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# Smart Drip Irrigation System Using IOT

Korabu Sofiya[1], Pawar Gouri[2], Gandule Shital[3], Gaikwad Tararani[4], Prof. Vasekar S.R.[5]
[1,2,3,4] *Student, Department of Computer Science and Engineering, SMSMPITR, Akluj, Maharashtra, India*
[5]*Assistant Professor, Department of Computer science and Engineering, SMSMPITR, Akluj, Maharashtra, India.*

***Abstract:*** ***Water is the important source in human life. Around 80 % to 90 % water used in agriculture field. As due to day by day growth in globalization and population water consumption is also increases. Today automation is one of the important roles in agriculture field. Agriculture is the primary occupation in our country. India's major income source is depending on agriculture therefore the development of agriculture is important. In today also most of the irrigation systems are operated manually. The available traditional techniques are like drip irrigation, sprinkler irrigation etc. By the use of Drip Irrigation we can save water and fertilizer provided to the crops. Whenever there is a change in temperature, humidity and current status of rain of the surroundings these sensors senses the change in temperature and humidity and gives an interrupt signal to the raspberry pi. This paper focuses primarily on reducing the wastage of water and minimizing the manual labor on field for irrigation so that you can save time, cash and power of the farmer.***
***Keywords: Smart Drip Irrigation, Automated Drip Irrigation, Soil Moisture, Drip Irrigation, Irrigation System***

## I. INTRODUCTION

India is the country of village and agriculture plays an important role for development of country. In our country, agriculture depends on the monsoons which has insufficient source of water. So the irrigation is used in agriculture field. In Irrigation system, depending upon the soil type, water is provided to plant. In agriculture, two things are very important, first to get information of about the fertility of soil and second to measure moisture content in soil. Nowadays, for irrigation, different techniques are available which are used to reduce the dependency of rain. And mostly this technique is driven by electrical power and on/off scheduling. In this technique, water level indicator placed in water reservoir and soil moisture sensors are placed root zone of plant and near the module unit handles the sensor information and transmit data to the controller which in turns the control the flow of water through the valves. The Internet of Things (IoT) is transforming the agriculture industry and enabling farmers to content with enormous challenges they face. Livestock monitoring, conservation monitoring and plant & soil monitoring are the challenges where IoT can be a solution. The innovative IoT applications address the issues in agriculture and increase the quality, quantity, sustainability and cost effectiveness of agricultural production. Here we are using different sensors like humidity, temperature, moisture, rain drop etc. These sensors gives signal to the microcontroller and microcontroller gives the data to the isolated server through a serial communication. Today's large and local farms can leverage IoT to remotely monitor sensors that can detect soil moisture, crop growth and detect pest and control their smart connected harvesters and irrigation equipment's. This project aims at monitoring the soil parameters like soil moisture, temperature and electrical conductivity and automates the irrigation process. Decision making is done through microcontroller. User is acknowledged about the field when there is any deviation from the expected values via text message. Along with soil parameters, plant pest detection is also included in this project. This ensures the complete system health.

## II. STUDY AREA

### A. *Literature Survey*

1) *Implementation Of IOT In Smart Irrigation System Using Arduino Processor:* In[1] October 2017 .V. Vinton Kumar, R.Ramasamy, S.Janarthanan,M. VasimBabu anther tells that proposed Irrigation system IoT is implemented, in this system all the information that are received from the sensors and the various parameters are given to the Arduino microcontroller as an analog input. A preset value of soil moisture sensor is fixed in microcontroller and also for fencing.
2) *IOT Based Smart Irrigation System:* In[2] February 2017 ,Srishti Rawal author tells that Automation of farm activities can transform agricultural domain from being manual and static to intelligent and dynamic leading to higher production with lesser human supervision. This paper proposes an automated irrigation system which monitors and maintains the desired soil moisture content via automatic watering. Microcontroller ATMEGA328P on Arduino platform is used to implement the control unit. The setup uses soil moisture sensors which measure the exact moisture level in soil.
3) *Smart Irrigation System using IOT:* In [3] September 2017,Arif Gori, Mangles author tells about As water supply is becoming scarce in today's world there is an urgency of adopting smart ways of irrigation. The project describes how irrigation can be

handled smartly using IOT. This project aims at saving time and avoiding problems like constant vigilance. It also helps in conserving water by automatically providing water to the plants/field depending on the water requirements. This system can also prove to be helpful in agriculture, parks and lawns.

