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A Comprehensive IOT Based Farm Supervision

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Abstract: ***Coming from a flourishing nation like India, Farming and Agriculture is the main source of income the recent stats shows it is about still IOT and application of automation and handheld devices engages an imperative role towards greatness and amelioration of the country. During these present times there have been some previous old methods being used in farming which have many limitations and also very demanding in terms of human labour and have to go out for supervision and check for any intruders or alerts or even to spray water. These conventional process have recurring costs and more demanding sometimes false human alarms or even a false crop information as a result substantial damages are foreseen hence it increases the costs and burden over the farmer. It has been observed that in some cases where farmers are cooperating with the technological advancements which are available in the present era have benefited from its fruitful outcome. The aim of this paper is to develop a smart farm supervision and protection system which comes in handy for getting regular farm alerts on a smart phone the alerts can be changed in the form of a text message or even an automated phone call hence the additional feature of this model is the improvement of crop growth according to different seasons and weather.***
Keywords: Arduino, IOT, Soil Sensor, Gas Sensor, PIR Sensor.

I. INTRODUCTION

Contemporary accounts suggest that any task can be completed with the help of correct technologies and machines. IOT helps in communication over the internet protocol and increases the potential of any device and the scope of work and reduces the human effort and the proneness towards any kind of error.In the following paper we will be discussing a smart farm system using Arduino and IOT. The intention of this smart farming system is to give updates about the environment around and inside the farm boundary at regular intervals in the form of message or calls whatever the farmer likes and even give sos alerts if a fire breaks out or an unnecessary entity intrudes into the farm, So the parameters which can be reported using this system are moisture content in the soil, temperature of the surroundings and the percentage of gases present in the environment like Oxygen, Nitrogen, Carbon Dioxide and Sulphur Dioxide. The proposed system can also detect fire in the farm and start spraying water if the temperature sensor detects the temperature to be rising, jointly this system can also water the plants just through a single tap on a smart phone making it a very feasible system which could be adapted for years to come and also save our earth from water losses and different kinds of pollution, Furthermore in this paper we will altercate about the design and codes and the technologies we will be using.

II. LITERATURE SURVEY

1) *Compact Approach to Farming:* As mentioned in the paper by [Sangeetha K and at al 2021] haven't utilized the use of IOT and are significantly having different data prediction at every intervals nor have they showcased any protection towards the farm incase their system gets shortcircuited due to systematic errors.
2) *Monitoring Farm Conditions:* As mentioned in the paper by [Jash Doshi and at al 2019] had a prototype suggested wherein the IR sensor was only able to detect objects in front of it so the scope of the device reduces hence reducing the efficiency and also a crop yield algorithm could have been integrated on a virtual project.
3) *Futuristic Approach:* In the paper by [Kushagra Agrawal and at al 2019] have suggested pest, water and crop management along with precision farming which requires a high level skill set to implement and also consumes more time and is not feasible for villages where there is scarcity of electricity,neither it has a guarantee nor a warranty whether the proposal will come on top of its claims or not.
4) *Strategic Approach:* As discussed by [Muthunoori Naresh and at al 2019] have discussed a strategized way of predicting the crop yield based on the last harvest which requires more involvement in the technicalities and is difficult to install due to sensitive nature of the components used.

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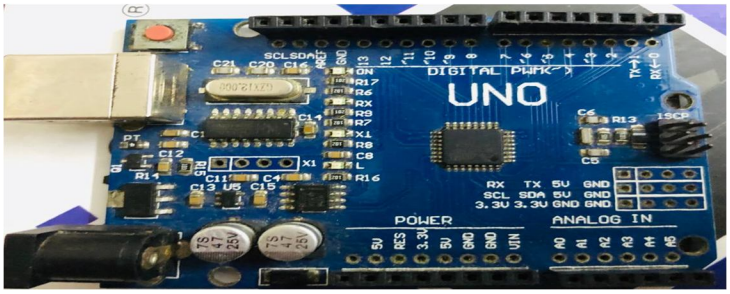
III. COMPONENTS REQUIRED

1) *Arduino:* It is an open-ware source utilized for electronic projects it comprises of a programmable circuit board having different parts, we can upload our code to it using its IDE and In layman terms it is the brain of this proposed system and all the sensors and information goes through and then it communicates the output to us in form of signals which in turn are processed by IOT features of other sensors.In the following venture we have used Arduino Uno R3, the picture for the same has been uploaded just below.



