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Smart Traffic System

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Abstract: ***The objective of this project is to control the traffic signal with help of solar energy. This project has been developed as a model of Traffic light controller. The signals can be controlled through software programs and can be varied depending upon the location. For example some places needs green signal to glow for long time. And some directions need red signals to glow for long time. This can be achieved simply by varying the delay in the software. Solar power is used to provide the power to the solar lights. So this project is very useful to the government to save the power.The solar panel is solar photovoltaic modules use solar cells to convert light from the sun into electricity. Now-a-days, instead of using the power from the supply line for various operations, most of them are going for solar energy source, as it is cheapest.***
Keywords: Arduino Mega2560, LED, LCD, IR Sensor, OR Gate, Jumper, etc.

I. INTRODUCTION

Traffic lights, developed since 1912, are signalling devices that are conceived to control the traffic flows at road intersections, pedestrian crossings, rail trains, and other locations. Traffic lights consist of three universal colored lights: the green light allows traffic to proceed in the indicated direction, the yellow light warns vehicles to prepare for short stop, and the red signal prohibits any traffic from proceeding. Nowadays, many countries suffer from the traffic congestion problems that affect the transportation system in cities and cause serious dilemma. In spite of replacing traffic officers and flagmen by automatic traffic systems, the optimization of the heavy traffic jam is still a major issue to be faced, especially with multiple junction nodes [2]. The rapid increase of the number of automobiles and the constantly rising number of road users are not accompanied with promoted infrastructures with sufficient resources. Partial solutions were offered by constructing new roads, implementing flyovers and bypass roads, creating rings, and performing roads rehabilitation.

A. Inteligent Traffic System

The design of intelligent traffic control system is an active research topic. Researchers around the world are inventing newer approaches and innovative systems to solve this stressful problem. Models based on mathematical equations are applied to estimate the car waiting time at a junction, the number of cars in the waiting queue, the extension of the waiting cars along the lane, the optimal timing slots for green, yellow, and red lights that best fit the real and veritable situation and the efficient combination of routing. In fact, the mutual dependencies between nearby intersections lead to a complicated formulation with cumber some parameters. These parameters are accidental, hazardous, dependent, and the worse point is the variance of these parameters with time.

B. Psystem Design

The designed smart traffic light control system corresponds to a junction of 4 mono directional roads in the form of "+" as shown in Fig. 1. We aim in the first place to investigate the technologies of the existing systems and seek the most appropriate employed devices. We try also to test the proposed integrated design as architecture, hardware, and software. Next step will be an extension of the suggested traffic light system to a bidirectional "+" junction with various routing configurations. Our research target involves the management of traffic light systems for multiple adjacent bidirectional roads.

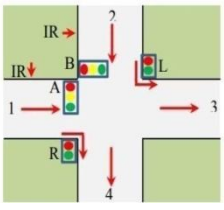

FIG 1. System Design

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II. MODE OF OPERATION

Above arrangement shows the operation of traffic when there is green light for thetraffic coming from lane A. This traffic can circulate in the blocks and go to lane B , C, D.Is the sensor senses more traffic in lane A then it will increase the timing by 5 seconds or according to the time setting .Lower given arrangement shows the operation of traffic when there is green light for the traffic coming from lane B. This traffic can circulate through the block and go to lane A, C, D. Is the sensor senses more traffic in lane B then it will increase the timing by 5 seconds or according to thetime setting.

A. Operation A Is On

Lower given arrangement shows the operation of traffic when there is green light for the traffic coming from lane C. This traffic can circulate through the block and go to lane A, B, C. Isthe sensor senses more traffic in lane C then it will increase the timing by 5 seconds or according to the timesetting. If there is no more traffic in lane B then the traffic light will switch to red in the time asdesigned.

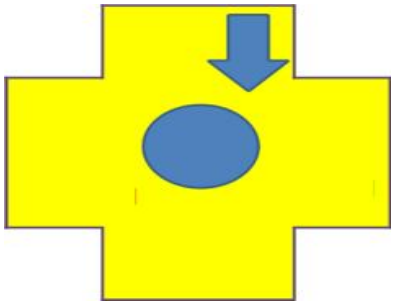

FIG 2.1 OPERATION A IS ON

B. Operation B Is On

Lower given arrangement shows the operation of traffic when there is green light for the traffic coming from lane B. This traffic can circulate through the block and go to lane A, C, D. Is the sensor senses more traffic in lane B then it will increase the timing by 5 seconds or according to the time setting If there is no more traffic in lane B then the traffic light will switch to red in the time as designed.

