iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** V **Month of publication:** May 2023

DOI: https://doi.org/10.22214/ijraset.2023.51395

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue V May 2023- Available at www.ijraset.com

Smart Irrigation System

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Abstract: ***IoT and Remote Detecting Innovation are generally utilized wherever in the current logical world. As the innovation is developing and evolving quickly, Remote detecting Organization (WSN) serves to update the innovation. In the examination field of remote sensor networks, the power effective time is a significant issue. The answer to this issue can be tackled by utilizing the LoRaWAN innovation with IoT. The fundamental thought of this is to grasp how information goes through a remote medium transmission utilizing remote sensor organization and checking framework. This paper plans a water system framework that is robotized by utilizing controllable boundary soil dampness on the grounds that they are the significant elements to be controlled in Dad (Accuracy Horticulture).***
Keywords: IOT Technology, Sensor Technology, Drip irrigation.

I. INTRODUCTION

With the development of the world, the health monitoring system in India is a developing and agriculture-based country. 1/3 of the rain is falling in our country. Day by day manpower availability for farming is lacking. To introduce a new range of technologies and fuel more development on underdeveloped or new technologies for making India develop. Due to this problem, farmers face a lot of issues. Therefore, it is very difficult for an average farmer to gain information regarding soil and weather is good for crop production or not. Due to very poor water management and not much scientific development is happened in agriculture, our contribution is on using IOT for Smart Irrigation Systems with LoRaWAN technology. Smart electromagnetic valve-based irrigation system. Through the LoRaWAN communication, we can access up to 120 devices. It is a full-duplex communication-supported device. This proposed system 'automatic irrigation using LoRaWAN' helps to understand the soil and humidity conditions that are ideal for irrigation. A sensor is deployed, which gives information about moisture and humidity content in the different soil. The sensed data are transmitted to the control station LoRaWAN.

II. LITERATURE REVIEW

Maksudjon Usmonov and Francesco Gregoretti, in this paper, the solution using LoRa technology for cost-effective wireless control of drip irrigation systems has been presented. The system which utilizes LoRa modules to establish reliable radio links has been designed and a customized data transfer protocol that stratifies the requirements has been deployed. It is shown that this solution has advantages over the existing LORAWAN protocol in terms of cost complexity for this specific application.

Wenjo Zhao, Shengwie Lie, Jiwen Han, Rongtao Xu, and Lu Hao, this paper proposes a smart irrigation system based on LoRa technology. In order to validate the excellent execution of the proposed irrigation system, experiments have been carried out. Exploratory outcomes approve the materialness of the proposed framework. Simultaneously, the benefits of LoRa innovation received in the keen water system framework have appeared through tests. The system proposed by us facilitates more efficiency and also minimizes the cost of deployment and maintenance. According to the experimental results, the irrigation node equipped with a hydroelectric generator can operate for decades. The communication distance between the irrigation node and gateway is up to 8 *km*, thus the irrigation system can cover up to 200 hectares. By mobile App, users can control the irrigation system remotely and check the status of the system in time. It is believed that adopting LoRa technology to smart irrigation systems will significantly stimulate the development of smart agriculture Of course, we have a lot of follow-up work to do to make the system more intelligent and precise controlling.

K. Zheng, S. Zhao, and Z. Yang, in this paper, implemented an air quality monitoring system by using advanced IoT techniques in this paper. With the guidance of the LPWA organization, the air-detecting information over a huge inclusion region is gathered and sent to the IoT cloud on schedule. The gateway checking hubs are produced for simple organization and can work the entire day with a battery or a sun-based board. Every one of the elements of the AP is carried out on a GPPbased SDR stage. The detected information is put away in the data set and dissected in the IoT cloud. A lot of investigations have been completed in metropolitan conditions to approve the dependability of the proposed framework. Some intriguing realities have been uncovered when contrasting the air quality pattern and other comparable information.

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It is accepted that long haul and huge scope air observing can significantly assist us with understanding air contamination and figuring out how to tackle the.

K. Zheng, H. Meng, and P. Chatzimisions, in this paper we have proposed a computation resource allocation scheme for a Vehicular Distributed computing framework, which is detailed as an infinite skyline Semi-Markov Decision Process (SMDP). An ideal dynamic plan is acquired through the emphasis calculation to augment the drawn-out anticipated all-out remuneration of the VCC framework. Mathematical outcomes show significant expect reward execution acquisition over others, e.g., contrast and Greedy Allocation (GA) conspire, with almost 7% execution acquired when either λ p is high or K is low. Besides, the intricacy of the SMDP-based plan is lower than that of the SA Conspire.