2) *Jumper Wires:* These are the wires used to connect different sensors or components through the breadboard and onto the arduino and ahead.

3) *Piezo Buzzer:* This is a normal buzzer which starts beeping whenever an iteration has crossed a given value.

4) *DC MOTOR:* We use a Dc motor to control the speed of water to be dispersed under an emergency situation and also to naturalize the circuit environment.

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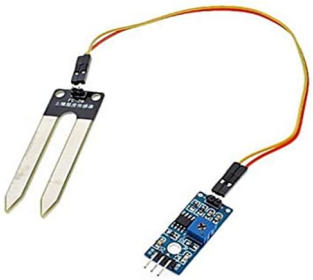
5) *Sprinkler:* It will sprinkle water when a fire is detected and also water the plants if the farner commands it to do so.

6) *PIR Sensor:* We have used a PIR sensor which acts as a barrier detection system or also give updates on who has entered the farm premises and click an image and send it to the farm owner.

7) *MQ-2 Gas Sensor:* This sensor is highly responsive towards flammable gases like oxygen hydrogen methane butane, we use it to detect fire and give alarms and updates about the gases present in the atmosphere around in regular intervals.

8) *LM-35 Temperature Sensor:* This sensor is used to calculate correct temperature around the farm and record the readings and send it to the farmer.

9) *FC-28 Soil Sensor:* This sensor is used to measure the moisture in the soil so as to predict which type of crop can be planted and suitable for that soil, it also sends the data to the farmer as requested by the farmer.



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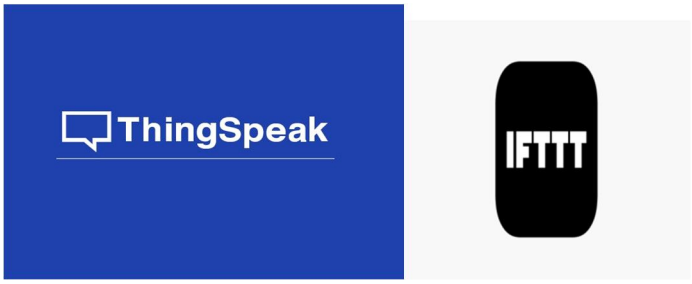
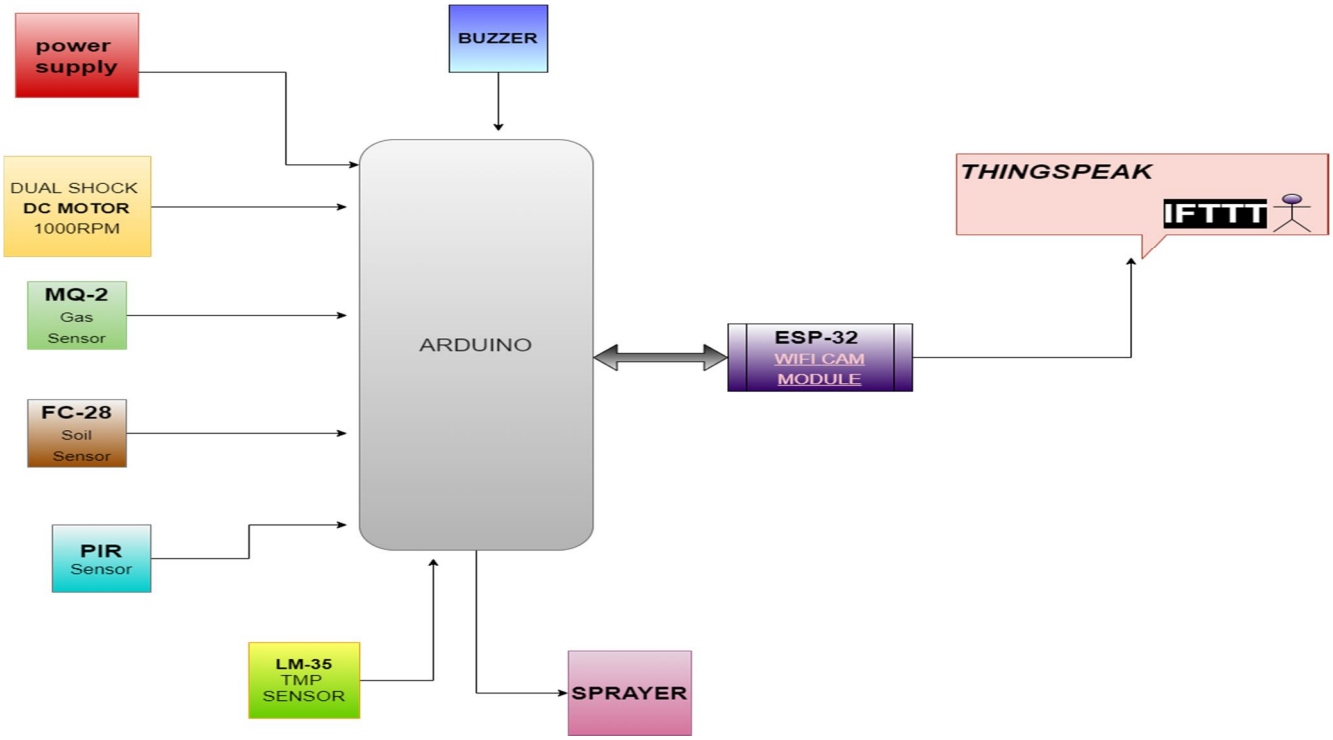
10) *ESP-32 WIFI Cam Module:* It is a cheap , less power consumption chip based microcontrollers with wifi and bluetooth, it can be used in various IOT application cause it also has a storage and a ram but we have used an added feature in this module which is the camera which we have integrated with it so that we can keep an eye on the smart farm and regularly communicate with the farmer.