4) *Smart Irrigation System using IOT Approach:* In [4] March 2017, Dr.S.Jothi Muneeswari author tells about automatic irrigation system using the Arduino microcontroller with moisture sensor and water flow management. The humidity sensor unit consists of an Arduino board, Wi-Fi unit, and Humidity sensor and water flow control mechanism. The data taken from Humidity sensor will be sending to data monitoring system by Arduino boards over a wireless network using Wi-Fi. At Monitoring system, the humidity levels are monitored and any decrease in humidity level below a limit will be reported as requirement for water and signal is raised to the entire humidity sensor unit to open the water flow management. Also, Humidity level in agricultural field can be checked any time through the web portal.

## III. METHODOLOGY

### A. *System Architecture*

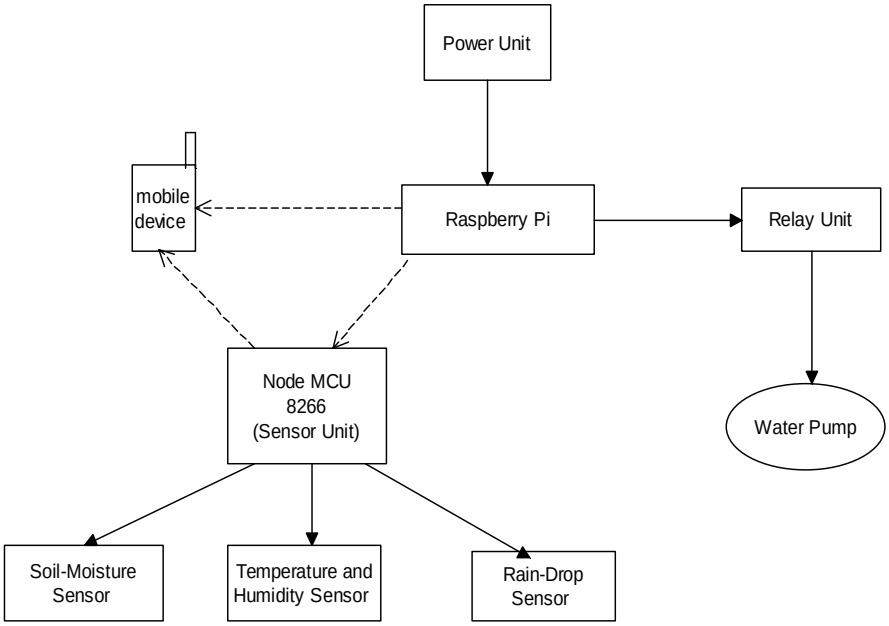



Figure3.1: System Architecture of smart irrigation system Using IOT

In this architecture making an intelligent analysis for irrigating the field, different soil conditions i.e. Dry, little Dry, little wet and Wet are taken for training the data set pertaining to soil moisture and temperature and accordingly predicting the soil based on real time data received for actuating the pump for watering the field.

Finally the analyzed data along with field irrigated are updated in cloud server which lets the farmer know the condition of soil and also water being irrigated. This can be accessed from farmer's mobile. Also graph data sheet of moisture versus temperature and humidity and rain-drop and also data set are stored in internet server too. The complete system architecture of our IoT based System is shown in Figure.

The system here consists of three components. First component is the Raspberry Pi 3 part where Soil Moisture and Temperature and Humidity and rain-drop Sensors deployed in soil are connected to Raspberry pi3 which gives the moisture ,temperature ,humidity and rain-drop output based on soil condition and Temperature and Whether. The data received by the sent to Edge level processor called the Raspberry Pi3 using Serial communication. In Pi3, K-NN Machine learning algorithm been employed for predicting the soil condition based on Moisture and Temperature level and Humidity level and Rain-drop also. The predicted output is then used for sending the control signal via the serial communication to raspberry for controlling water pump for watering the field accordingly. The last and final component is recording the soil moisture , Temperature level ,Humidity level ,Rain-Drop and prediction with date and time in the Internet server for farmer's to access from their mobile to have good knowledge and understanding on field being irrigated.