L. Atzori, A. Iera, and G. Morabito, The Internet has changed drastically the way we live, moving interactions between people at a virtual level in several contexts spanning from professional life to social relationships. The IoT can possibly add another measurement to this interaction by empowering correspondences with and among brilliant articles, consequently prompting the vision of "whenever, anyplace any media, anything" communications In this paper, we have overviewed the main parts of the IoT with accentuation on the thing is being done and what are the issues that require further exploration. In fact, current advances make the IoT idea practical yet don't fit well with the adaptability and effectiveness prerequisites they will confront. We accept that given the interest appeared by enterprises in IoT applications, before long resolving such issues will be an incredible driving element for systems administration and correspondence research in both mechanical and scholarly labs.

S. Manimurugan, this work was defined with the objectives of helping the farmers through the recent technologies by reducing their burdens, and loss and enlarging the yields. In connection with that, the survey of their real problems had been undertaken and listed in the previous sections. The most important problem on the list is considered and it is addressed by the proposed smart water irrigation system for the high-yield process. Though many sensors are used the installation cost of the developed technology should be less. It is also been addressed. As the outcome of this work, it can support the farmer's needs 100%, secure them from loss, with cost less and gain more.

Poonam S. Jakhotiya, Dr. N. N. Kasat, Dr. A. D. Gawande, Dr. V. T. Gaikwad, the practice of smart agriculture using LoRa to LoRaWAN network. There are two LSN50 nodes, one at the transmitter and the other at the receiver. The node at the transmitter is equipped with a variety of sensors that collect and transmit data to our cloud services, while the node at the receiver is equipped with actuators for controlling the technology enhancing the former methods of collecting and analyzing data in the agro-environmental system. By leveraging LoRa technology and LoRaWAN protocol, agribusiness can digitally monitor, analyze and monitor every aspect of their business. Lora automatic sprinklers, turn on/off the valve, etc... technology provides a solid platform for the When a command is sent through the TTN network, the LSN50 node gets the data from the sensors which can be seen through TTN and the future of smart agriculture as it is easy to deploy and helps farmers to grow their business.

III. METHODOLOGY

Smart electromagnetic valve-based irrigation system, as the title said the main purpose behind that system. This paper is to design a device that monitors soil moisture, temperature, and humidity of the field atmosphere and transmits the information to the remote receiver at the farmhouse or outside the field. The remote receiver (Receiver) is a laptop connected to the LoRa transceiver.

A soil moisture and temperature humidity sensor are fetched to the WSN data collection node. The sensor node also consists of an LCD module, where the sensor output is shown in real-time. The sensor node is the building unit of the WSN. The duty of the sensor node is to achieve the perception, collection, processing, and wireless transmission. The sensor node converts the physical quantity to the voltage signal and the Arduino Nano board controls the processing and manages the utilized different types of sensors for the Automatic Smart irrigation system.

