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Wireless Human Detection

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Abstract: ***Natural calamities do occur and they are unstoppable. But humans are normal becoming increasingly aware of the concept of intelligent rescue operations in such calamities so that precious life and material can be saved. Still there are lots of disasters that occur all of a sudden and earthquake is one such thing. Earthquakes produce a devastating effect and they see no difference between human and material. Hence a lot of times humans are buried among the debris and it became impossible to detect them. A timely rescue can only save the people who are trapped and wounded. Detection by rescue workers becomes time consuming and due to the vast area that gets affected it becomes more difficult. So the project Wireless Human Detection Robot is an autonomous robotic vehicle that moves in the earthquake prone area and helps in identifying alive people. The main aim of the project is to detect the human being by using a wireless remote controlled robot, which have the sensors that detects the presence of the human being and indicates the presence to user. As it is a wireless robot, it can be easily mobilized and controlled. This can also be used to detect terrorists/thieves hiding inside the building.***

I. INTRODUCTION

Our project is basically made to overcome with the loss of live during natural calamities especially earthquake, landslides, accidental fire etc. to achieve this objective our project has various components for various requirements like infrared signals, flame sensors, distance measurement components and many more. At the time of that adverse situation rescue team also need helping hand of technologies and hence through our project we are providing that helping hand so to save as much lives as can

II. OBJECTIVE

A. Helping hand for emergency(earthquake)
B. Predicting movement through passive device
C. Notification with distance and movement
D. Compact wireless robot
E. User friendly

III. SCOPE

A. The living beings affected by disasters can be sensed in a quicker time and the rescue operation will be there for the stake to help the victims.
B. The invention of this device will be user friendly and advanced in technology.

IV. PROPOSED SYSTEM

In our Project, we proposed a mobile rescue robot system based on wireless sensor network technology to help the people on time which are trapped in natural calamity like disaster, earthquake, floods etc. We have mounted few sensors, which has distinguished working by its own time and accuracy, which reflects the dynamics of our project for Disaster management department. Using our project one can get to know whether any alive human existence, as well as presence of fire. This project will be a great help indeed to rescuers in detection of the human beings at the disaster sites. This is also user friendly, semiautonomous and efficient device by software programming interfacing for detection. This model system will be a combination of a stationary as well as a mobile robot system especially for the disaster affected chaotic areas [2], [3]. In our Project, we have proposed a mobile rescue robot system based on wireless sensor network technology to help the people on time which are trapped in natural calamity like disaster, earthquake, floods etc. We have proposed a network system and an algorithm for a rescue robot to obtain its position under collapsed area. The network system consists of communication tags, operates dynamically by the rescue robot in its rescue activities. According to the temporary tags, the system constructs temporary communication infrastructure and obtains geometrical information of the area. In particular, to get the position of the rescue robot, our algorithm employs angle obtained from Omni-directional Sensor mounted on the communication tag. Wireless sensor network can solve the key issue of communication bandwidth, data transmission and real-time

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detection and so on. Wireless sensor network is composed of a large number of micro-sensor nodes which have small volume, low cost, good compatibility and battery power. Thus we proposed a new approach for detecting alive humans in destructed environments using an autonomous robot PIR sensor is placed on a moving all direction robot that can man oeuvre in the earthquake prone areas [1]. The robot is driven on a geared dc motor for increased torque and low speed and stepper motor for increased turning accuracy hence the precise control of position is monitored.

The robot consists of a four wheel geared drive with DC motors attached to perform forward and reverse movement. PIR sensor plays a primary role in the circuit that is detecting the human being.

PIR sensors work on the principle that they every human being emits infra-red radiations of very low wave length. Thus this sensor senses these radiations and outputs a logic high value.

The flame sensor detects the presence of fire or flame based on the Infrared (IR) wavelength emitted by the flame. It gives logic 1 as output if flame is detected, otherwise it gives logic 0 as output [4].

