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IOT based Fire and Toxic Gas Extinguisher using RF Module

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***Abstract:** In real world, fire accidents can happen anytime and anywhere that. In addition, death not only thanks to the hearth but also from smoke inhalation and toxic gases. Flame detectors represent one among the main sorts of automatic detection. Gas sensors typically Carbon Nano Tube Gas Sensor or different Resistant Gas sensors can be used to detect the harmful or toxic gas. The RF transmitter will transmit a signal to RF receiver while it detects any flame or toxic gas. The robot will move using RF receivers instruction when the power is on. When the flame sensors detected the hearth , the robot will move to the hearth source and send a warning message to the user. Once the robot reached the burning area using controls, it will stop at a certain distance and extinguish the fire by using water or gas like nitrogen or carbon-dioxide. Here also used camera for live tracking and observation of cause occurred.*

I. INTRODUCTION

One technology that grows at this moment is that the Robotic technology. Robots can help people performing certain jobs, especially within the field that needs a high degree of precision, high-risk, or employment that needs an excellent power. generally , the robot are often defined as a robot capable of performing human tasks or behave like humans. Fire disaster may be a common disaster caused by humans. It can occur at anytime, anywhere, with varies trigger that would cause fires. Important factors in handling of fireside are how precise we define a location of the source and the way fast we put out the hearth . One man's work which will be perfectly done by robots is extinguisher . this sort of labor requires quick reaction to avoid fire spreading too wide. When the hazard area spread, fire-fighter jobs are going to be a troublesome job and increase the danger . it's often that fireplace fighters cannot access the source of fireside thanks to the damage of building and really heat , or maybe thanks to the presence of explosive materials. Considering the human constraints and thanks to high level of risk in handling of the hearth , it might require a technological development that would help fire fighters in extinguishing the hearth e.g. by using robots. extinguisher robot would be very useful to extinguish the hearth . the utilization of fireside fighting robot which will be controlled from a distance specified is predicted to scale back the danger . With this, fire fighters don't need to enter the building since the building that burnt are often collapsed and there was potential explosion at any time. In 2013 Suryatini conducted research a few extinguisher robot with ultrasonic sensors by using wall follower method. the method to look hot spots was done by detecting the ultraviolet rays emitted by the hearth using fire sensors. To extinguish the hearth they used a lover driven by a DC motor. A PING ultrasonic range finder sensor was wont to guide the robot navigation in avoiding obstacles. This proposed quite similar system with ultrasound sensor and ATMEL 89552. The propose of this project is to developed a fireplace extinguisher robot that connected to the Smart phone via Wi-Fi networks in order that it are often controlled at a particular distance.

II. RELATED WORK

Yu Cong, Yunlong Xing, Junchao Zhu proposed to unravel the matter of real- time monitoring of the distribution of toxic gases in high-risk pollution areas and make sure the safety of field workers, a transportable toxic facility supported u/COS-II is meant by combining embedded system and Internet of things technology. The system can collect six sorts of toxic gases like carbon monoxide gas and sulphur dioxide within the environment in real-time; display the gas concentration through the human-computer interface, use the wireless transmission unit to upload the info to the cloud server. The experimental data show that the system has stable performance and little error, which may meet the wants of real-time, accurate and comprehensive monitoring of gas distribution in high-risk pollution sites, and remind the location staff to evacuate in time.
Junchao Zhu, Ye Fu, Yao Zhang proposed to a multi-component toxic gas monitoring system supported the web of Things was designed to unravel the matter that the private safety of the workers couldn't be guaranteed thanks to the presence of toxic gases in the contaminated site restoration environment. The system integrates functions of Internet of Things technology, could data storage display, sound and light alarm, and real-time display of Android mobile phones to realize HCN, CO, H2S, NO2, NH3, SO2, etc.

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In the environment of contaminated sites. In order to realize the aim of ensuring the private safety of the staff, the restoration of the contaminated site is administered efficiently, healthily and safety. The system can operate stably and may make sure the personal safety of the workers on the location of the contaminated site.