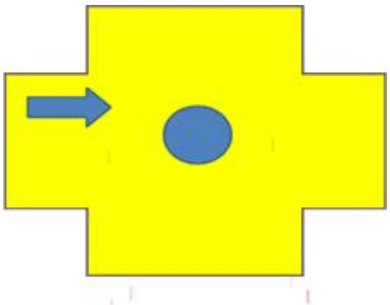

FIG 2.2 OPERATION B IS ON

C. Operation C Is On

Lower given arrangement shows the operation of traffic when there is green light for the traffic coming from lane C. This traffic can circulate through the block and go to lane A, B, C. Is the sensor senses more traffic in lane C then it will increase the timing by 5 seconds or according to the time setting. If there is no more traffic in lane B then the traffic light will switch to red in the time as designed.

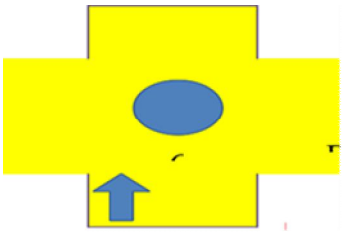

FIG 2.3 OPERATION C IS ON

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D. Operation D Is On

Lower given arrangement shows the operation of traffic when there is green light for the traffic coming from lane D. This traffic can circulate through the block and go to lane A, B, C. Is the sensor senses more traffic in lane C then it will increase the timing by 5 seconds or according to the time setting . If there is no more traffic in lane B then the traffic light will switch to red in the time as designed.

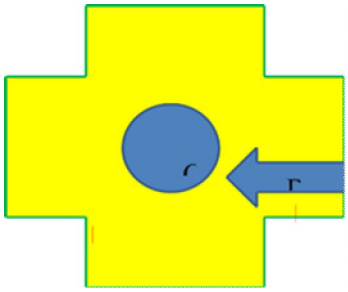
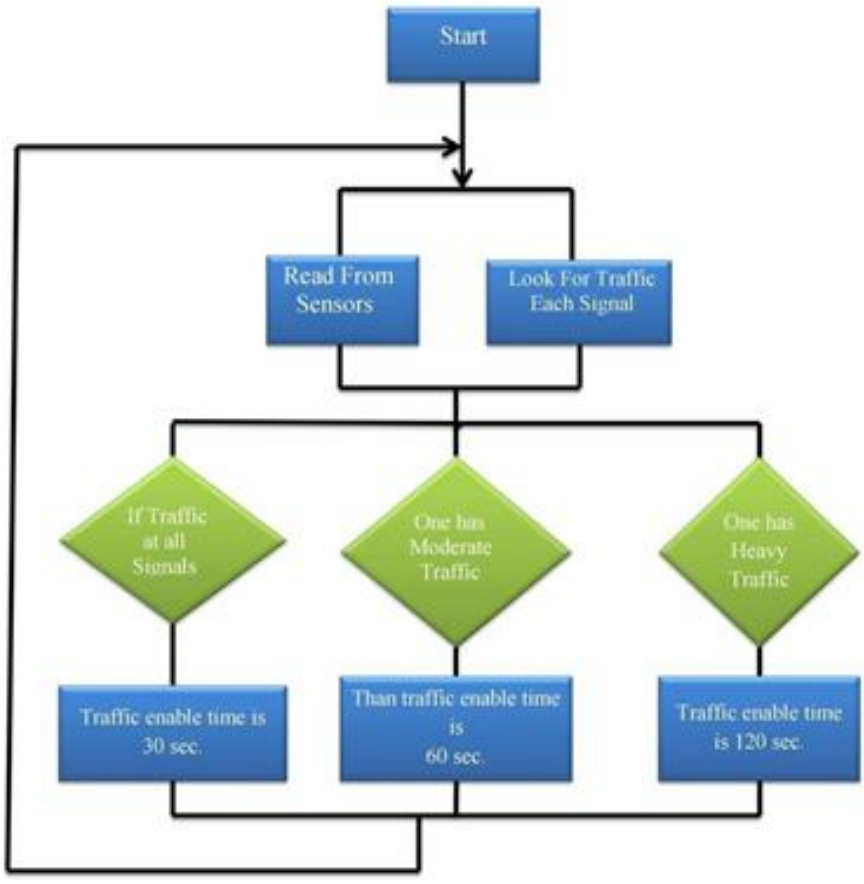


FIG 2.4 OPERATION D IS ON

E. Working Model

The main heart of this traffic system is microcontroller. IR sensors are connected to the analog pin (A0, A1, A2, and A15&52) of the microcontrolle .Traffic lights are connected to Digital pin 2 to 13. If there is a traffic on road then that particular sensor output becomes logic 0 otherwise logic 1. By receiving these IR sensor outputs, we have to write the program to control the traffic system. If you receive logic 0 from any of these sensors, we have to give the green signal to that particular path and give red signal to all other paths. Here continuously we have to monitor the IR sensors to check for thetraffic. This circuit consists of IR sensors, an arduinonano microcontroller,4 traffic lights. transmitter looks like an LED. This IR transmitter always emits IR rays from it. The operating voltage of this IR transmitter is 2 to 3v.



