iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** IV **Month of publication:** April 2021

DOI: https://doi.org/10.22214/ijraset.2021.33551

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue IV Apr 2021- Available at www.ijraset.com

IOT Based Blood Bank Monitoring and Ibeacon Donor Finder

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Abstract: ***The unit which administers and manages the requisition and distribution of the blood is known as a bank. The main objectives of the blood banks are providing blood to the patients with minimal blood transfusion error. The blood is very important medical supplies so it should be managed well. As the bank management consists of variety of manual steps, therefore it'll become difficult for the blood banks to supply a high level of accuracy, reliability, automation in blood storage and transfusion process. The system proposed is divided into three segments, the first segment consists Temperature & humidity sensor, IR sensor nodes which is installed in rack of blood bank, and blood banks all these are interfaced with Microcontroller. Second segment consists of wi-fi module for data transfer to the server and third segment is displaying the status of obtainable blood stock. All the important time status relates to the available blood stock of the bank are displayed on website, in order that the blood seeker can get the blood from their nearest blood bank. And also, donor have the iBeacon is an android application developed to help users find the right blood donor at the right time. The app stores information of users like name, age, blood type, address, and so on. This ensures the safety of the app. The app helps users find a suitable blood donor when required by searching for the required blood group in the city/area which they want. This helps in reducing time to manually look for a donor.***

Keywords: iBeacon, Blood bank management, Blood donor, Website.

I. INTRODUCTION

Every year the country requires about 4 Crore units of blood, out of which only a meagre 40 Lakh units of blood are available. There are multiple blood banks around the world, however none of them offer the potential for an immediate contact between the donor and recipient. This is often a significant disadvantage notably in cases wherever there's associate pressing would really like of blood. This project aims to beat this communication barrier by providing an instantaneous link between the donor and thus the recipient by victimization low price and low power Raspberry Pi B+ kit. It requires Micro USB of 5V and 2A power supply only. All communication takes place via SMS which is compatible with almost all mobile types. "Automated Blood Bank" proposes to bring voluntary blood donors and people in need of blood on to a standard platform. The proposed work aims at servicing the persons who seek donors who are willing to donate blood and also provide it within the time-frame required. Every year the state needs regarding four Crore units of blood, out of that solely a meagre forty Lakh units of blood area unit out there. Every two seconds somebody desires blood. More than thirty-eight thousand blood donations area unit required a day. A complete of thirty million blood parts area units transfused annually. More than a million new individuals are unit diagnosed with cancer annually. Several of them can would wish blood, typically daily, throughout their therapy treatment. One automotive accident victim will need as several as hundred units of blood. All the on top of requirements are met by the planned work. Automated bank tries to assist victims/patients/those in need of blood.

II. RELATED WORKS

Ashlesha C. Adsul proposed a rapid advancement in Internet of Things (IoT) empowers the solutions to mention new and intriguing applications. The smart Healthcare system is one among the key IOT application that connects smart sensors, patients, doctors, systems and other smart devices to the web . In best manner, the IOT smart healthcare system has provided the likelihood for doctors to watch their patients at a foreign location continuously. Internet of things compromises different technologies like frequency identification, smart mobile innovations mart mobile innovations, wireless sensor network (WSN) which are interacting with each other through the Coap, 6LoWPAN, REST and other protocols. Various architectures supported IOT for the patient healthcare monitoring system has been discussed during this paper. The paper proposes the patient continuous healthcare monitoring system which consists of various sensors, web applications and a connected device Raspberry Pi. the continual healthcare monitoring system will supervise patient's blood heat , vital sign , and heartbeats continuously. The doctor are going to be ready to grasp patient's related information anytime from any locations. Norlaili Mat Safri proposed a wireless temperature monitoring system has been designed and fabricated for the monitoring of bank temperature. The protection of blood is completed by labeling of blood components and stored at refrigerator temperature of 4°C.