*B. Block Diagram and Algorithm*

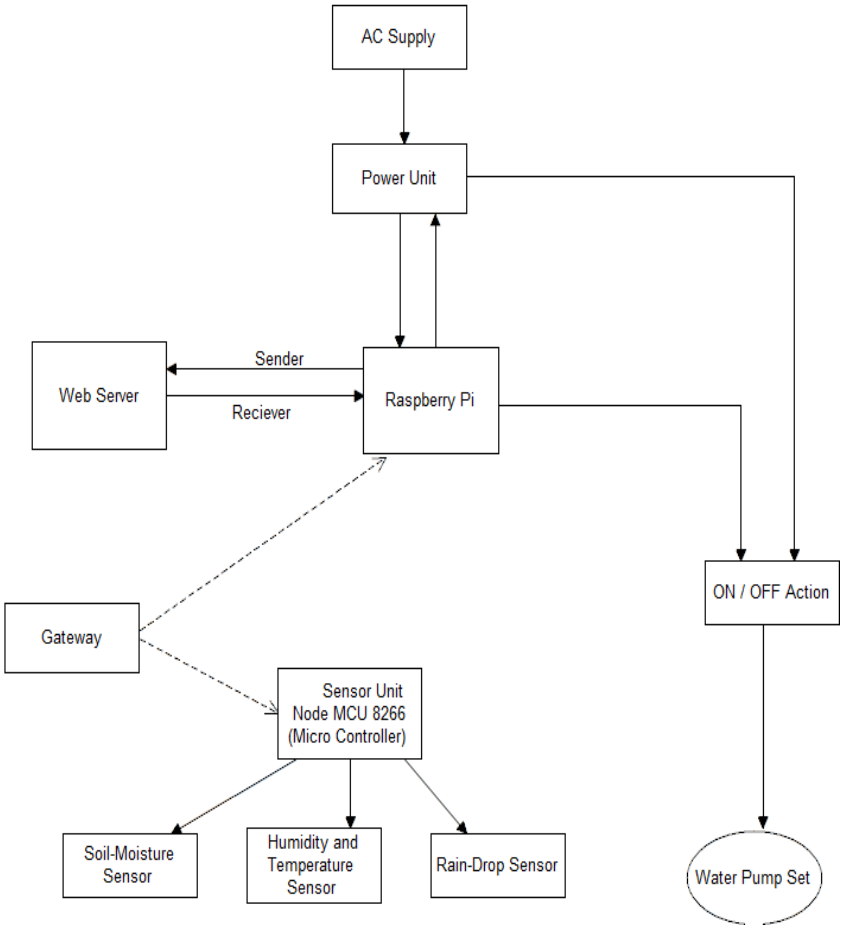



Figure: Block diagram of Smart Irrigation System Using IOT

In this system first on the AC supply it goes to the power unit then first check action is performed ON or OFF. Suppose action is on then it set the water pump. When action is off the power unit goes to the raspberry pi to perform the action. Then raspberry pi send to sensor for sense the value by using the internet module. Then sensor sense that value and send these value to the raspberry pi. Then raspberry pi send these value to the web server. And then web server compares the throughput value of the sensor and current value which send to raspberry pi. And send these comparable values to raspberry pi then raspberry pi perform the action.

*C. Algorithm*

*1) Reading Sensor Values*

*a)* Start the modules to ready mode.
*b)* Read the sensor value.
*c)* Store it in the register.

*2) Posting the Value to Sensor*

*a)* Get connected to server.
*b)* Instruct the Internet module for sending data.
*c)* Post a sensor value to the server.
*d)* Store a value in server database.
*e)* Taking action based on server response

*3) Take action Based on Server Response*

*a)* YES- Taking action & continue the reading.
*b)* NO Continue reading next sensor values.