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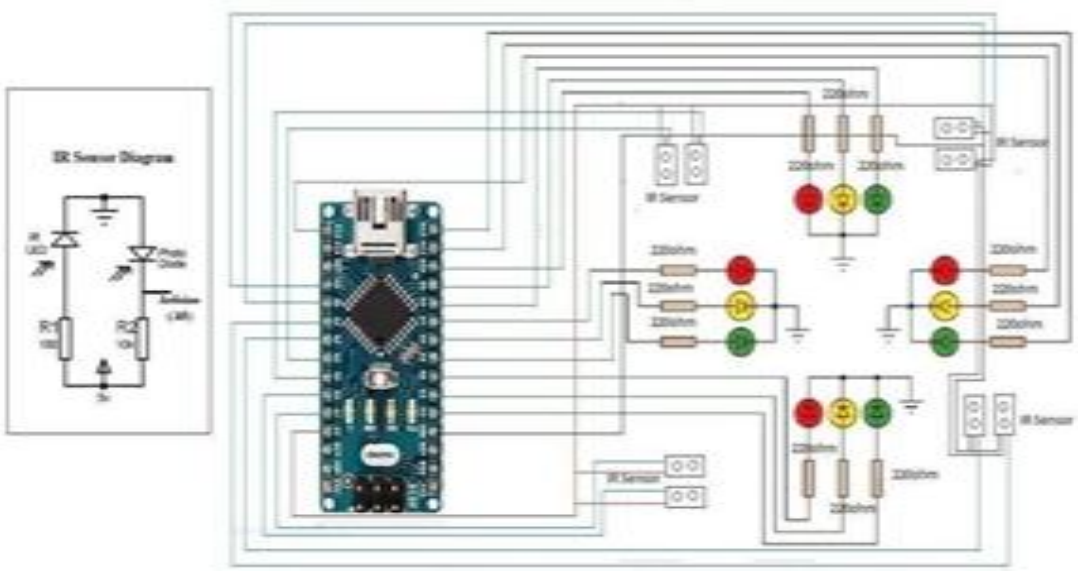
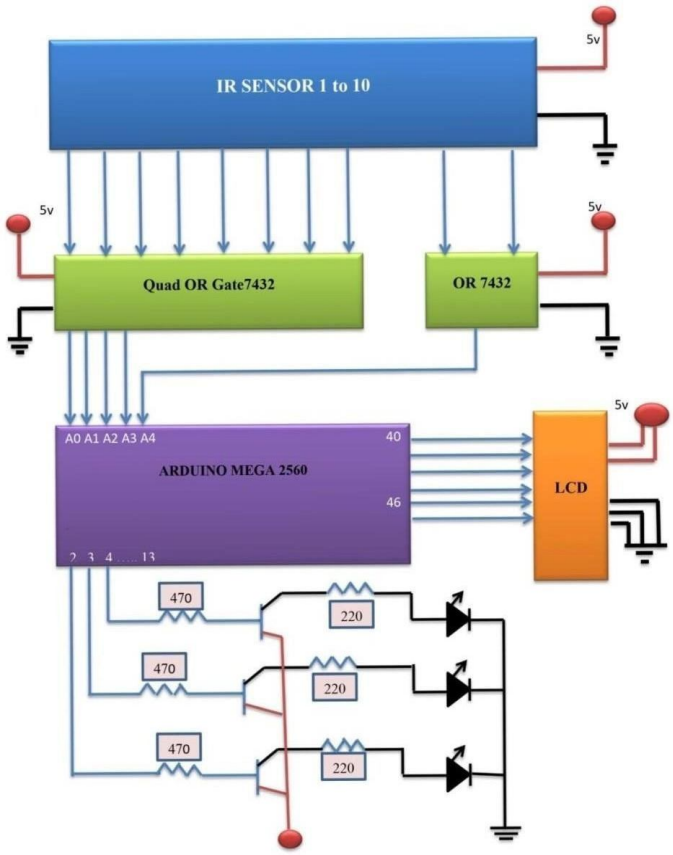
III. CIRCUIT DIAGRAM

The circuit diagram consist of 36IR sensor, 12 LED (3 red, 3green, 3yellow), 12 220ohm and470ohm resistor, arduinomega2560 and 5v power supply. In which we will use IR sensors to measure the trafficdensity. We have to arrange 10 IR sensor for each road, each two IR output is further connected to or gate is connected to the arduinomega microcontroller port number of A0 to A15 to pin 52. The led is connected to port number Digital pin 2 to 13 of the arduino.



