill the detection delay requirement. Intensively evaluate our algorithm through simulation, with the results validating its performance. The original COI is an approach for identifying multiple instances of bad data in power system state estimation. The essential idea is to construct a partial decision tree using the branch-and-bound method to obtain a feasible solution with the minimum number of bad data. Borrow this idea and make two modifications to fit our problem. As mentioned above, there may be more than one feasible solution. Therefore, our first modification is to find all feasible solutions instead of only the one with the minimum number of bad data. The second modification is setting a time threshold to meet the time requirement in cooperative Spectrum sensing. For instance, in IEEE WRANs, the center node must make detection decision once every 2 seconds. We will run the branch-and-bound method with increasing bound until hitting the time threshold.

I. COI Algorithm Steps

At the beginning, sensor A has the largest normalized residual, and it becomes the root of the tree; with node A declared bad, run state estimation and node B emerges to have the largest normalized residual; then node B becomes the b successor of node A in Fig 2.1.With node B declared bad, run state estimation and node C has the largest normalized residual; then node C becomes the b-successor of node B. construct node D suppose a feasible solution is found. Backtrack to node C, assume node C is good and run state estimation; node E becomes the g-successor of node C. Construct node F; suppose another feasible solution is found. Backtrack to node B and construct node G in Fig2.2.The above construction only shows branching. The bounding is taken care of by a heuristic parameter *h*. Complement IRIS algorithm in cooperative spectrum sensing. We present a theorem to show uncertainties in cooperative spectrum sensing, and point out that from the view of the center node there may exist multiple feasible solutions under a cooperative attack. We propose a modified COI algorithm to improve spectrum sensing performance. Our algorithm can be flexibly adjusted to meet the time delay requirement. Intensively evaluate our algorithm with simulations, and the results show that our algorithm improves the detection accuracy rate compared to IRIS.

J. The Advantages are

1) Improve detection accuracy
2) COI, defend against such attacks.

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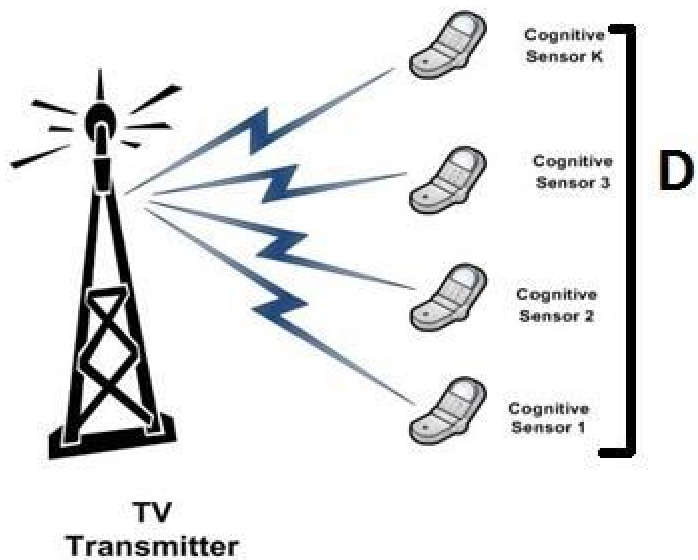
a) *The Disadvantages are:*
i) The malicious users and attacks
ii) As a result such that sensing reports not trust worthy.

K. Clustered Based Algorithms

The spectrum sensing methods can be distributed in three categories i.e. transmitter, receiver.(Dr. Talat Altaf et al.,2013) is propose cluster based algorithms is based spectrum sensing and interference-temperature based detection algorithms. From these, transmitter detection based methods are a preferred way of sensing for presence/absence of spectral holes. These methods can be implemented through various techniques including coherent detection, feature detection and energy based detection algorithms. Coherent sensor is an optimal linear detector for known primary signals in presence of white Gaussian noise. However, detector implementation requires. Demodulation of received signals for achieving the optimal gains.



Cognitive Radio Network, Sensing TV Transmitter

The proposed system model and a brief discussion on the double correlation model are presented in Section II. In addition to that, this section also includes the derivation of asymptotic probability of detection using double exponential model under suburban environments. Section III presents the evaluation of detection probability under given environment conditions in figure 2.3. Section IV concludes the paper in addition to a brief discussion on future work**.** The proposed spectrum sensing scenario in this paper includes a TV transmitter as primary/licensed radio network and the secondary radio network consists of a large number of cognitive sensors, detecting primary transmissions collaboratively. The received signal energy from primary transmitter to cognitive sensor can be represented with y(n) that can be defined as a binary hypothesis testing rule.

L. Clustered Sensing

Clustered sensing corresponds to the case where a number of sensors combine their sensing results for improved detection probability. In this case we consider twenty sensors to submit their results at a fusion center that combines the results of the sensors using OR based combination rule. The following equations can be used to determine detection and false alarm probabilities under suburban environment. Cluster-based detection algorithms are also proposed. This strategy exploits cooperation among sensors to improve detection performance.

1) *The Advantages is :* The reliable and efficient Spectrum.
2) *The Disadvantages is:* Missed Detection problem.