## IV. FLOWCHART

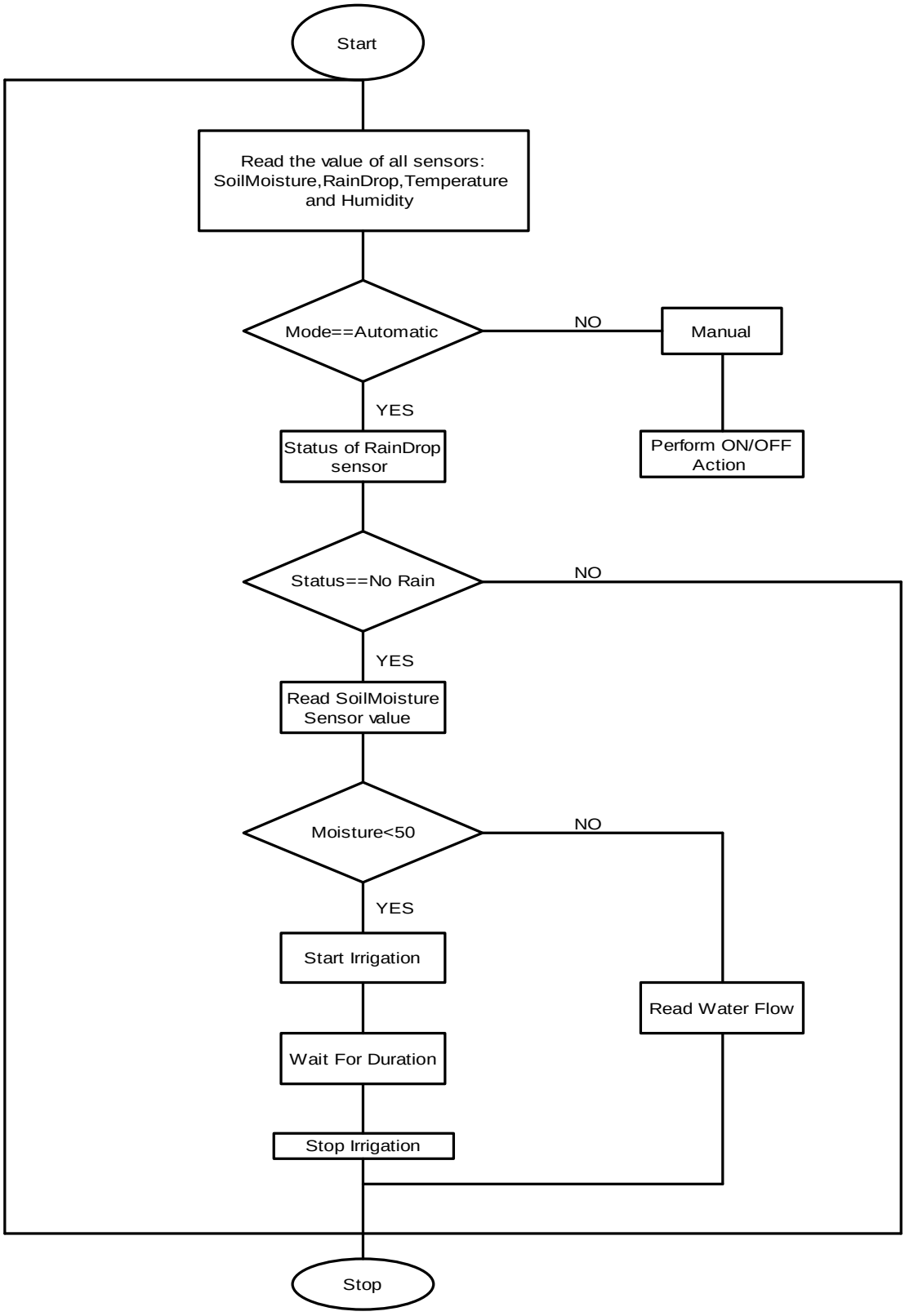
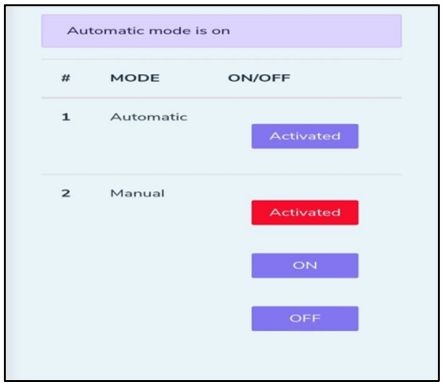



Figure: 4.1 Flow chart of smart irrigation system

## V. RESULTS





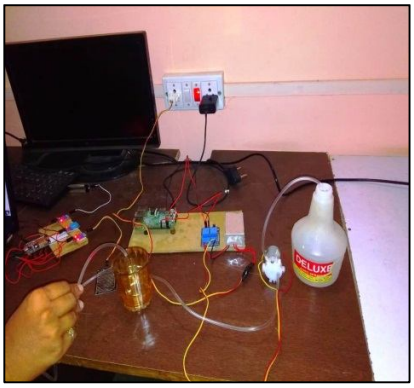


Fig: Raspberry Pi model B

Fig: Rain Drop Sensor

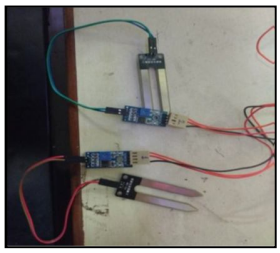


Fig: Soil Moisture Sensor

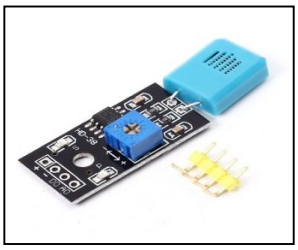


Fig: - Humidity and Temp. Sensors

## VI. CONCLUSIONS

Automated drip irrigation is the most beneficial approach for the farmers. This system reduces the extra manpower to the farmer for his farm work like supplying water to plants, safeguard the crop from intruders. The smart irrigation system is suitable and cost effective for advance water resources for agricultural production. The system would provide feedback control system which will monitor and control all the activities of plant growth and irrigation system efficiently.

