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A Cost Effective Smart Home Automation System Using NodeMcu

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Abstract: ***The Internet of Things (IoT) is paving the way for a smart, computing-enabled future in some aspects. Using wireless connectivity and rising automation technologies, all of the appliances in a home may be connected and communicated with.It aims to delegate other responsibilities, such as simple monitoring of various phenomena around us, and to make a variety of tasks easier for users.In this tutorial, we will use NodeMCU to build a cost-effective home automation system. This platform is used to control home appliances such as lighting, fans, and air conditioning from a distance. The fundamental purpose of this proposed effort is to design a system that is affordable (cost-effective), small, and scalable.***
Keywords: NodeMcu, Light, Home Automation, IoT.

I. INTRODUCTION

In some ways, the Internet of Things (IoT) is laying the groundwork for a smart, computerised future. Computing will be integrated into everything as a result of ubiquitous computing, operating automatically and without human intervention. The Internet of Things also uses the terms "things," "objects," or "machines" to describe the environment and everyday items. Generally, in our homes the power outlets have sockets and switches with wired connections .To operate the home appliance, one has to move physically and operate. The individual who is away from home is unable to control or keep an eye on the appliances' current condition. The Internet of Things (IoT) in this context offers a platform that enables objects to be identified, linked, and remotely managed via a network architecture. Numerous home appliances, including as heaters, televisions, air conditioners, washing machines, electronic security systems, and other electrical gadgets, can now automatically link thanks to the Internet of Things. This scenario can considerably reduce the wastage of energy and improves the living environment.

II. EXISTING SYSTEM

A. Wired Home Automation System

In this type of home automation, a primary controller is linked to all of the home's appliances via a communication link. Actuators link apparatus to the central controller. The PC that is in constant communication with the central controller handles all duties.

B. Wireless Home Automation

This innovation in wired automation permits remote control via wireless technologies such as IR, Zigbee, Wi-Fi, GSM, Bluetooth, etc.

III. PROPOSED SYSTEM

In the proposed system, we develop a cost optimization home automation satisfies the remarkable requests of the increasing global population. Our method has the benefit of making it easy to regulate the functionality of a wide variety of electrical apparatus. Our busy lives and activities frequently make it difficult for us to work diligently at home. This allows us to remotely turn off lamps, fans, and other electronic equipment.

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The main advantage of our model is its ease of control over a wide range of electrical and electronic device functions. Due to our hectic schedules and traffic, it can be difficult to be at work and at home at the same time. It is made feasible by one of our model's features, which allows for remote access to home systems, saving a significant amount of time. Another component of our proposed strategy is the ability to remotely turn off lights, fans, and other electrical and electronic devices when they are not in use, which aids in energy consumption control in the home. The NodeMCU is utilised as an embedded kit because smart devices must be synchronised in order to be controlled remotely.

When the NodeMCU is activated through its USB port, it searches for the wireless network to which it was previously connected using the SSID and password. This access point allows users to connect to the Internet via wired, wireless, or cellular networks. To get the code and libraries onto the NodeMCU, the Arduino IDE is used. The ESP8266 joins the network after it has successfully connected to the access point by entering the right SSID and password. The NodeMCU is preconfigured to function as a web server on port 80. The server's local IP address, denoted as Server_IP, can be seen in the serial monitor of the Arduino IDE. Once the server has begun listening on port 80, the client can send data to it. The information instructs the ESP8266 to alter the state of its GPIO pins, which in turn triggers the relay connected to that pin. The relay governs the 220 volt AC power to the household appliance by acting as a switch.