Arduino Uno checks the logic level on the output pin of the sensor and performs further tasks such as activating the buzzer and LED, sending an alert message [1], [2], [3]. We also have proposed (IR) Infrared Sensor in our project so that any kind non los can be detected through the control panel [1]. A transmission medium is required for infrared transmission, which can be comprised of either a vacuum, the atmosphere or an optical fiber, is used to sense certain characteristics of its surroundings. It does this by either emitting or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion.

We have proposed Ultrasonic Sensor in our project so that any obstacle chasing nearby can be detected easily and distance between the source and the target can be benighted without a jerk. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception. Detection is not affected by accumulation of dust or dirt. Since ultrasonic waves can reflect off a glass or liquid surface and return to the sensor head, even transparent targets can be detected. Proposing a new approach for detecting alive humans in destructed environments using an autonomous robot [2].

Human detection in an unmanned area can be done only by an automated system. Alive human body detection system proposed a monitoring system using ultrasonic sensors transmit and analyze conditions of human body [2]. This robot is developed as field efficient by using the structure and theme of this proto-type robot with optimization in design and working principle. Advance equipments and rugged structure make it more field effective keeping in mind the whole scenario of disaster area. Using our project even one can get to know whether there is any alive human existence. As well as presence of fire. The distance between any obstacles in the way of robot [2].

By This project it will be a great help indeed to rescuers in detection of the human beings at the disaster sites. This is also user friendly, semi-autonomous and efficient device by software programming interfacing for detection. This model system will be a combination of a stationary as well as a mobile robot system especially for the disaster affected chaotic areas.

V. BLOCK DIAGRAM

A. Transmitter

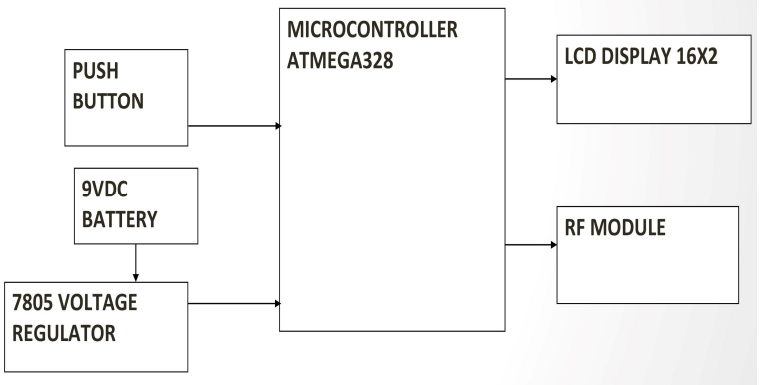


Figure: Transmitter

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1) For the working of transmitter section, 5vdc power supply is applied. For the process of data controlling and monitoring Atmega328p microcontroller is under turbulence.
2) As we are compensating all types of receiver side robot data towards the transmitter section a LCD(16*2) is being utilized under process, through the roots of Atmega328p microcontroller SMD package. Apart from that interfacing of radio frequency module is also subjected to control and monitoring the bidirectional control system.
3) LCD(16*2) is configured as 4-bit mode programming. Its is connected to microcontroller pin number as (D3toD8) with respecting D7,D6,D5,D4,RS,EN pins of LCD display. 7805 voltage regulator IC is being used to convert power supply to 5Vdc.
4) For Receiver and transmitter modulation process (NRF2404) serial module is connected to RX and TX pins of the microcontroller. For the controlling and command of the robot movements, pushbuttons are configured at the transmitter section. There are same controller settings used in both side which is Atmega328p.
5) Its has 8 channels of analog input. 3 Timers and internal oscillators. We have to control robot by using transmitter command and also working with analog sensor with alternately continuous updating process of value determination and monitoring in remote area. There are main four sensors installed in the receiver section:
6) PIR Sensor
7) Ultrasonic Sensor
8) IR Sensor
9) Flame Senson
10) Robot movement is controlled by L293d motor driver IC. Reconsidering the situation in accident and disaster field all four direction movements control is applied in our robot. For the conversion of power supply 7805 regulator IC is implied. 7805 regulator IC have input maximum voltage is 24vdc and give constant 5vdc power supply. Bridge Rectifier is used for the protection or wrong power supply.