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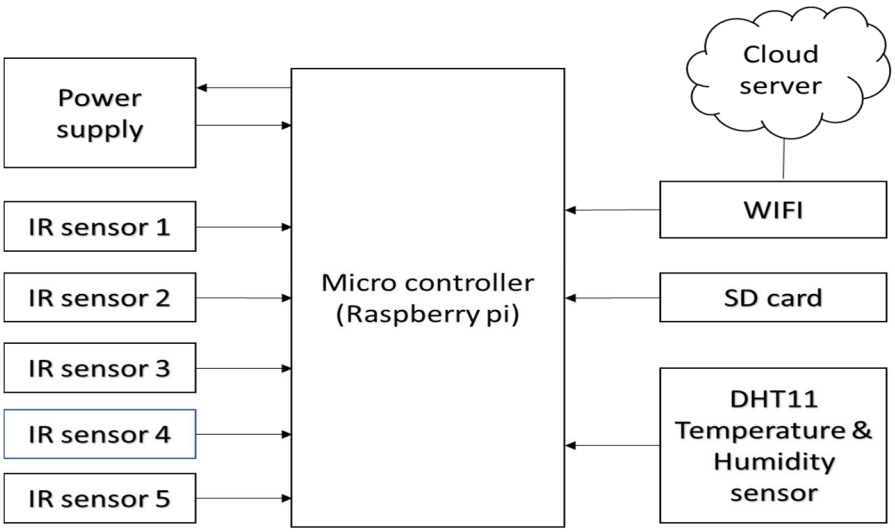
Therefore, it's important to watch the temperature of bank to make sure the blood is stored properly to avoid the shortage of blood supply. This study involve both hardware and software implementation. A circuitry is produced and is placed at the bank which involves thermistor, ZigBee as transmitter and a buzzer as alarm. The temperature data is transmitted for each one second to the bottom station. As for the monitoring system, it'll display the temperature data also as time that received by another ZigBee at the bottom station. By using Lab VIEW, the monitoring system was published to the web by creating an internet site which may reduce the work load without involvement of labour. the mixing of both software and hardware is completed , where activation of the alarm and indicators for both circuit and monitoring system happen simultaneously supported the temperature condition of the bank . K. Sravani proposed a Blood may be a saver of all existing lives just in case of emergency needs. The task of "Automated Blood Bank" is to gather the knowledge from the donors, to watch the blood type database and to send the specified Blood during the necessity of recipient just in case of emergency. we would like to create a network of individuals who can help one another during an emergency. By using low cost and low power Raspberry Pi kit. It requires Micro USB of 5V and 2A power supply only. Entire communication takes place via SMS (Short Messaging Service) which is compatible among all mobile types without internet. This server timely updates the knowledge regarding the donors. Donor are going to be prompted to entire a private details like name, telephone number, blood type. "Automated Blood Bank" is an project that brings voluntary blood donors and people in need of blood on to a standard platform. Automated bank tries to help victims/patients/those in want of blood. it's an attempt to realize bent these people in want of blood and connect them to those willing to donate. The proposed work explores to seek out blood donors by using GSM based open-end credit CPU - Raspberry Pi B+ Kit. The vision is to be "The hope of each Indian in search of a voluntary donor. Lau Jye Hui proposed a A wireless temperature monitoring system has been designed and fabricated for the monitoring of bank temperature. The protection of blood is completed by labeling of blood components and stored at refrigerator temperature of 4°C. Therefore, it's important to watch the temperature of bank to make sure the blood is stored properly to avoid the shortage of blood supply. This study involve both hardware and software implementation. A circuitry is produced and is placed at the bank which involves thermistor, ZigBee as transmitter and a buzzer as alarm. The temperature data is transmitted for each one second to the bottom station. As for the monitoring system, it'll display the temperature data also as time that received by another ZigBee at the bottom station. By using LabVIEW, the monitoring system was published to the web by creating an internet site which may reduce the work load without involvement of labour. the mixing of both software and hardware is completed, where activation of the alarm and indicators for both circuit and monitoring system happen simultaneously supported the temperature condition of the bank .

III. PROPOSED SYSTEM

The proposed system is an embedded system which can closely monitor the available status of the blood and temperature of the refrigerator which is present inside the bank. The proposed system includes service domain and administration domain. Service domain has blood bank that has sensing unit installed to it which has array IR sensor, temperature sensor, humidity sensor node mcu as a gateway with Wi-Fi module using wireless protocol for wireless communication between blood bank and cloud, Ibeacon app for nearest donor finding.