IX. PROBLEM DEFINITION

The T-CSS(Traditional collaborative spectrum sensing)protocol delays in data transmission and unaware of secondary user selection

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for licensed bandwidth and interference occur in unlicensed secondary network, it lack in secondary power, not able to detect weak primary signals, in order to protect primary receivers from interference. By proposing an energy efficient CSS protocol, namely energy efficient collaborative spectrum sensing EE-CSS protocol is used to transmit the data efficiently. EE-CSS attempts to reduce the number of transmitted reports from HSUs, based on the observation that HSUs agree on the spectrum usage more often than they disagree. CRN is to utilize the unused licensed spectrum opportunistically. The SUs should protect the accessing right of the PUs whenever necessary. The interference of SUs to PU depends on the sensing accuracy of Sus. Decision making algorithm is used to detect and decline the malicious secondary user and priority scheduling algorithm is used to allocate the spectrum bandwidth depending on the priority size. Capability of operating at high volumetric densities. Highly intelligent and adaptive to the environment. Development of globally operable CR networks. Enhancing Priority Based Secondary Selection is Used Based on Data Transmission Size.

X. CONCLUSIONS

Cognitive Radio (CR) is an adaptive, intelligent radio and network technology that can automatically detect available channels in a wireless spectrum and change transmission parameter enabling more communications to run concurrently and also improve radio operating behaviour. Cognitive radio uses a number of technologies including Adaptive Radio (where the communications system monitors and modifies its own performance) and Software Defined Radio (SDR) where traditional hardware components including mixers, modulators and amplifies have been replaced with intelligent software. A spectrum sensing scheme, was proposed to improve the utilization efficiency of the radio spectrum by increasing detection reliability and decreasing sensing time. The proposed scheme presented spectrum sensing in effective manner So the priority based and security based spectrum sensing is produced. This system also implemented in hardware successfully.

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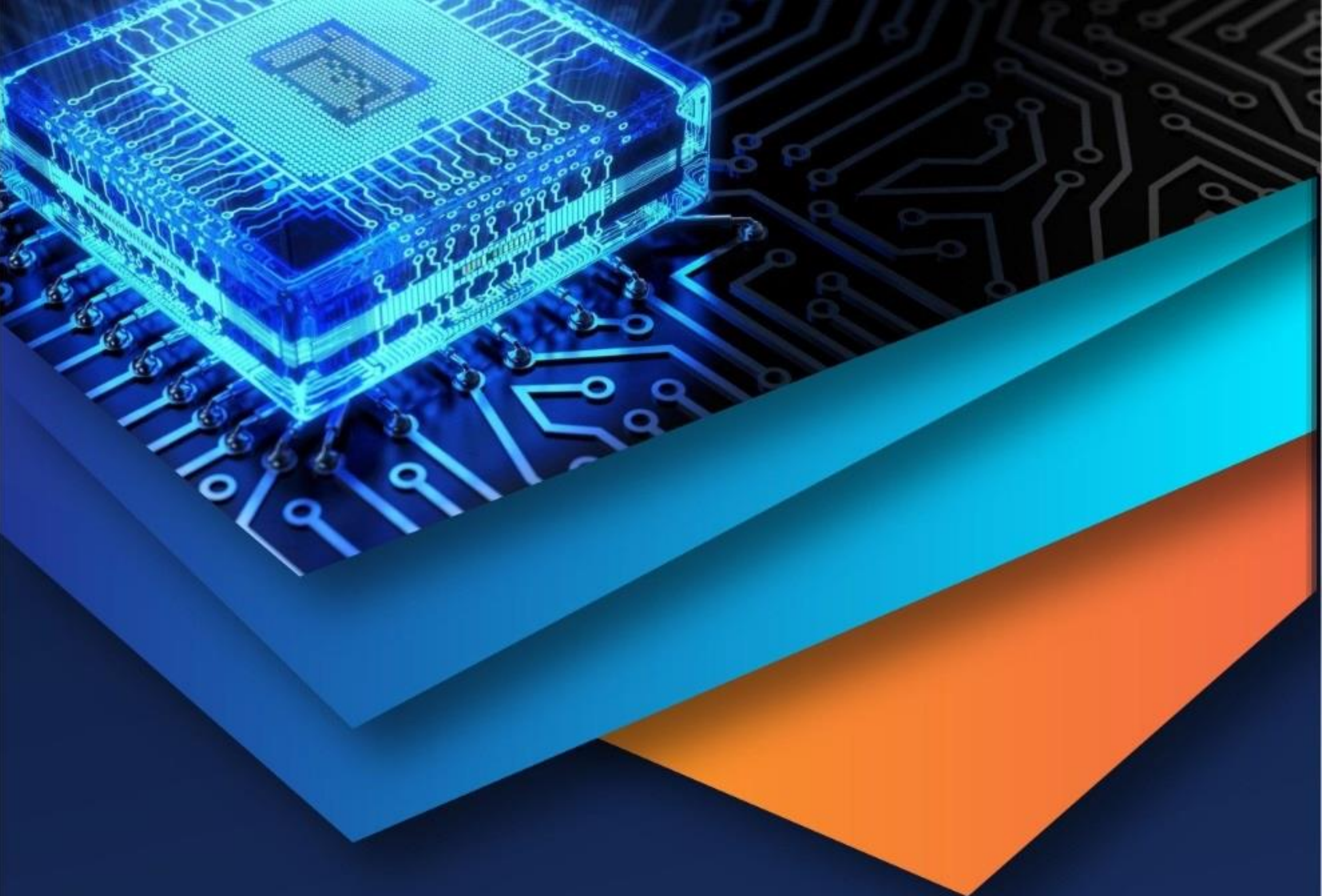

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