B. *Receiver*

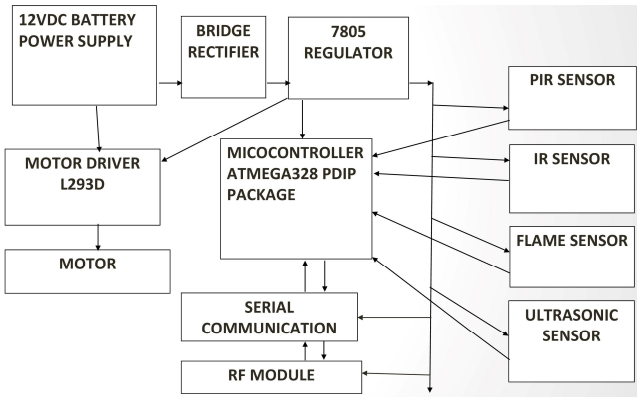


Figure: Receiver

1) Transmitter sends command to the receiver section and this side we have to use same receiver module to control monitoring this data to any time receiving content. NRF2404 module is working with radio frequency range and also work under 100m area of coverage.
2) This module is working with both side tx and rx working, so that we can send and receive data any time as per serial coordination.
3) PIR Sensor have digital signal so it connects in digital pin PC3. When any object is not moving then it gives stable output . When any object is in moving form then its gives low signal and it can be measured.
4) Flame sensor is used to nullify, whether the deployed area have any kind of fire or not. If there is any kind of fire existence, then this sensor gives high signal and alertion goes active. Signal pin of Flame Sensor is connected to PC1 of microcontroller pin.
5) IR Sensor is used for low brightness area display unit. This is also working as PIR sensor but most likely it is use to check any kind of obstacle present in front of robot or not. PC0 is pin where IR sensor signal is connected[3].
6) For distance measuring Ultrasonic sensor is implied in the receiver. It consists of two signal pins one is trigger and another one is echo. This both pins are connected to PD2 and PD3 respectively with maximum range of 4m.