A. Block Diagram



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IV. HARDWARE DESCRIPTION

A. Raspberry PI 3

The Raspberry Pi 3 Model B is the third generation Raspberry Pi. This powerful credit-card sized single board computer can be used for many applications and supersedes the original Raspberry Pi Model B+ and Raspberry Pi 2 Model B. Whilst maintaining the popular board format the Raspberry Pi 3 Model B brings you a more powerful processer, 10x faster than the first generation Raspberry Pi. Additionally, it adds wireless LAN & Bluetooth connectivity making it the ideal solution for powerful connected designs. The Raspberry Pi 3 is the third generation Raspberry Pi. It replaced the Raspberry Pi 2 Model B in February 2016. The Raspberry Pi 3 has an identical form factor to the previous Pi 2 (and Pi 1 Model B+) and has complete compatibility with Raspberry Pi 1 and 2. The best part about all this is that the Pi 3 keeps the same shape, connectors, and mounting holes as the Pi 2 Dual Core Video Core IV Multimedia Co-Processor. Provides Open GL ES 2.0, hardware-accelerated Open VG, and 1080p30 H.264 high-profile decode.

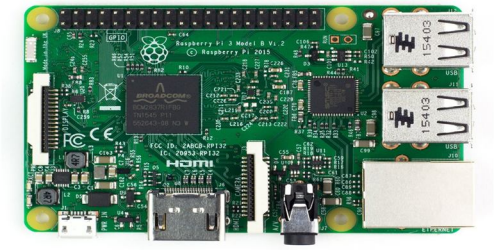

Figure 1 Raspberry PI 3

B. SD Card Port

Secure Digital (SD) cards are removable ash-based storage devices that are gaining in popularity in small consumer devices such as digital cameras, PDAs, and portable music devices. Their small size, relative simplicity, low power consumption, and low cost make them an ideal solution for many applications. This application note describes the implementation of an SD Card interface for the Texas Instruments MSP430, a low-power 16-bit microcontroller. This interface, combined with the MSP430, can form the foundation for a low-cost, long-life data logger or media player or recorder.

C. WIFI

Wi-Fi or Wi-Fi may be a technology for wireless local area networking with devices supported the IEEE 802.11 standards. Wi-Fi may be a trademark of the Wi-Fi Alliance, which restricts the use of the term Wi-Fi Certified to products that successfully complete interoperability certification testing. Wi-Fi most ordinarily uses the 2.4 gigahertz (12 cm) UHF and 5 gigahertz (6 cm) SHF ISM radio bands. Having no physical connections, it's more susceptible to attack than wired connections, like Ethernet.

D. Temperature Sensor

A temperature sensor is a device, typically, a thermocouple or RTD, that provides for temperature measurement through an electrical signal. A thermocouple (T/C) is made from two dissimilar metals that generate electrical voltage in direct proportion to changes in temperature. The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly-proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. LM35 device does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C above a full −55°C to 150°C temperature range. The low-output impedance, linear output, and precise inherent calibration of the LM35 device makes interfacing to readout or control circuitry especially easy. LM35 is a precision IC temperature sensor with its output proportional to the temperature (in °C). The sensor circuitry is sealed and therefore it is not subjected to oxidation and other processes. With LM35, temperature can be measured more accurately than with a thermistor. It also possesses low self heating and does not cause more than 0.1 °C temperature rise in still air.

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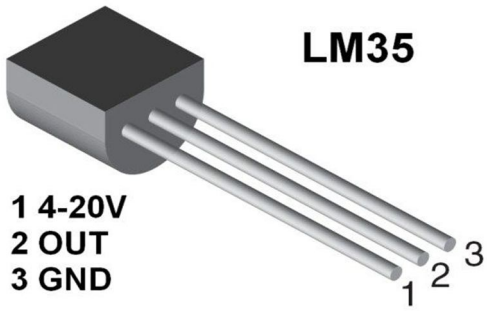

Figure 2 Temperature Sensor

E. Humidity Sensor

A humidity sensor (or hygrometer) senses, measures and reports the relative humidity in the air. It therefore measures both moisture and air temperature. Relative humidity is the ratio of actual moisture in the air to the highest amount of moisture that can be held at that air temperature. A humidity sensor senses, measures both moisture and air temperature. The sensor is composed of two metal plates and contains a non-conductive polymer film between them. This film collects moisture from the air, which causes the voltage between the two plates to change. These voltage changes are converted into digital readings showing the level of moisture in the air.