A. Block Diagram

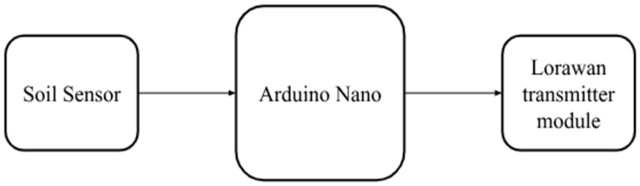


Fig1.1 shows that the transmitter system

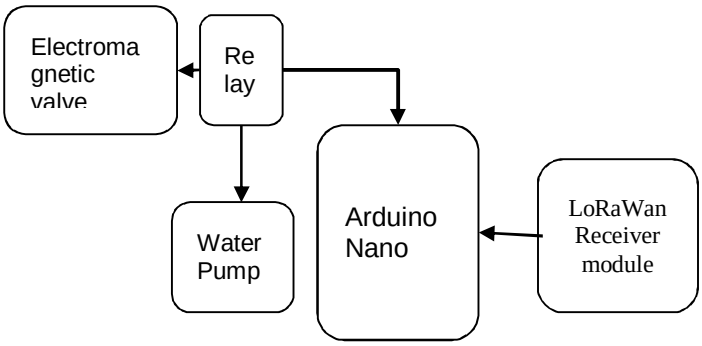
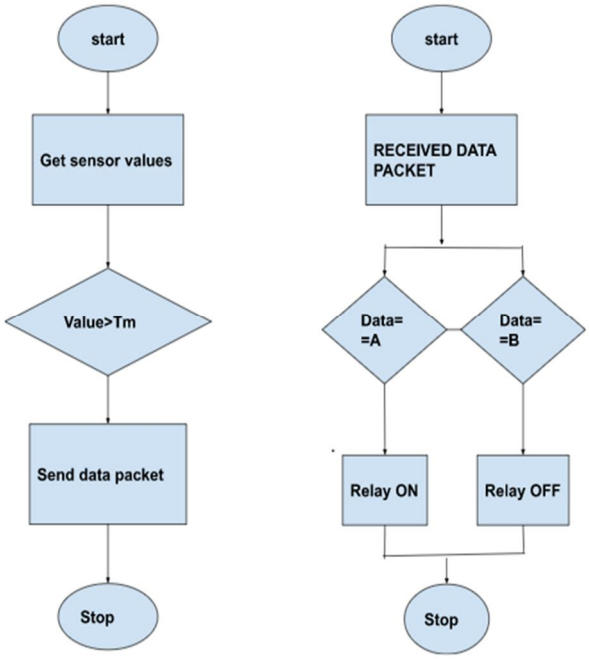


Fig1.2 shows that the Receiver system

B. Description

This block diagram contains Arduino UNO, DHT11 as a temperature sensor, a Pulse rate sensor, an oximeter, and things that speak. The Node MCU is used as a microcontroller. The 3 Sensor is connected to the Node MCU. things speak is used as a display unit or communication device, where the output of three sensors is displayed on the things speak.

C. Flow Chart



IV. SYSTEM REQUIREMENT

A. Hardware Requirement

1) *Arduino Nano*- Arduino Nano is one type of microcontroller board, and it is designed by Arduino. cc. It can be built with a microcontroller like Atmega328. This microcontroller is also used in Arduino UNO. It is a small-size board and also flexible with a wide variety of applications. Other Arduino boards mainly include Arduino Mega, Arduino Pro Mini, Arduino UNO, Arduino YUN, Arduino Lilypad, Arduino Leonardo, and Arduino Due. And other development boards are AVR Development Board, PIC Development Board, Raspberry Pi, Intel Edison, MSP430 Launchpad, and ESP32 board.
2) *Lorawan module (SX1287)*- The SX1278 LoRa modules are used in Long Range communications. It is a type of low-cost RF front-end transceiver module based on SX1278 from Semtech Corporation. The high sensitivity (-136dBm) in LoRa modulation and 20dBm high power output make the module suitable for low-range and low-data rate applications.

3) *Water Pump*- Water pump motor is a direct current motor device that moves fluids. A DC motor converts direct current power from electrical to mechanical power. DC or direct current motor operates on the principal, when a current-carrying conductor is placed in a magnetic medium, it experiences a torque and has the propensity to move. This is known as motoring action.
4) *Relay*- Relay is one kind of electro-mechanical component that functions as a switch. The relay coil is energized by DC so that contact switches can be opened or closed. A single channel 5V relay module generally includes a coil, and two contacts normally open (NO) and normally closed (NC).
5) *Soil Sensor*- Soil moisture sensor can be used to check the moisture of soil, when the soil is consuming water shortage, the module output is at a high level, and else the output is at a low level. Using this sensor one can spontaneously water the flowering plant, or any other plants requiring an automatic watering technique.
6) *Electromagnetic Valve*- The solenoid is an electromagnetic part of a valve, comprised of a coil, core tube, core, and enclosure. The selection of 2-way, 3-way, and 4-way solenoid valves are designed to handle the most demanding fluid control applications.

B. Software Requirement

1) *Arduino IDE*- Arduino IDE is open-source software that is mainly used for writing and compiling code into the Arduino Module. It is official Arduino software, which makes code compilation too easy that even a common person with no prior technical knowledge can get their feet wet with the learning process. A range of Arduino modules is available including Arduino Uno, Arduino Mega, Arduino Leonardo, Arduino Micro, and many more. Each of them contains a microcontroller on the board that is actually programmed and accepts the information in the form of code. The main code, also known as a sketch, created on the IDE platform will ultimately generate a Hex File which is then transferred and uploaded to the controller on the board. The IDE environment mainly contains two basic parts: Editor and Compiler where the former is used for writing the required code and later is used for compiling and uploading the code into the given Arduino Module
2) *Proteus*- The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.
3) *Embedded System*- Embedded C is a set of verbal extensions for the C programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires modified extensions to the C language in order to support exotic structures such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operation.