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VI. CIRCUIT DIAGRAM

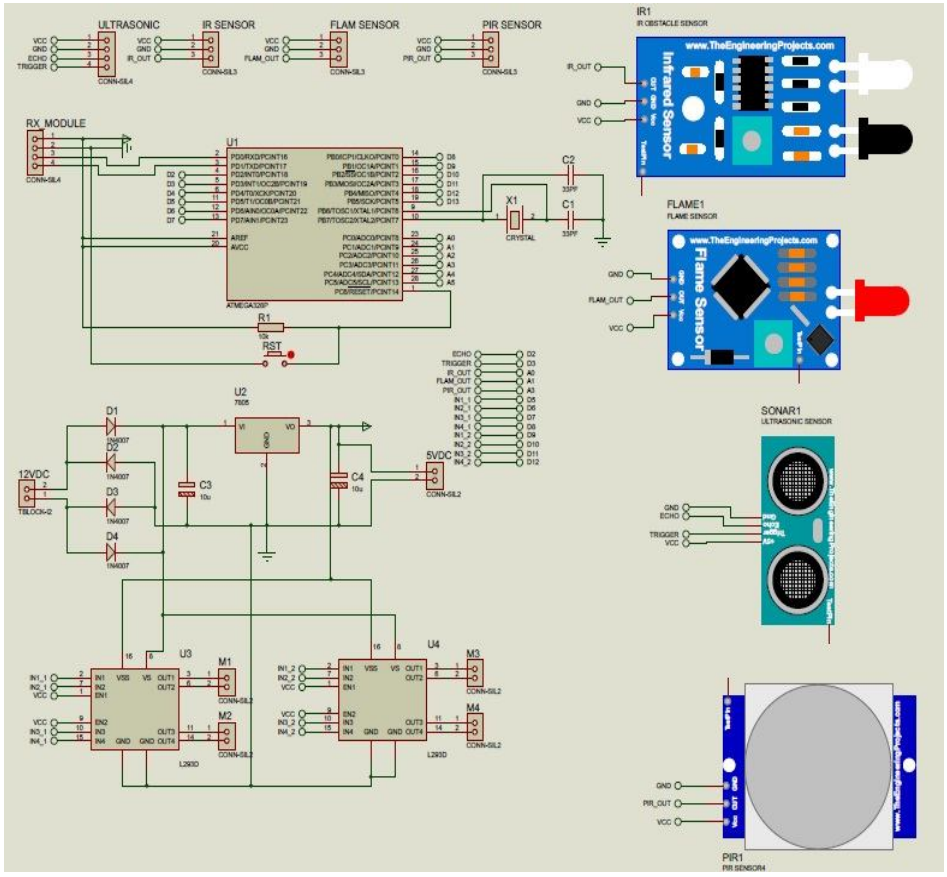


Figure: Circuit Diagram

VII. PROPOSED MODEL

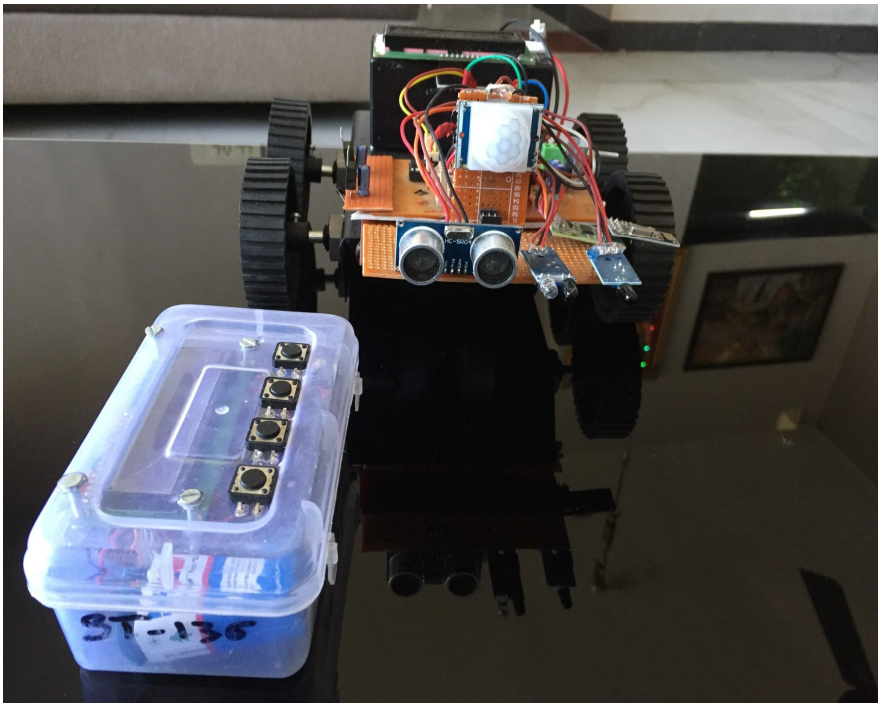


Figure: Proposed Model

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VIII. SOFTWARE USED

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.