11) *THINGSPEAK And IFTTT:* These are IOT Analytics and servers for sending storing and giving updates of what's happening around the farm they are serving for the purpose of IOT and sole heart of this project.



IV. BLOCK DIAGRAM OF SMART FARM SYSTEM



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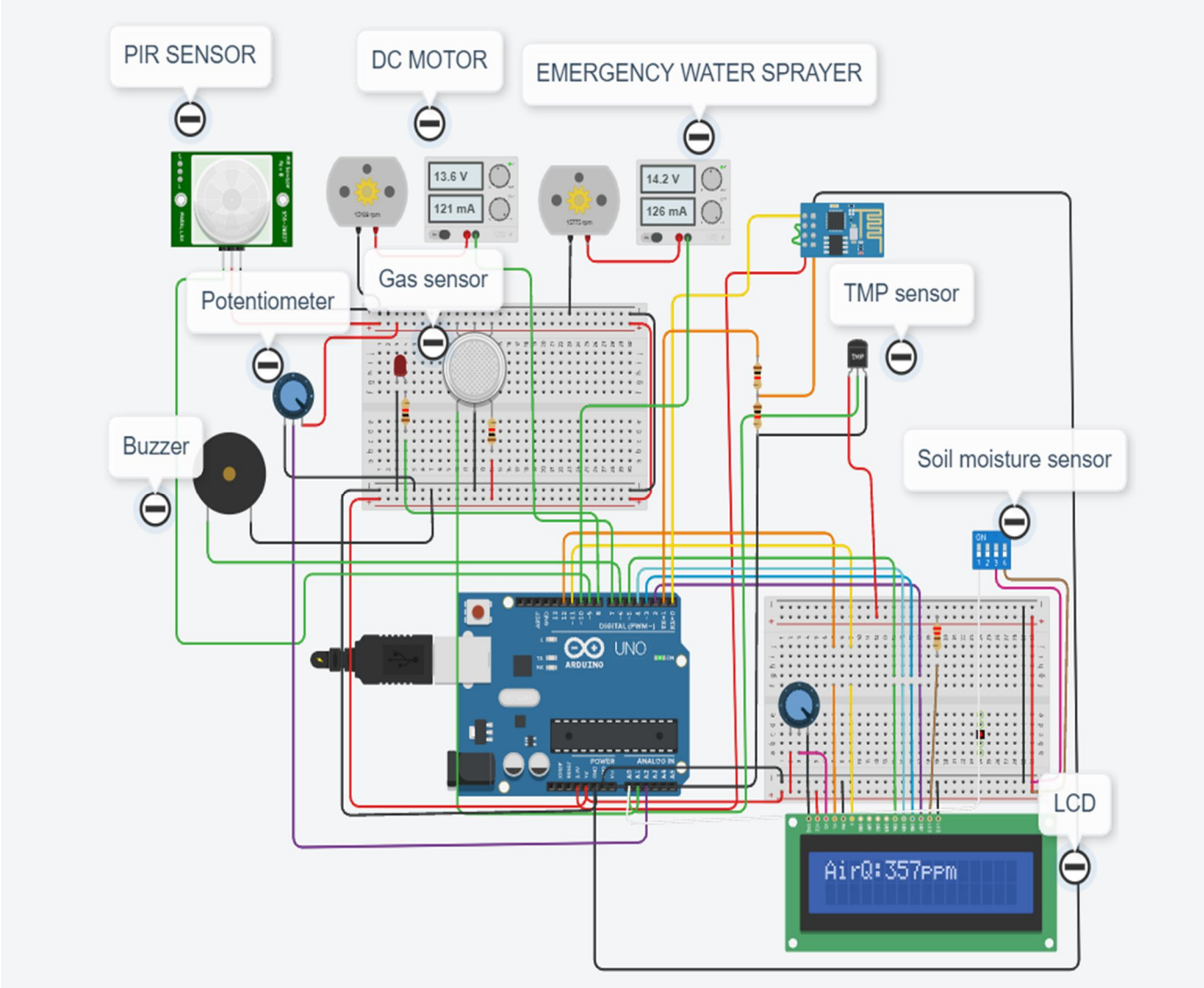
V. CIRCUIT



VI. CODE

```
String ssid     = "ENTER THE WIFI YOU WANT TO CONNECT";  // SSID to connect to
String password = "enter wifi password";
String host     = "api.thingspeak.com";
const int httpPort   = 80;
String url     = "Update your API KEY";
int setupESP8266(void) {
  // Start our ESP8266 Serial Communication
  Serial.begin(115200);   // Serial connection over USB to computer
  Serial.println("AT");   // Serial connection on Tx / Rx port to ESP8266
  delay(10);        // Wait a little for the ESP to respond
  if (!Serial.find("OK")) return 1;
  // Connect to 123D Circuits Simulator Wifi
  Serial.println("AT+CWJAP=\"" + ssid + "\",\"" + password + "\"");
  delay(10);        // Wait a little for the ESP to respond
```