Mukul Diwanji, Saurabh Hisvankar proposed to the present paper examines and leverages the potential of automation in hazardous but important occupation as firefighting. Robots are designed to seek out the situation of fireside , before it goes out of control. It might be wont to work with fire fighters to scale back the danger of injury to victims. This paper presents the Fire Fighting Robot. The development of robot is split into three elements which is that the hardware, electronic, and programming. Servo Motor (SG90) for axial spraying of water. (0 degrees to 60 degrees)Various sensors also are interfaced with Arduino Uno Board. For the programming part, Arduino IDE language was wont to determine the robot movement from the sensors input.

Anandha Raj P, M. Sri Vani proposed to this paper in industries, measuring the parameters of machines is still a tedious process which is carried out by some human personnel. This paper mainly focuses on the remedial measures petroleum),it includes a Rope path for hanging robot to travel, sensor to sense and Base station to control.The robot collects physical parameter like temperature, toxic gases and lightweight intensity. Any abnormal change within the parameters gives an alert using buzzer, this prevents a greater extent.

Shiva Mittal, Manish Kumar Rana proposed to this paper presents Cease Fire – the firefighting robot developed to serve firefighting crews in real-time situations. The development aims to scale back the danger to human lives during fire hazards. The robot has the potential to extinguish fires using water and CO2 sprays, protect itself from burns using mist sprays, and deliver live video frames of the hearth sites. The merits of the planning include simple handling, quick on-site initiation and long range remote controllability. Fire-fighters can send the robot in to the hazard- affected site; analyze the precise situation using temperature, air-quality and visual inspections of prone structures; and subsequently stop the hearth source using on- board extinguishers. Its quick and efficient response to check situations demonstrates its reliability of usage in world cases.

Mengjia He, Fuji Ren proposed to this paper in industries, measuring the parameters of machines is still a tedious process which is carried out by some human personnel. This paper mainly focuses on the remedial measures made to scale back human interaction with machines by using Industrial monitoring robot. Here implement a Hangi robot for monitoring the industrial like(Gas and petroleum), it includes a Rope path for hanging robot to travel, sensor to sense and Base station to control.The robot collects physical parameter like temperature, toxic gases and lightweight intensity. Any abnormal change in the parameters gives an alert using buzzer, this prevents a great extent.

Jayanth Suresh proposed to this paper with the advent of technology, humans are replaced with robots in life-threatening situations. We aim to style a robot capable of detecting and suppressing fires. In this research, we illustrate an autonomous robot capable of detecting flames indoors and maneuvering towards the flame to extinguish it with the assistance of CO2.

J. Subash Chandra Bose, Marzougui Mehrez proposed to this paper one of the most efficient tools for early extinguishing of fire is fire fighter robot. This is considerably needed for all kinds of industries. In most of the Industries fire sensing is extremely essential to stop heavy losses. Robots with this sort of embedded systems can save lifetime of Engineers in industrial sites with dangerous conditions. It are often wiped out four components: First, the PIC16F876A Microcontroller is employed during this project, programmed and controlled all other circuits and components. Second 12V, 300 rpm rated DC motor is employed to maneuver the robot forward, reverse, left and right. Third components contains two sensors: one is to detect smoke and alarm the circuit and therefore the other is to detect the hearth and alarm the circuit to trigger the pump. Finally using the extinguisher. Here we've used the advanced technical sound and efficient extinguisher named Soteria. The results are analyzed using CRO. As well real time experiments.