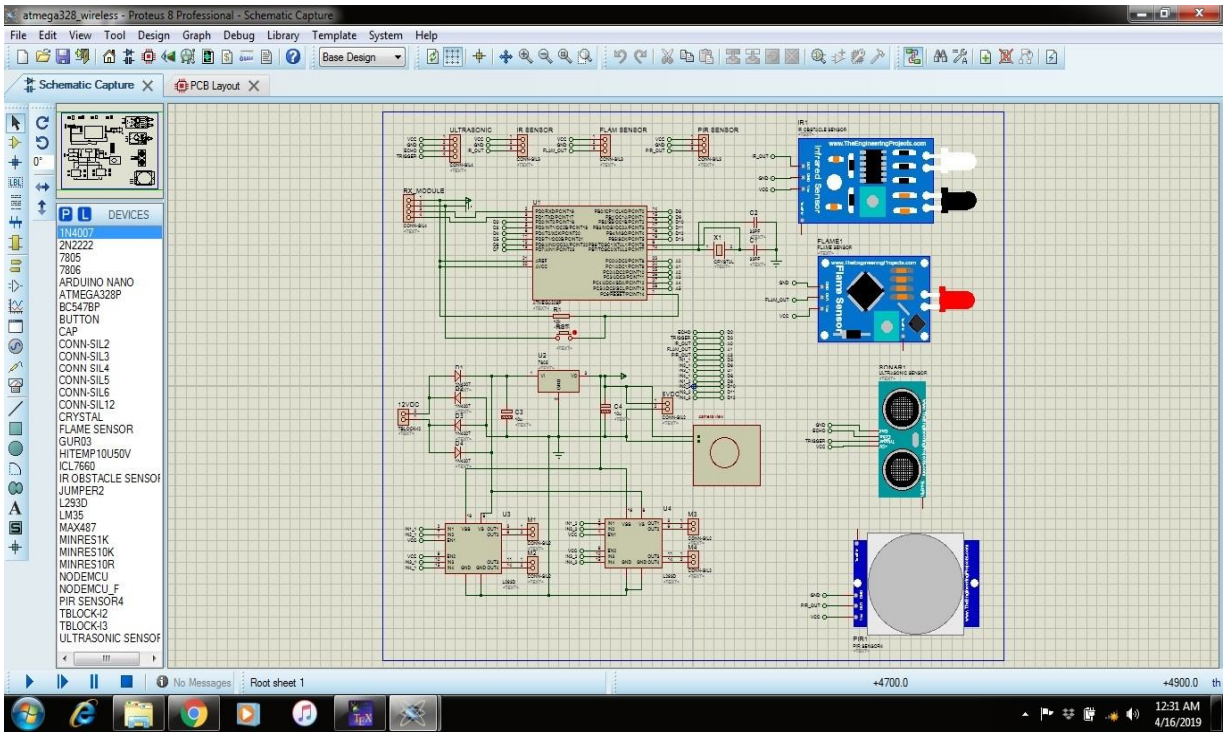


Figure: Proteus

IX. SYSTEM RQUIREMENTS

A. *Required Tools*

1) Battery (12V)
2) Battery (9 V)
3) PCB (8*4)
4) LCD 16X2
5) Resister
6) Capacitor
7) voltage regulator(7805)
8) Push Button
9) 16MHZ CRYSTAL

B. *Essentials*

1) Microcontroller (ATMEGA328P)
2) RF Module NRF2404
3) PIR sensor
4) IR sensor
5) Ultrasonic sensor
6) Flame sensor

a) *Motor Driver L293d:* It works on the concept of H-bridge. It's a circuit which allows the high voltage to be flown in either direction. With the help of voltage, its direction should be change or able to rotate the motor in clockwise or anticlockwise direction. Using micro-controller, the voltage of l293d IC can be control and hence the robot can be moved [2], [3].