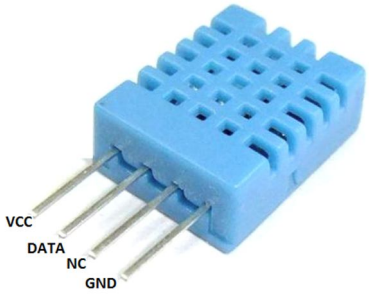

Figure 3 Humidity Sensor

F. IR Sensor

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measure only infrared radiation, rather than emitting it that is called as a passive IR sensor. An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measure only infrared radiation, rather than emitting it that is called as a passive IR sensor.

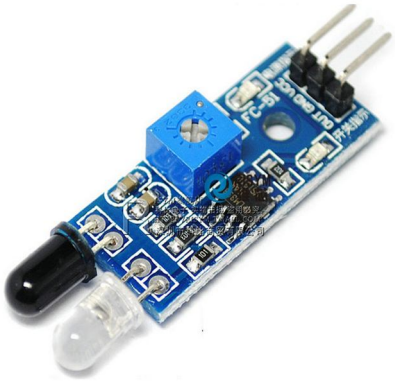

Figure 4 IR Sensor

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Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes, that can be detected by an infrared sensor. The emitter is simply an IR LED and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR light received. The emitter is an IR LED and the detector is an IR photodiode. The IR photodiode is sensitive to the IR light emitted by an IR LED. The photo-diode's resistance and output voltage change in proportion to the IR light received. This is the underlying working principle of the IR sensor. When the IR transmitter emits radiation, it reaches the object and some of the radiation reflects back to the IR receiver. Based on the intensity of the reception by the IR receiver, the output of the sensor defines.

V. SOFTWARE DESCRIPTION

A. iBEACON

iBeacon may be a protocol developed by Apple and introduced at the Apple Worldwide Developers Conference in 2013. Various vendors have since made iBeacon-compatible hardware transmitters – typically called beacons – a class of Bluetooth Low energy (BLE) devices that broadcast their identifier to nearby portable electronic devices. The technology enables smartphones, tablets and other devices to perform actions when in proximity to an iBeacon. iBeacon is based on Bluetooth low energy proximity sensing by transmitting a universally unique identifier picked up by a compatible app or operating system. The identifier and a number of 4 other bytes sent with it are often wont to determine the device's physical location, track customers, or trigger a location-based action on the device like a check-in on social media or a push notification. iBeacon also can be used with an application as an inside positioning system, which helps smartphones determine their approximate location or context. With the assistance of an iBeacon, a smartphone's software can approximately find its relative location to an iBeacon during a store. Brick and mortar retail stores use the beacons for mobile commerce, offering customers special deals through mobile marketing, and can enable mobile payments through Point of sale (POS) systems. Another application is distributing messages at a selected Point of Interest, for instance a store, a stop, an area or a more specific location sort of a piece of furniture or a vending machine. This is similar to previously used geo push technology based on GPS, but with a more reduced impact on battery life and better precision.

B. Python

Python features a dynamic type system and automatic memory management. It supports multiple programming paradigms, including object-oriented, Imperative, functional and procedural, and has a large and comprehensive standard library. Python interpreters are available for many operating systems. Python, the reference implementation of Python, is open-source software and features a community-based development model, as do nearly all of its variant implementations. Python is managed by the non-profit Python Software Foundation. Python is a multi-paradigm programming language. Python uses dynamic typing, and a mixture of reference counting and a cycle detecting garbage man for memory management. It also features dynamic name resolution (late binding), which binds method and variable names during program execution. Rather than having all of its functionality built into its core, Python was designed to be highly extensible. This compact modularity has made it particularly popular as a means of adding programmable interfaces to existing applications. Van Rossum's vision of a small core language with a large standard library and easily extensible interpreter stemmed from his frustrations with ABC, which espoused the opposite approach.