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```
  if (!Serial.find("OK")) return 2;
  // Open TCP connection to the host:
  Serial.println("AT+CIPSTART=\"TCP\",\"" + host + "\"," + httpPort);
  delay(50);       // Wait a little for the ESP to respond
  if (!Serial.find("OK")) return 3;
  return 0;
}
#include<LiquidCrystal.h>
LiquidCrystal lcd(12,11,5,4,3,2);
#include<Servo.h>;
Servo servo;
int air;
int motor=7;
int buzz=6;
int sprinkler=10;
int led=8;
int sensor=9;
int temp;
int pir;
float mois;
byte degree[8]={
  B00110,
  B01001,
  B01001,
  B00110,
  B00000,
  B00000
};
void setup(){
  lcd.begin(16,2);
  setupESP8266();
  Serial.begin(9600);
  pinMode(sensor,INPUT);
  pinMode(A0,INPUT);
  pinMode(A1,INPUT);
  pinMode(A2,INPUT);
  pinMode(buzz,OUTPUT);
  pinMode(sprinkler,OUTPUT);
  pinMode(motor,OUTPUT);
  pinMode(led,OUTPUT);
}
void senddata(void) {
  int temp = map(analogRead(A0),20,358,-40,125);
  // Construct our HTTP call
  String httpPacket = "GET " + url + String(temp) + " HTTP/1.1\r\nHost: " + host + "\r\n\r\n";
  int length = httpPacket.length();
    // Send our message length
  Serial.print("AT+CIPSEND=");
  Serial.println(length);
  delay(10); // Wait a little for the ESP to respond if (!Serial.find(">")) return -1;
```

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```
 // Send our http request
 Serial.print(httpPacket);
 delay(10); // Wait a little for the ESP to respond
 if (!Serial.find("SEND OK\r\n")) return;
}
void loop() {
 senddata();
 delay(20);
 air=map(analogRead(A1),0,358,0,125);
 temp=map(analogRead(A0),20,358,-40,125);
 mois=map(analogRead(A2),0,5,0,1);
  if(mois<0.5)
 {
  digitalWrite(motor,HIGH);
  lcd.setCursor(0,1);
  lcd.print("low moisture, Motor on");
  delay(10);
 }
 else if(temp>=75)
 {
  digitalWrite(sprinkler,HIGH);
  digitalWrite(led,HIGH);
  delay(10);
 }
 else
 {
  digitalWrite(sprinkler,LOW);
  digitalWrite(led,LOW);
  digitalWrite(motor,LOW);
 }
 pir=digitalRead(sensor);
 if(pir==1)
 {
  digitalWrite(buzz,HIGH);
 }
 else if(pir==0)
 {
  digitalWrite(buzz,LOW);
 }
 //Temperature:
 lcd.createChar(0,degree);
 lcd.clear();
 lcd.print("Temp:");
 lcd.print(temp);
 lcd.write(byte(0));
 lcd.print("C");
 if(mois<0.5)
 {
  lcd.setCursor(0,1);
```