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C. Transmitting and Receiving

The RF module, as the name suggests, operates at Radio Frequency. The corresponding frequency range varies between 30 kHz and 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK). Transmission through RF is better than IR (infrared) because of many reasons. Firstly, signals through RF can travel through larger distances making it suitable for long range applications. Also, while IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter receiver. Next, RF transmission is more strong and reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are

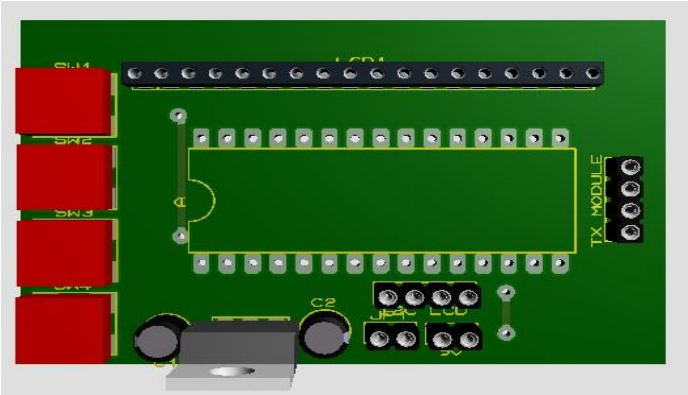
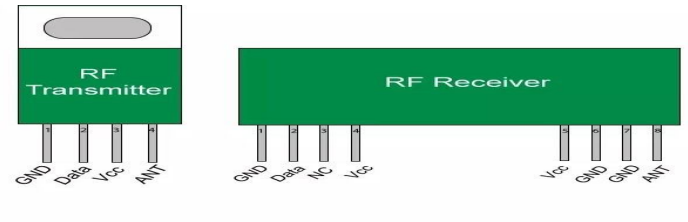


Figure: Transmitter and Receiver module



Affected by other IR emitting sources. This RF module comprises of an RF Transmitter and an RF Receiver. The transmitter/receiver (Tx/Rx) pair operates at a frequency of 434 MHz. An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4. The transmission occurs at the rate of 1Kbps - 10Kbps.The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter [2], [3].

X. APPLICATIONS

Robots can perform variety of functions independently. General-purpose robots may perform a variety of functions simultaneously or they may take on different roles at different times of day. This specific Rescue robot that has been designed for a specific purpose can be used for the following applications:

A. In military applications to detect the presence of militants.
B. In disaster zones, whether it natural or man-made disaster.
C. In Rescue operations where human reach is not possible.
D. In Medical applications to detect motion.
E. In Warfield affected areas, to detect the presence of bomb.
F. Human detection robot can be used at the time of natural calamities to save the lives of human.
G. his can also be used to detect the humans in the war field.
H. This can be used for security purpose in the jewelry shops, museums, etc.
I. Ultrasonic sensors can measure the distance to a wide range of objects regardless of shape, color or surface texture.
J. They are also able to measure an approaching or receding object.

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K. Infrared technology is implemented in night vision equipment if there is not enough visible light available to see unaided. Night vision devices convert ambient photons of light into electrons and then amplify them using a chemical and electrical process before finally converting them back into visible light.

L. Infrared tracking, also known as infrared homing, is a missile guidance system which operates using the infrared electromagnetic radiation emitted from a target to track it.

M. These missile systems are often known as 'heat-seekers' as infrared is radiated strongly by hot bodies such as people and vehicle.

N. Used in intrusion detection, auto light switches, etc. Intrusion alarm system sense temperature of human body. If the temperature is more than threshold value, it sets on the alarms.

O. It uses electromagnetic system which is suitable for human body in order to protect it from unwanted harmful radiations.

P. Hydrogen stations, Gas-fueled cookers, Industrial heating and drying systems, Domestic heating systems, Industrial gas turbines.

XI. FUTURE SCOPE AND SUMMARY

In this report, we have introduced our primitive idea to make a rescue robot using some types of primitive sensors like PIR,IR, Ultrasonic and a simple Wi-Fi camera. This vehicle may be improved by using high range sensors (Laser, ultrasound or powerful thermal cameras), GPS, and motors of high capacity. Long distance telecommunication protocols will be also proposed in any future version of this robot. Our final goal is to develop a full autonomous rescue robot [2], [3], [4].