C. Linux

Linux was developed for private computers supported the Intel x86 architecture, but has since been ported to more platforms than the other OS. due to the dominance of the Linux kernel-based Android OS on smartphones, Linux has the most important installed base of all general-purpose operating systems. Linux is additionally the leading OS on servers and other big iron systems like mainframe computers, and therefore the only OS used on TOP 500 supercomputers it's employed by around 2.3% of desktop computers. The Chromebook, which runs the Linux kernel-based Chrome OS, dominates the USK12 education market and represents nearly 20% of the sub $300 notebook sales within the US. Linux also runs on embedded systems devices whose OS is usually built into the firmware and is very tailored to the system. This includes TiVo and similar DVR devices, network routers, facility automation controls, televisions, video game consoles and smartwatches. Many smartphones and tablet computers run Android and other Linux derivatives. The development of Linux is one among the foremost prominent samples of free and open-source software collaboration. The underlying ASCII text file could also be used, modified and distributed commercially or non-commercially by anyone under the terms of its respective licenses, like the GNU General Public License.

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VI. RESULTS AND DISCUSSION

The output of the proposed system is shown in figure 5.

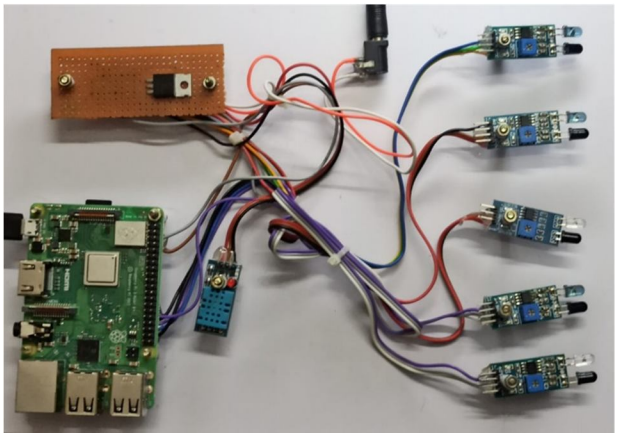

Figure 5 Output Of The Proposed System

The donor page shows the name of the donor, blood group, age, phone number and lastly updated date and time. It also shows the distance of the donor from the required hospital. The location of the requesting hospital for emergency of blood is take as dynamic and the location of the blood donor as static. These data are calculated and the distance from the dynamic to static location

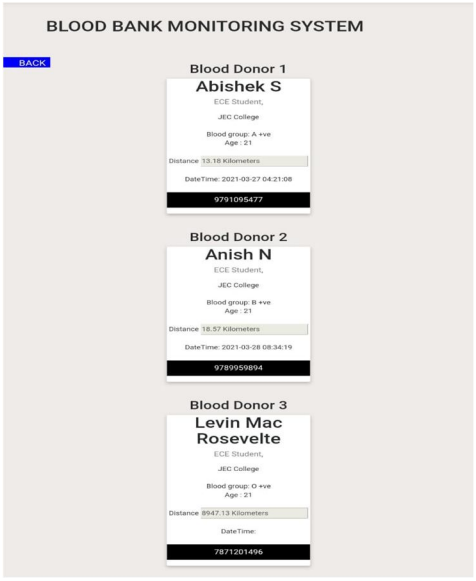

Figure 6: Webpage Of Blood Donor

VII.CONCLUSION

Growing population has increased the necessity for the blood supply for various diseases. In every two seconds, some person required transfusion and currently India facing problem of the blood shortage. to deal with the matter an efficient system is meant using the web of things. The system provides a strategy to fulfil the need of blood to the patients/victims without rushing to the bank to understand the supply of the blood. An IR Sensors are connected to the controller board which continuously monitors the status of the available bloodstock. In this work, the output data provided by the controller is displayed on the webpage using the Wi-Fi module so anyone accesses the web site and obtained the knowledge of obtainable bloodstock in real time. it'll reduce the manpower required at the bank to update the web data also reduces the efforts of blood seeker of searching bloodstock at each bank. When bloodstock reaches to zero system helps to send an invitation message to the donor and nearest bank. By using IoT the real-time available bloodstock is displaying on the web site it minimizes the efforts of blood seeker