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```
 lcd.print("low moisture, Motor on");
}
else if(temp>=75)
{
 lcd.setCursor(0,1);
 lcd.print("FIRE! EVACUATE!!");
} delay(1000);
//Air Quality:
lcd.clear();
lcd.print("AirQ:");
lcd.print(air);
lcd.print("ppm");
lcd.setCursor(0,1);
//Door
if(pir==1)
{
      lcd.print("Intruder");  }  }
```

VII. IOT APPLICATION

The IOT application that we have applied here is thingspeak and ifttt to further understand this technique first go to thingspeak and create your id then create a bucket list of all the sensors and upload the different api keys to your code to synchronize the values of the sensors and to keep it in one place, create a final bucket and then monitor the different graph values.Coming to the next phase of automation we enter IFTTT where we first create an id there and enter our initials like phone number and id where we want to get our updates, there after setting up the ID we look for the applet or the service we are looking for here in this case I have used a text message as my update then we search for webhooks and integrate our data coming from thingspeak and then for testing we can give alerts through the ifttt mobile apps or even from laptop. We can set the time intervals of the readings and whenever we want them.

VIII. CONCLUSION

By materializing these fresh and advanced technologies in farming could enhance the yield and make the farmers adapt to the latest techniques which could be adopted for there profits and get protection against any sort of natural error. Furthermore water and electricity could be saved by the use of this technique, the real time monitoring of certain events makes the farmer more aware of what could be sowed at a certain season and temperature and a future scope of this could be by taking the suggestions of the farmers using this method and adding a feature of suggestion based on the data given by them although certain algorithms have their own limitations but with the advancements we have today anything is possible and with the further use of these many sensors a unique use could be discovered though these Microelectromechanical systems (MEMS) sensors translate physical phenomenon, such as movement, heat, pressure, or location, into digital information and it will come in handy for a noble cause. These different sensors are not so expensive and a compact design could make it even more manageable to use. It is projected that almost everything will be connected to the network, even individual objects will be tracked, its condition and location communicated in real time to a higher level service. It opens a new research direction with many unique challenging issues. It is important that IoT becomes part of the current and future strategic conversation, whether on research institution level or international cooperation discussions to ensure that we reap the benefits presented by IoT.

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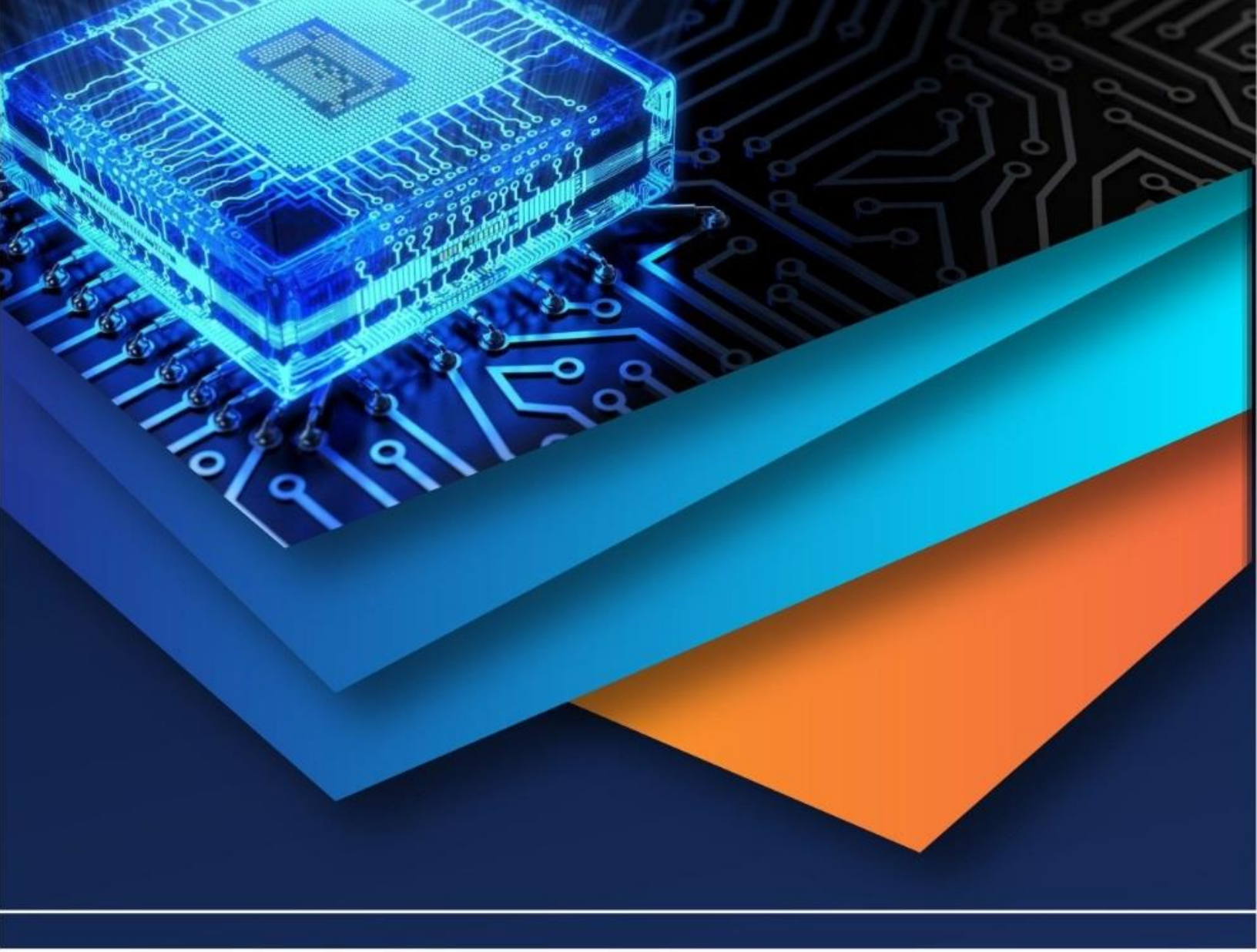

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