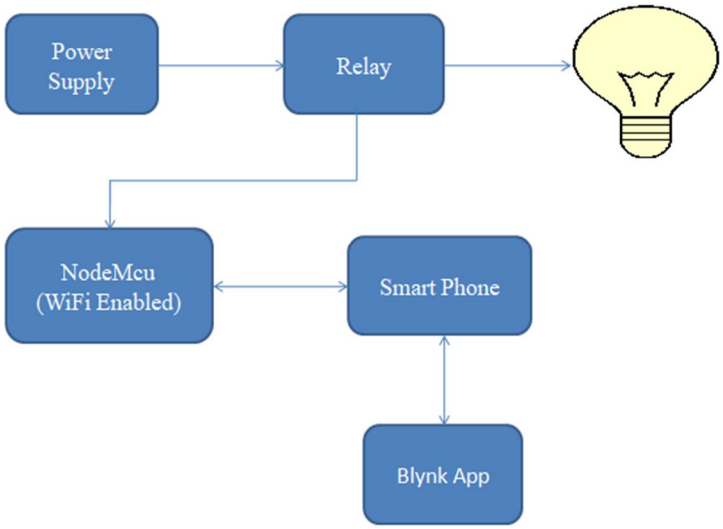


Figure 1: Architecture of the Proposed System

In our work we use a Hardware ESP8266 and Relay. An ESP8266. For rapid prototyping, it is a low-cost development board with GPIOs, I2C, UART, ADC, PWM, and WiFi. The 3.3V-powered ESP-12 module consists of an ESP8266, a voltage regulator, and a USB-to-serial converter. To write programmes for this device, use the Lua-based Arduino IDE or the Lua-based ESPlorer. It is fueled by a Tensilica Xtensa L106-based 80MHz 32-bit RISC CPU. Boot RAM is 64KB in capacity. External Flash memory is accessible via SPI.

A relay is a straightforward electromechanical switch composed of a collection of contacts and an electromagnet. There are hidden relays in a variety of devices. In actuality, some of the very first computers utilised relays to implement Boolean gates. Each relay consists of four components. Composed of an electromagnet, a spring, and an armature that the electromagnet can pull, electrical contacts are created using these components. A relay is a switch that is electrically operated. Numerous relays employ electromagnets to manually activate a switch. A contactor is a relay that can manage the high power required to directly control an electric motor or other applications.

In addition, we programme using the Blynk application and the Arduino integrated development environment. The Arduino Integrated Development Environment (IDE) consists of a text editor for composing code, a message box, a text console, a toolbar with icons for frequently used functions, and numerous menus. A connection is required to upload code and communicate with the Arduino and Nodemcu hardware. When using the Arduino IDE, sketches are written using computer code. The terminal presents all error messages and other information generated by the Arduino Software (IDE). In the lower right corner of the screen, the configured board and serial interface can be seen.

Blynk is a free and open source startup that was developed with the IoT in mind. With Blynk, you may remotely control and monitor the data from any Smart Power-Strip. The server, the libraries, and the application are the three main parts of Blynk. The app may be downloaded for nothing and works with any modern smartphone. The programme allows the user to configure the interface for the plugged-in device using a variety of readouts, buttons, and switches. The software provides a virtual interface for operating the controls. When a user creates a new project in Blynk, they are provided with a distinct project ID. Then, simply add the appropriate affiliation number to the code as seen below: You can find the text "Your Blynk association number is displayed here" in the char auth[] variable. Pin modes can be set on Blynk for each of the inputs and outputs on the WeMos-D1 microcontroller. A Blynk connection is established between a device and the Blynk server whenever that device connects to the Internet via a router or hotspot. Since Blynk libraries are freely available, they can be used by anyone.

IV. RESULTS AND DISCUSSION

In our Work we uses an Arduino IDE, Blynk and NodeMcu the work is mentioned below:

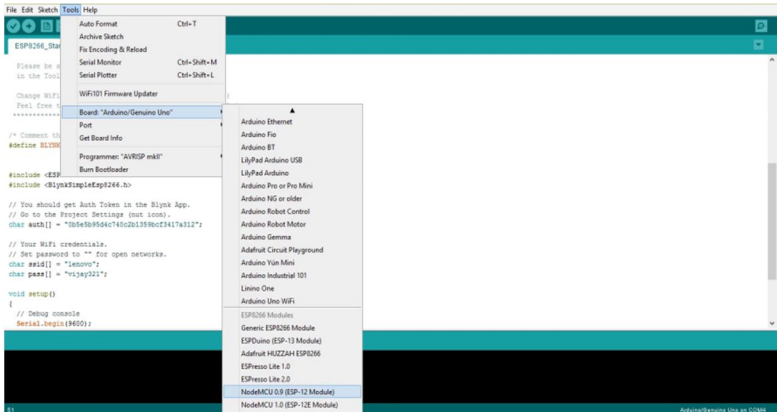


Figure 2: Opening the Arduino IDE and setting the NodeMcu board settings

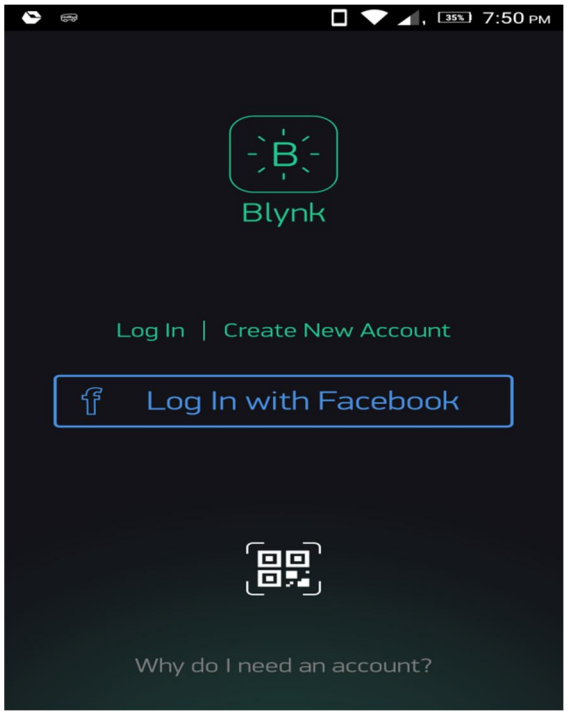


Figure 3: Open Blynk app by entering Username and Password

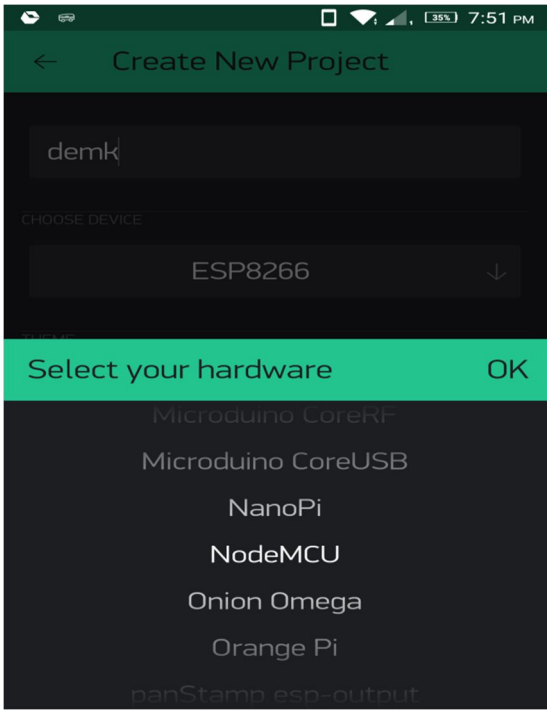


Figure 4: create new project and select NodeMcu

In the figure 3 we have to create an account in the Blynk app, After that we have to create a new project in Blynk app and select the NodeMcu board.