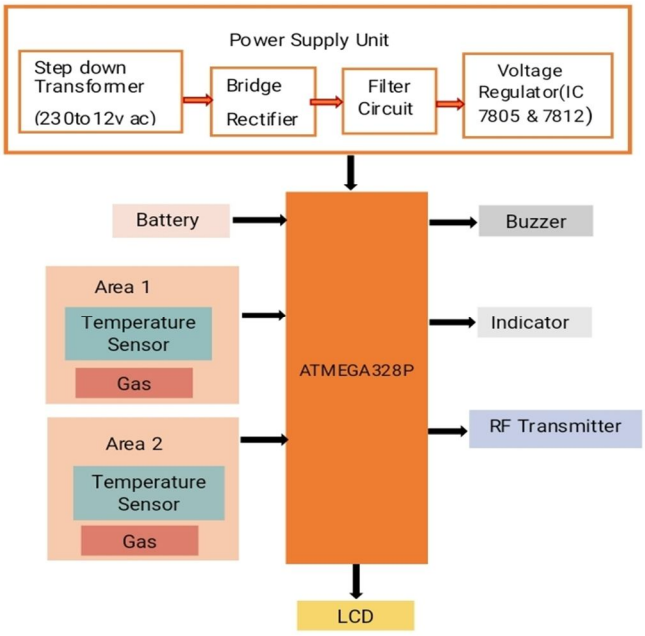
III. PROPOSED SYSTEM

This project presents the planning of a coffee value, sturdy and secure hearth or ototoxic protection system for buildings. It sends early alarm once the hearth or ototoxic happens and helps to cut back the injury. this technique consists of a smoke detector and a temperature detector square measure needed to be in physical contact with the thing being perceived and use physical phenomenon to watch changes in temperature. they will be accustomed discover solids, liquids or gases over a good vary of temperatures. whose outputs square measure connected to the controller. it's a wireless camera for video feedback thus operator will operate additional with efficiency.

The operation of automaton is controlled by victimization wireless module thus it will give additional vary of operation. Gas sensors square measure wide utilized in trade and in firefighting to discover flamable, and ototoxic gases that square measure threatening human health and properties. The system takes under consideration the density of smoke and therefore the chance of false alarms will be avoided. even though a automaton cannot reach AN item for disruption, it will still be accustomed relay data to help in tool and procedure choice to moving downrange. additionally, events recorded by a robot's camera will give proof for more analysis.

A. Block Diagram

1) Transmitter



2) Receiver

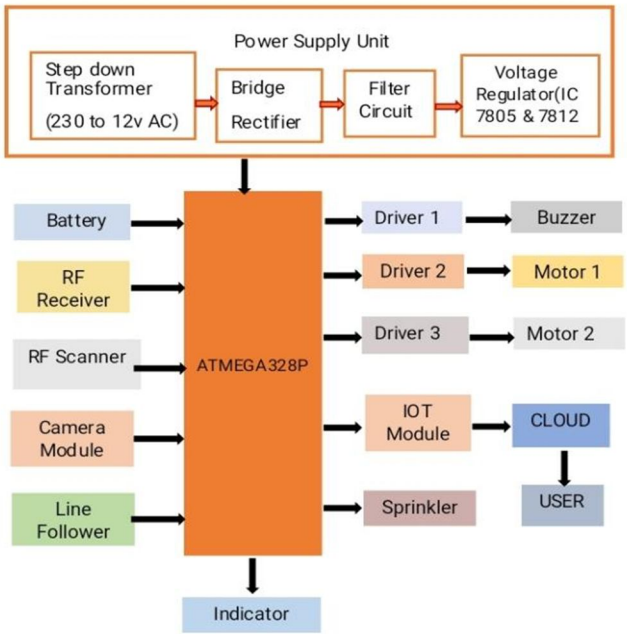


Figure 1 Block diagram of the proposed system

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Power supply for this system we use 6v battery because all the electronics components need various voltage and current values hence we use regulators to regulate the voltage values gas sensor where here we used detect If any flammable gases where spreading in nearby surrounding atmosphere. Temperature sensor here we used to measure the temperature range because in case the temperature range gets increase in nearby surrounding atmosphere. Atmega328p microcontroller here we used because its easy to access open source software and also reference are available more on online. As a Indicators we used LED and Buzzer electronics components to intimate to user the status of system and power supply on/off if the fire get detect as alarming purpose buzzer is added here. In transmitter side Drives need switch on the buzzer is because signal are come from controllers are digital value but the buzzer under their required voltage hence we use drivers to convert controller signal to components required voltage. In the transmitter side we used LCD to intimate status about sensors and name of the project and function also displayed step by step.In transmitter side RF module where we used to transmitted the as signal to receiver system to intimate and alert our robot. If the set point of the temperature and flammable gas measuring sensor values are increase RF transmit the signal to receiver. In robot side Camera module here we used to monitor the status and identify the correct place by viewer. In robot side we use RF receiver unit to receiver Rf transmitting signal to alert the robot to reach the particular area if area one or two detect the bit size of the signal will varied in programme based on that we classify the path. As a Indicators we used LED and Buzzer electronics components to intimate to user the status of system and power supply on/off if the fire get detect as alarming purpose buzzer is added here. Line follower we used to reach properly the areas RF card will we used here to confirm the path of the robot and process further. Here we used two motors to create movement the shaft of the project which connect with wheel. Finally IoT module node MCU which used to control the robot sprinkler setup through mobile and update the status of camera module.