## VII. FUTURE SCOPE

Agricultural monitoring is very much needed to reduce much of human labor and at the same time minimize on water usage. Lot of system been developed employing Wireless Sensor in monitoring and predicting the soil condition for irrigating the field. In addition machine learning techniques been employed towards crop yield and crop disease prediction only.

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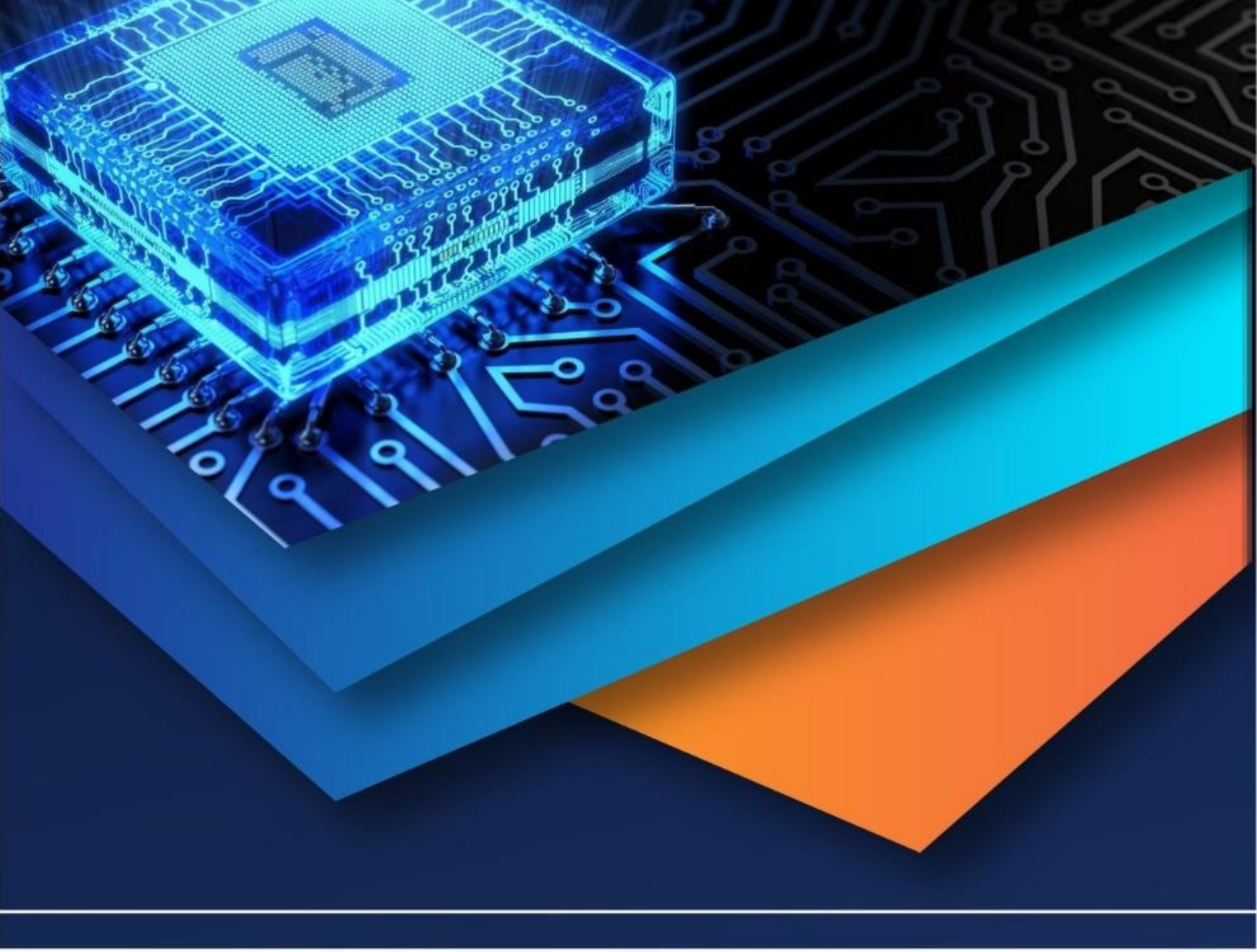

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