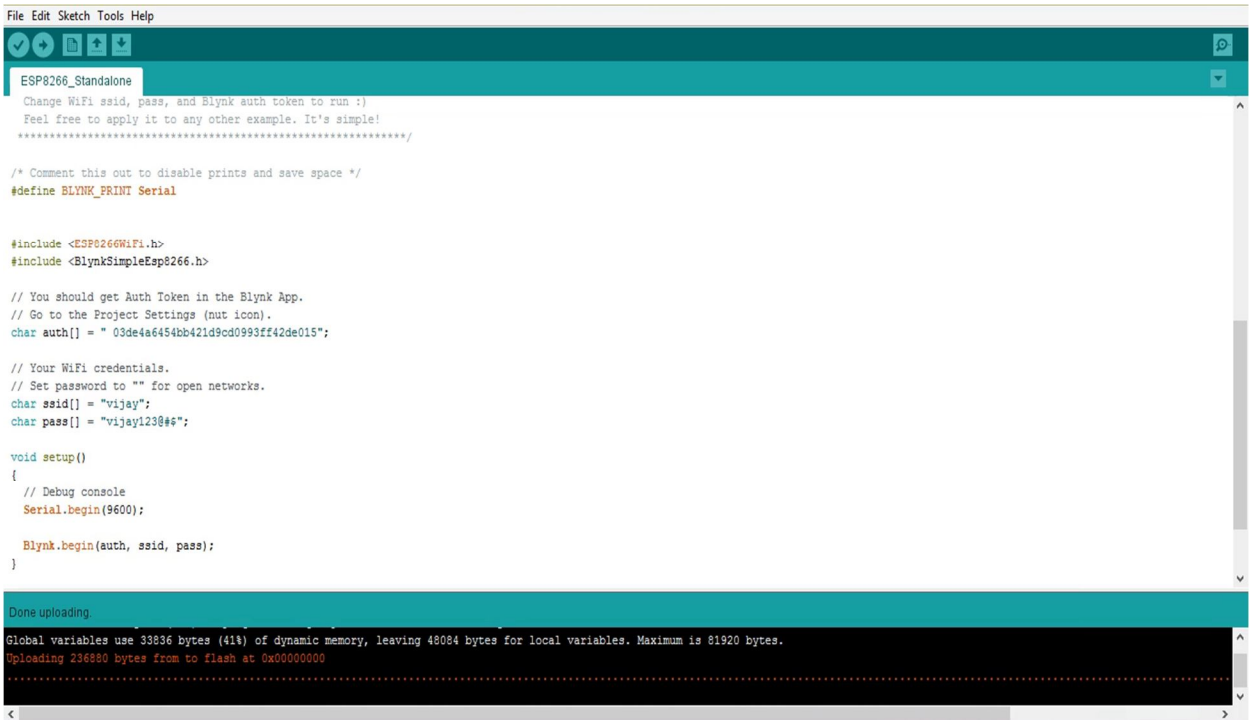


Figure 5: Configuration of Wifi Settings for Automation

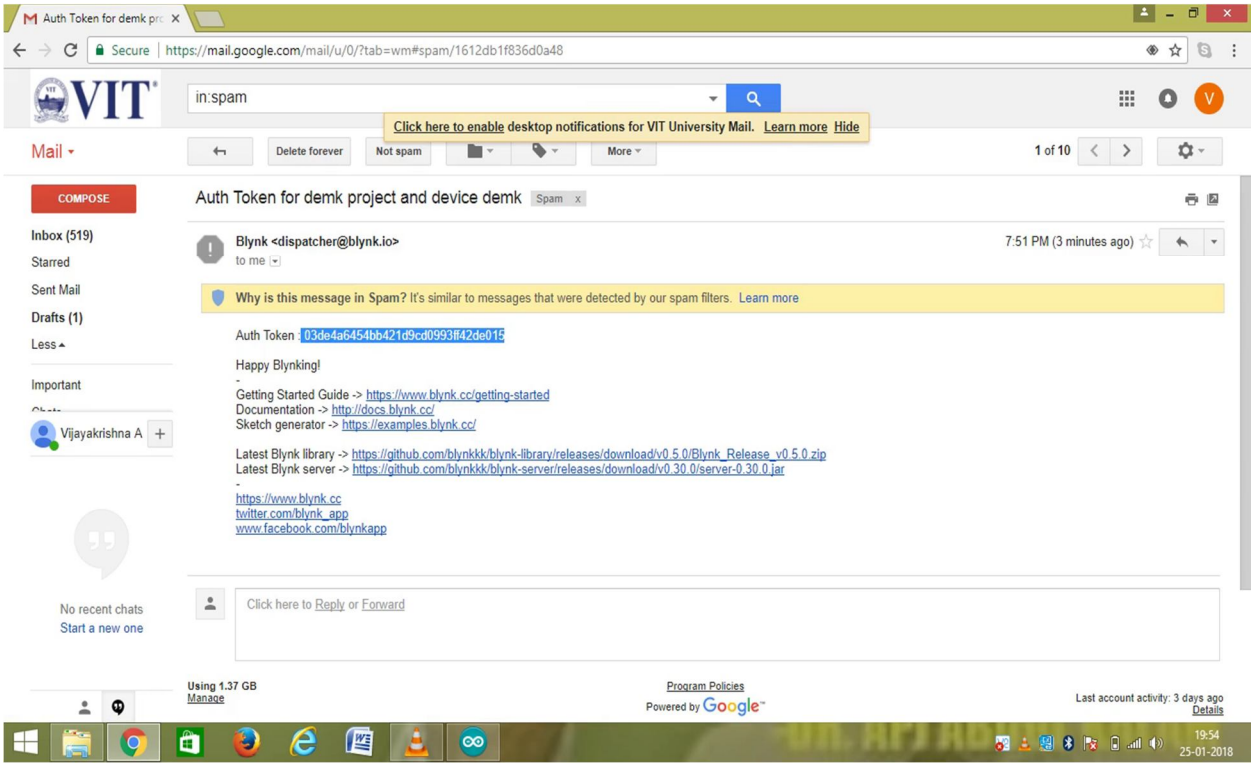
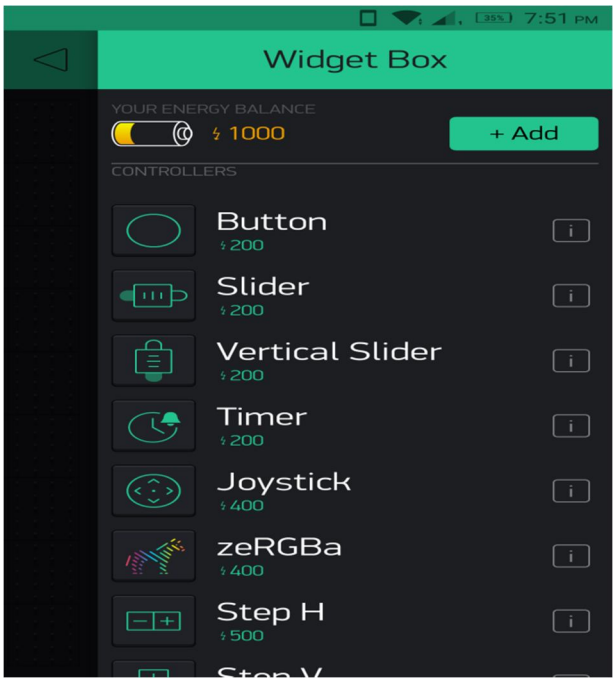


Figure 6: Generation of Authentication and sent to blink login mail id