IV. HARDWARE DESCRIPTION

A. ATMEGA 328P

ATMEGA328 is employed the same as the other controller. All there to try and do is programming. Controller merely executes the program provided by US at any instant. ATmega328P is employed in Arduino Uno and Arduino nano boards, you'll be able to directly replace the arduino board with ATmega328 chip. For that 1st you wish to put in the Arduino boot loader into the chip (Or you'll be able to conjointly get a chip with boot loader – ATMega328P-PU). This IC with boot loader will be placed on Arduino Uno board and burn the program into it. Once Arduino program is burnt into the IC, it will be removed and employed in place of Arduino board, in conjunction with a quartz oscillator and alternative parts pro re nata for the project. Below is that the pin mapping between Arduino Uno and ATmega328P chip.

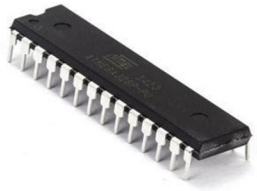

Figure 2 ATMEGA 328P

B. LM35 Temperature Sensor

LM35 could be a exactness IC temperature sensing element with its output proportional to the temperature (in oC). The sensing element electronic equipment is sealed and thus it's not subjected to oxidisation and different processes. With LM35, temperature is measured additional accurately than with a semiconductor unit. It additionally possess low self heating and doesn't cause quite zero.1 oC temperature rise in still air.

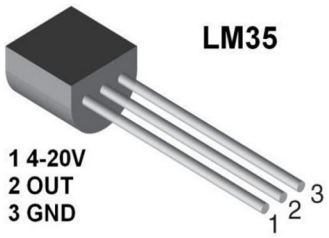

Figure 3 LM35 Temperature Sensor

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C. Gas Sensor

Its live associated indicate the concentration of bound gases in an air via totally different technologies. generally utilized to stop poisonous exposure and hearth, gas detectors area unit usually battery operated devices used for safety functions. they're factory-made as transportable or stationary (fixed) units and work by signifying high levels of gases through a series of sounding or visible indicators, like alarms, lights or a mix of signals. As detectors live a nominative gas concentration, the sensing element response is the point of reference or scale. once the sensors response surpasses an exact pre-set level, associate alarm can activate to warn the user. There area unit numerous kinds of detectors on the market and therefore the majority serves identical function: to watch and warn of a dangerous gas level. However, once considering what sort of detector to put in, it's useful to contemplate the various sensing element technologies.

Figure 4 Gas Sensor

D. L293D Motor Driver

L293D might be a 16-pin IC which may control a gathering of two DC engines all the while toward any path. It implies you'll control two DC engine with one L293D IC. Double H-connect Motor Driver microcircuit (IC). It chips away at the idea of H-connect. H-extension might be a circuit which permits the voltage to be flown one or the other way. As you perceive voltage had the opportunity to alter its course for being able to turn the engine clockwise or anticlockwise way, Hence H-connect IC are ideal for driving a DC engine. In a solitary L293D chip there are two h-Bridge circuit inside the IC which may turn two dc engine freely. Due its size it's significantly used in automated application for controlling DC engines. Given underneath is that the pin outline of a L293D engine regulator.