V. IMPLEMENTATION

A. Circuit Simulation

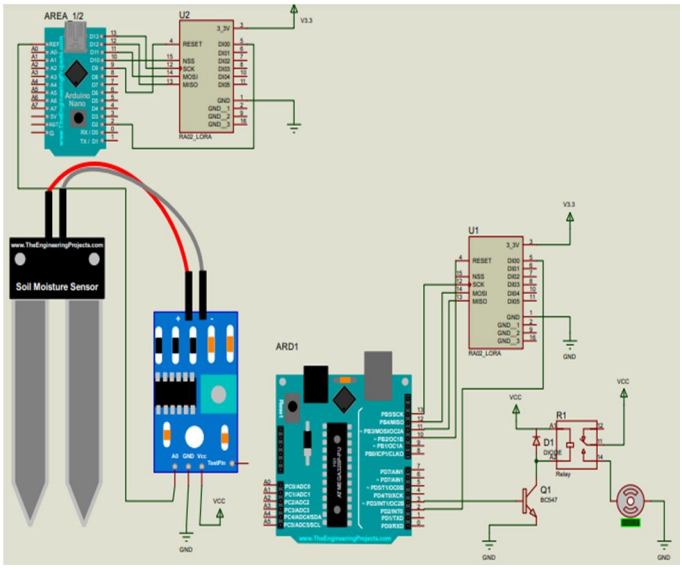


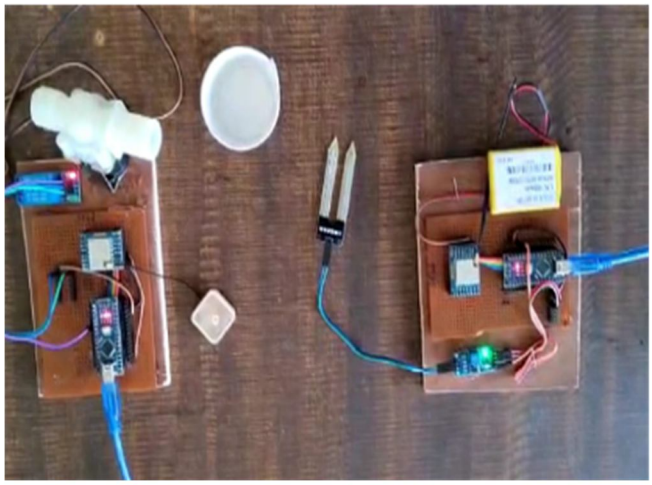
Fig1.3 Circuit Diagram

B. Working

The paper titled "SMART ELECTROMAGNETIC VALVE BASED IRRIGATION SYSTEM" is proposed for smart irrigation which is based on the LoRaWAN technology. Here we used LoRaWAN technology to implement the system on the small as well as the large farm. we make two circuits here transmitter circuit and a receiver circuit. In the transmitter circuit, the soil sensor takes the data from the soil to the Arduino Nano and this data has sent to the Receiver circuit. If the measurement value of the soil sensor is equal to the threshold value, then the relay trigger is off and using electromagnetic valve irrigation start. If no need for water, then the Pump and get off. This is a real-time project so for the big farm we can use multiple wireless circuits for implementing the same system.

VI. RESULT

The below fig shows the complete proposed system using LoRaWAN Module.



VII. CONCLUSION

The paper leads as the model and the successful arrangement over the issue of irrigation management. The Soil Moisture values are obtained at the remote site using the LoRa technology. So this cost-effective project ensures great yield production and Less Human Intervention in The practice of smart agriculture using the LoRa to LoRaWAN network. There are two LSN50 nodes, one at the transmitter and the other at the receiver. The node at the transmitter is equipped with a variety of sensors that collect and transmit data to our cloud services, while the node at the receiver is equipped with actuators for controlling the technology enhancing the former methods of collecting and analyzing data in the agro-environmental system. By leveraging LoRa technology and LoRaWAN protocol, agribusiness can digitally monitor, analyze and monitor every aspect of their business. Lora automatic sprinklers, turn on/off the valve, etc. technology provides a solid platform for the When a command is sent through the TTN network, the LSN50 node gets the data from the sensors which can be seen through TTN and the future of smart agriculture as it is easy to deploy and helps farmers to grow their business.