In the Figure 5 we can configure the wifi settings for home automation system and figure 6 we can generate a authentication token and send it to the mail for verification.



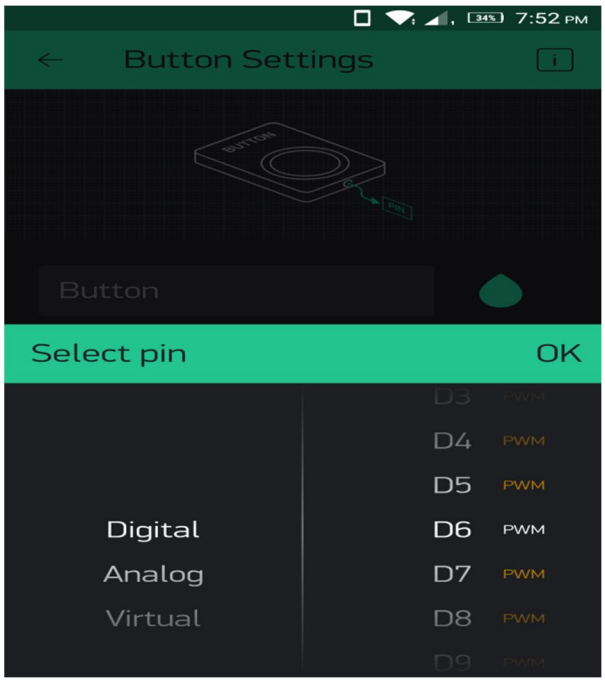


Figure 7: Select the buttons for Blynk app Figure 8: Select the digital pins and pin no here we are selecting D6