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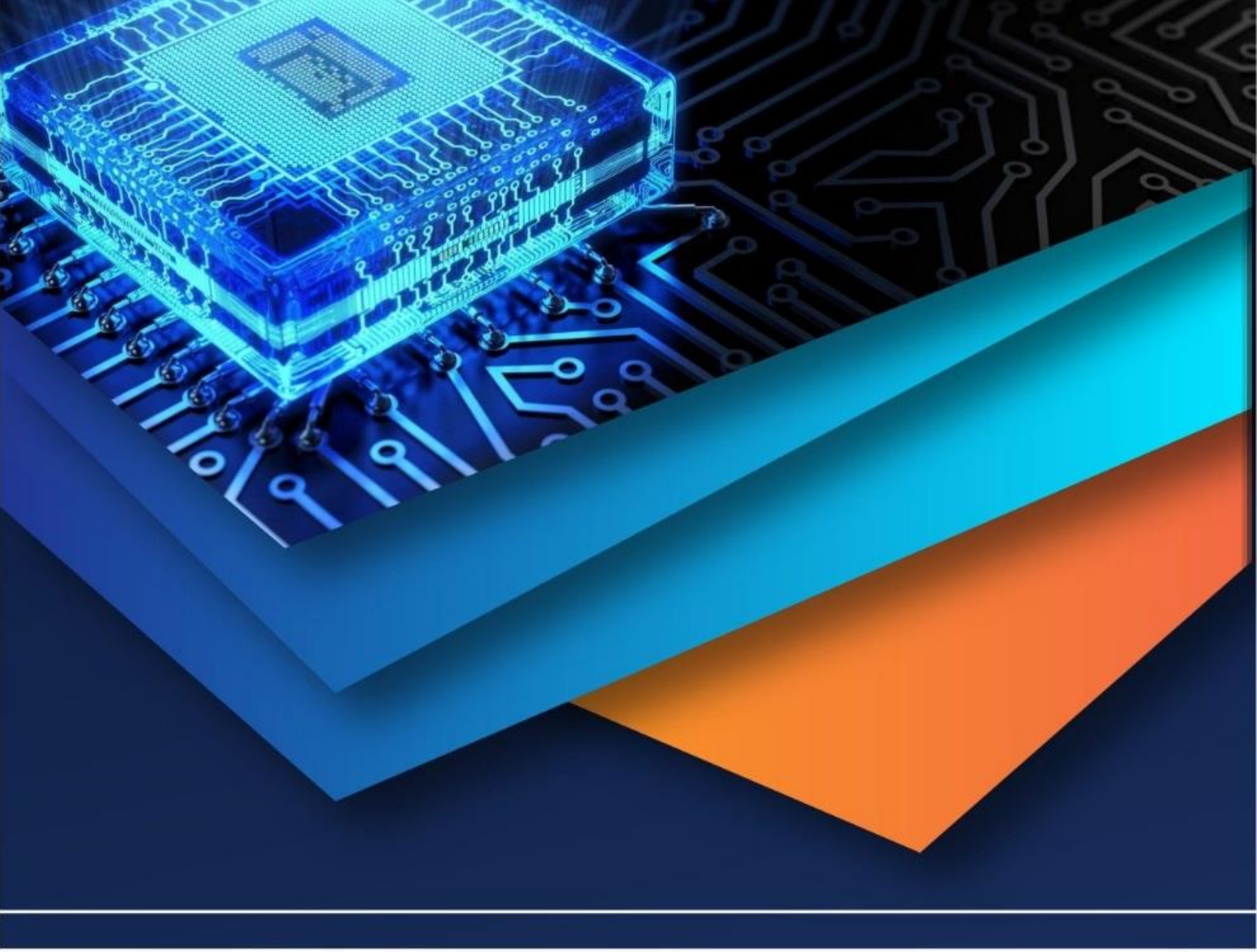

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