VIII. FUTURE SCOPE

The Cloud Systems are used to host the applications that are being used in the implementation of this system. This will all be connected to a public cloud which serves as a supervisor for the field monitoring. The cost factors resemble high in hosting a private cloud and to maintain it. The public cloud is viable and affordable in price. The main advantage is to pay for what you use. The future scope of this is to make advantage of the public cloud in numerous ways other than real-time data monitoring.

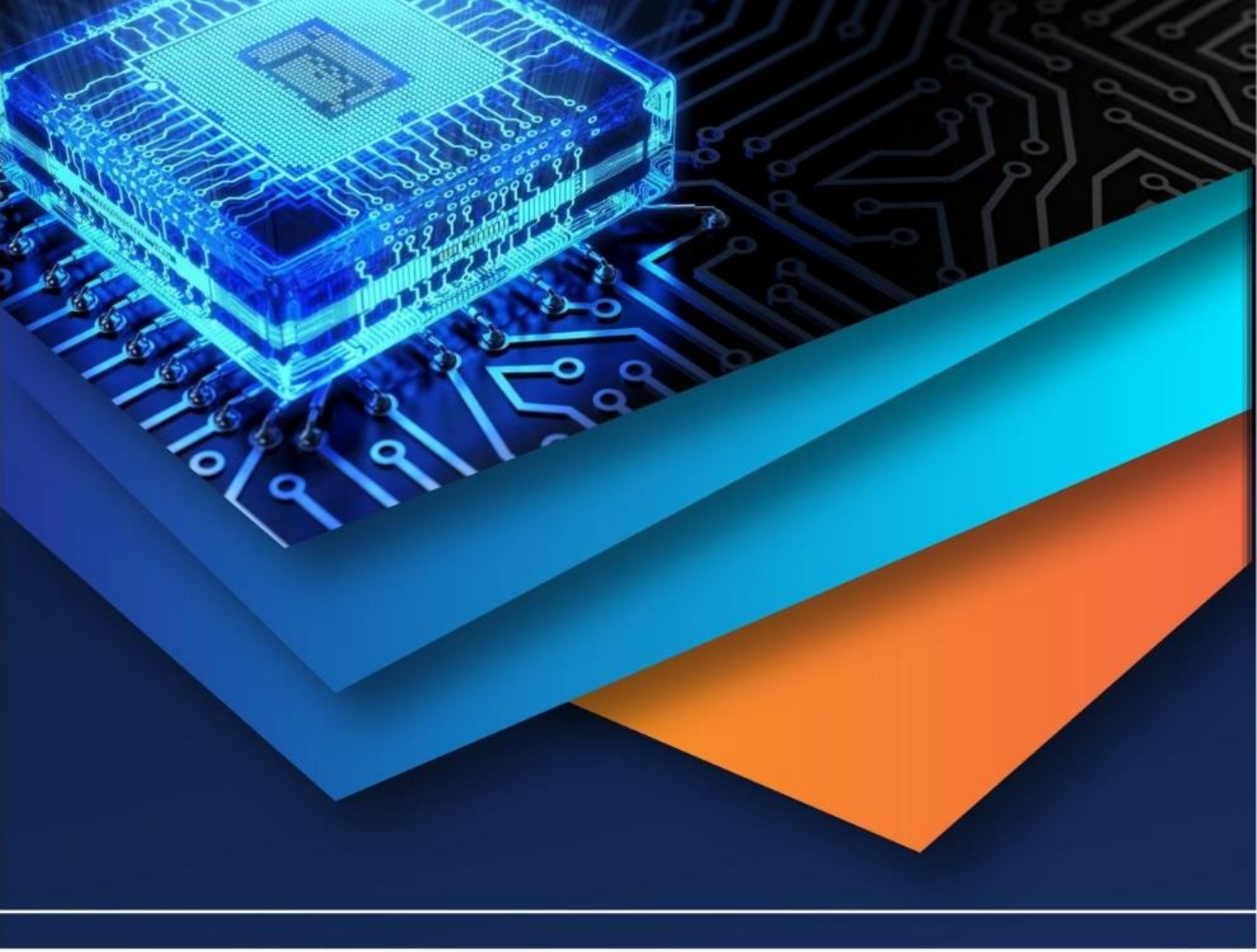
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