In the Figure 7 we can select the button for user interface and Figure 8 we are selecting the digital pin D6 for configuration

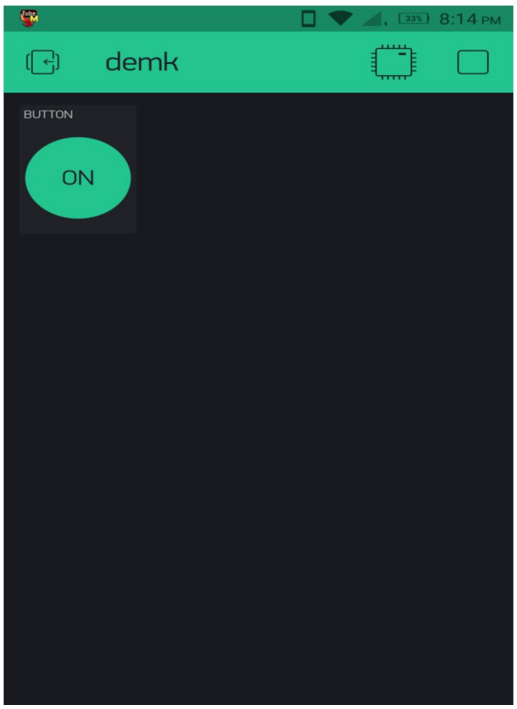


Figure 8: Switch ON button in Blynk App and Light ON

In the Figure 8 we can control the Bulb by pressing the Switch Button in Blynk App and make Light on in Home Automation System

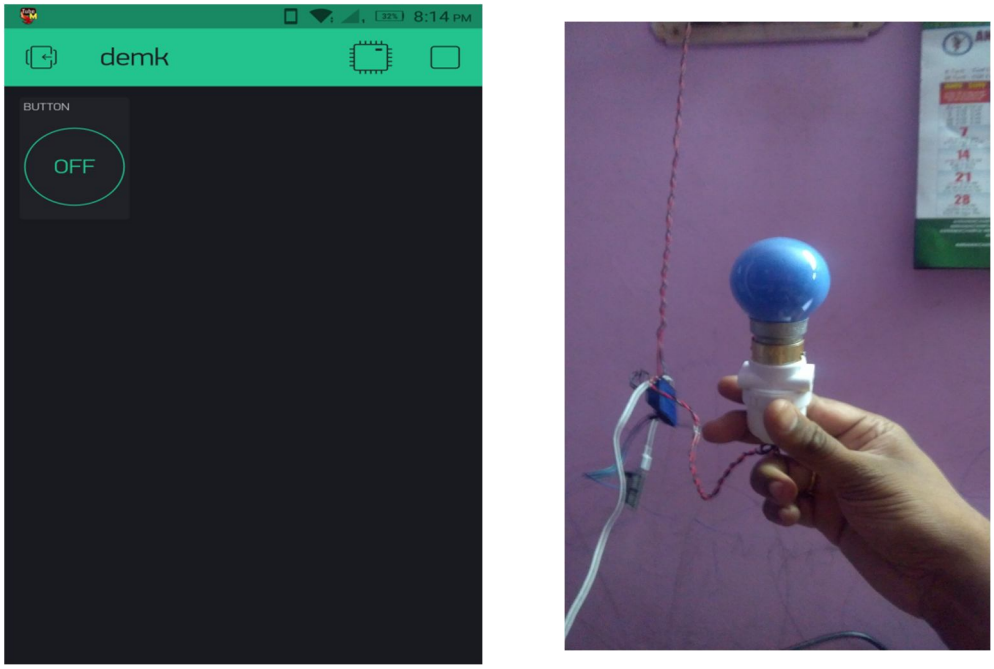


Figure 9: Switch OFF button in Blynk App and Light OFF

In the Figure 9 we can control the bulb by pressing the Switch Button in Blynk App and make the Light Off in Home Automation System.