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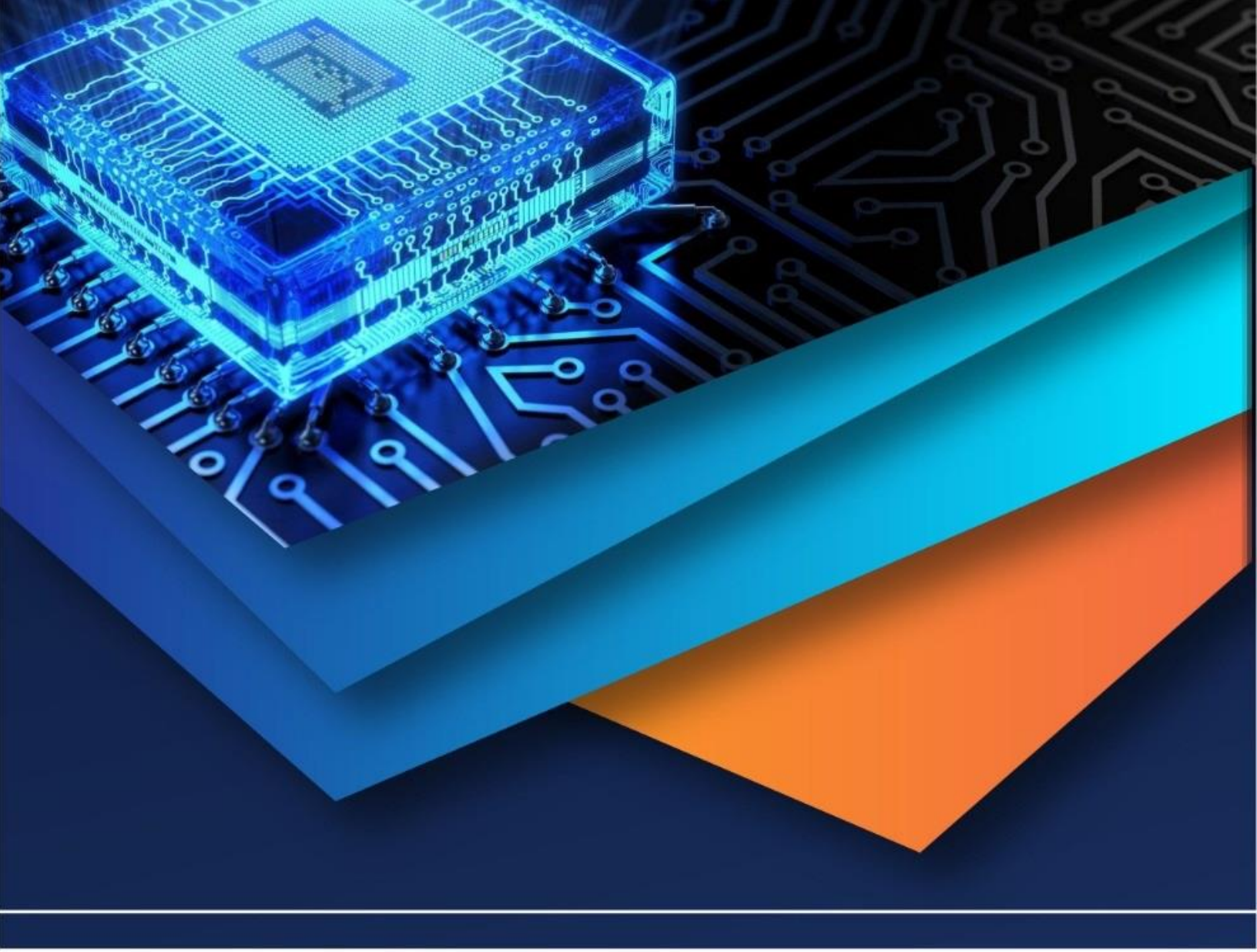
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