Figure 5 L293D Motor Driver

E. Wireless Camera

The robot utilizing remote night vision camera would be worked by removed administrator for observing just as controlling applications. In the evenings or where light force is poor, this robot is equipped for taking pictures and recordings, and afterward sending them to distantly working expert for additional developments. This strategy for activity can be utilized in the hour of wars and spying reason to screen foes' developments.

Figure 6 Wireless Camera

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V. SOFTWARE DISCRIPTION

A. Proteus

Proteus may be the best simulation software for various designs with microcontroller. it's mainly popular due to availability of just about all microcontrollers in it. So it's a handy tool to check programs and embedded designs for electronics hobbyist. you'll simulate your programming of microcontroller in Proteus Simulation Software. After Simulating your circuit in Proteus Software you'll directly make PCB design. The purpose of this tutorial is to point out you ways to conduct an interactive simulation with a microcontroller using Proteus VSM and therefore the VSM Studio IDE. the stress are going to be on practical usage of the simulator and IDE, with more detailed coverage of every topic being available within the reference manuals. This tutorial doesn't cover schematic entry; if you're not conversant in drawing in ISIS then you ought to take the time to figure through the tutorial content within the ISIS manual . ranging from the fundamentals of driving the simulation from the VSM Studio IDE we'll then check out a number of the varied debugging and measurement tools available inside the Proteus.

VI. RESULTS AND DISCUSSION

The output of the proposed system is shown in the figure 6.

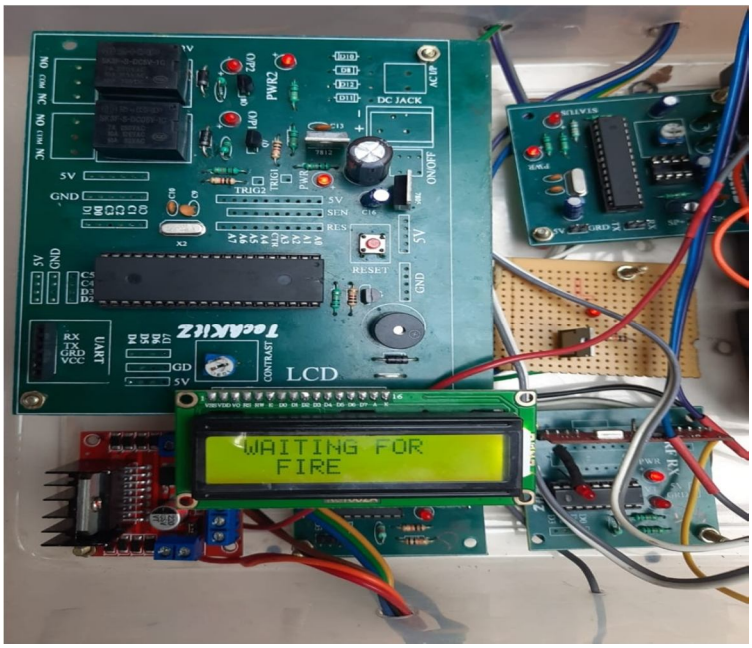

Figure 7 Output of the proposed system

Robot sends alert when fire or poisonous gas is distinguished in the encompassing. Remote camera is given to recognize the status distinguishes the purpose behind the fire accident. After arriving at the spot robot sprinkles water on that specific zone.

VII. CONCLUSTION

In this venture, built up a robot that associated with the Smart telephone by means of the idea of Internet of Things, so it very well may be controlled and checked from any distance. The gas sensors and the basic level of the separate gas ought to be known, and afterward this framework can be actualized for recognizing different gases either in homegrown zone like spots of instructive establishments, private and modern territories which tries not to jeopardize of living souls. The fire and temperature sensor put in this robot effectively recognizes the fire and douse it. The administrator can without much of a stretch watch the fire by the camera put on the robot. The controls put on RF Transmitter far off are not difficult to deal with and comprehend. At the point when fire happens in building or in manufacturing plants or any close places of the structure we would prefer not to trust that fire fighter will go for quench the fire. This Robot can be effectively use for smothering fire with least hazardous human intercession. This framework gives brisk reaction rate and the dissemination of the basic circumstance can be made quicker than the manual strategies. This robot can be utilized to help firemen and public clients to douse the fire and foresee the unsafe gas spillage distantly and along these lines diminishing danger in dealing with the fire mishaps and perilous gas explosives