V. CONCLUSION

The proposed automation framework is used for both domestic and office environments. The relay is selected predominantly based on the load, as the ESP8266 NodeMCU is a low-cost device with low energy consumption. The automation framework for remote control of home appliances is practical, secure, and cost-effective.

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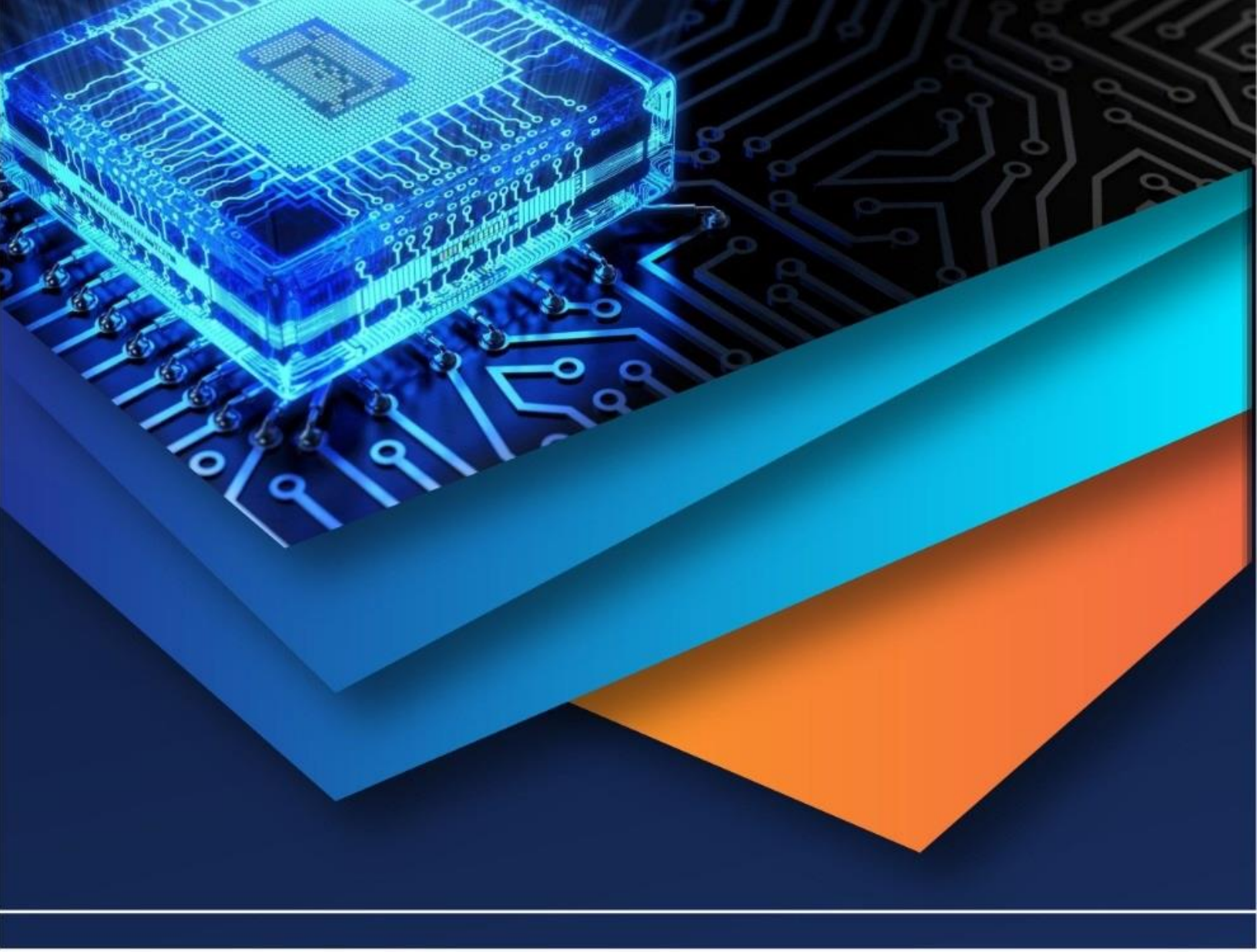

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