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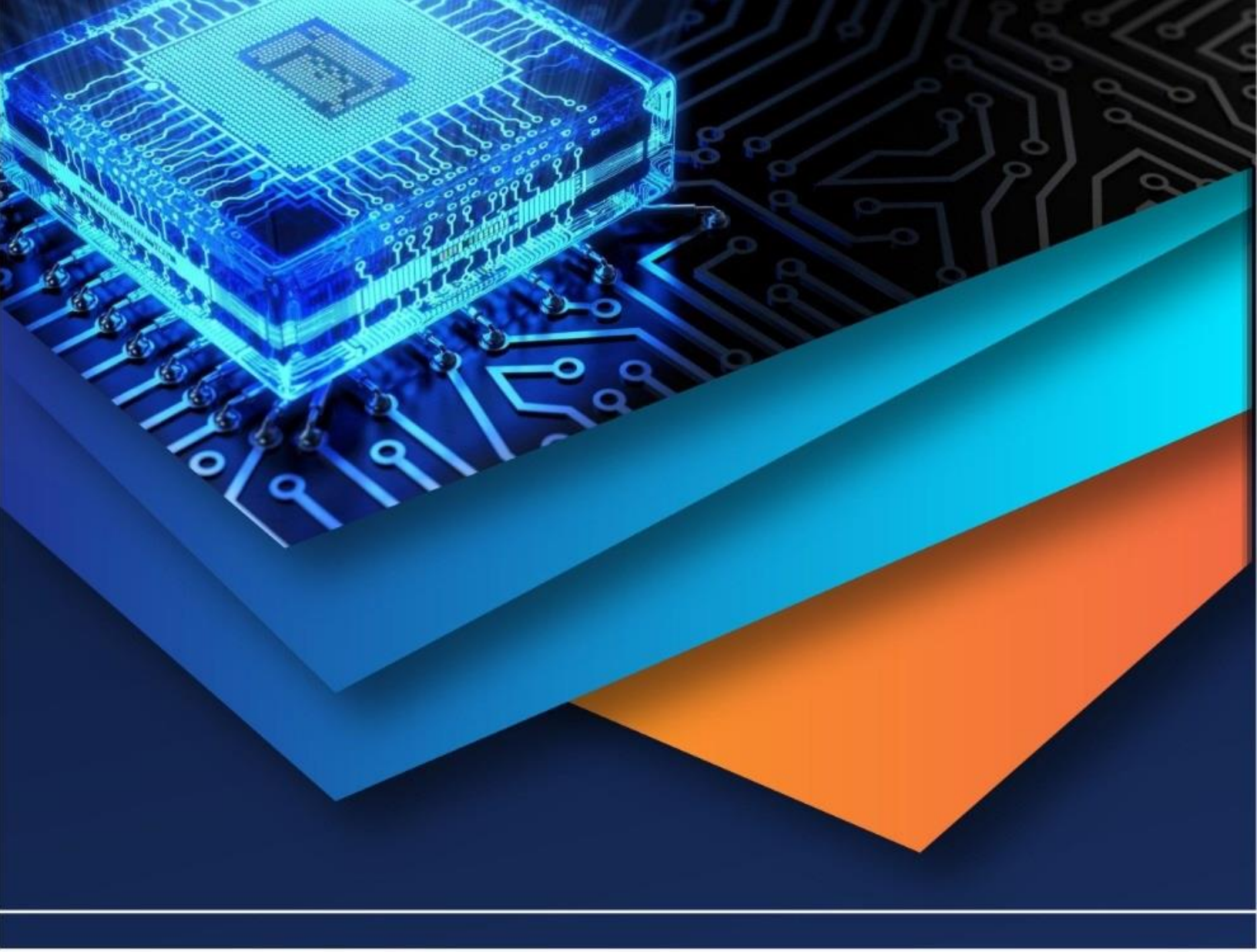

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