IV. BLOCK DIAGRAM



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V. HARDWARE DISCRIPTION

A. IR Sensor

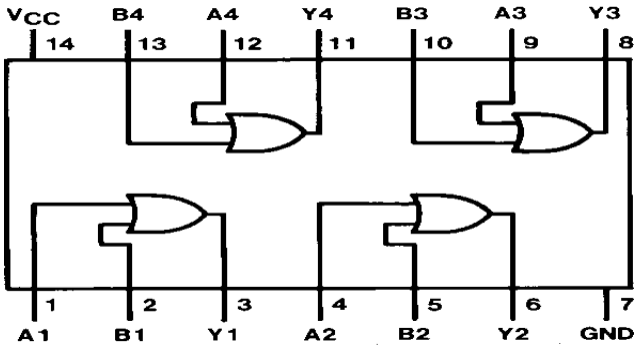
As artificial replications of human senses continue to give robots all the capabilities required to come to life. The line separating the two fades. Among all the senses vision is a vital sense in humans. Allowing us to learn more about the surrounding world than we do with any of the other four senses. An infrared sensors (IR sensor) is an electronic device used to sense some aspects of the surroundings and measure the heat of an object as well as detect motion, extending the sense of vision tomachines.

B. Or Gate 7432

The OR gate is a digital logic gate that implements logical disjunction.7432 QUAD 2- input OR Gate Positive Logic. This IC contains four independent positive logic OR Gates. This IC only gives output if it gets positive pulse at any one terminal of it's input.

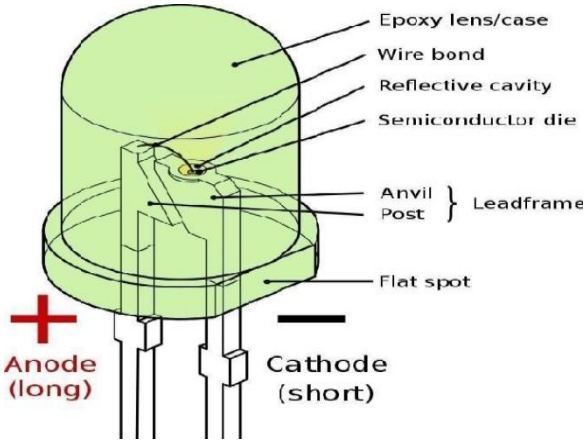
CONECTION DIAGRAM

Y=A+B



C. Light Emitting Diode

A Light emitting diode (LED) is essentially a pn junction diode. When carriers are injected across a forward-biased junction, it emits incoherent light. Most of the commercial LEDs are realized using a highly doped n and a p Junction.Appearing as practical electronic components in 1962, the earliest LEDs emitted low- intensity infrared (IR) light.



D. Liquid Crystal Display

The LCD (liquid crystal display) is device to good communicate between user and machine. It display the Software status, Errors, Indicators, Data as per user program by which a good Control method and a good communication occurs.

E. Jumper

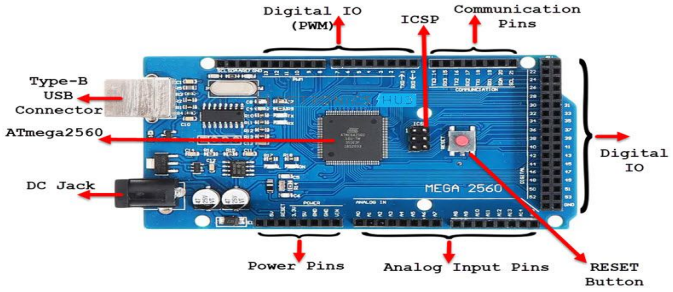
A **jumper** is a short length of conductor used to close, open or bypass part of an electronic circuit. They are typically used to set up or configure printedcircuit boards, such as the motherboards of computers. The process of setting a jumper is often called **strapping**.

F. Push Button

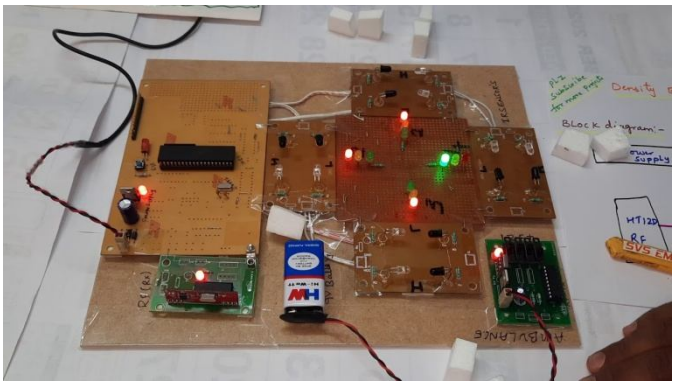
A push-button (also spelled pushbutton) or simply button is a simple switch mechanism for controlling some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal. The surface isusually flat or shaped to accommodate the human finger or hand, so as to be easily depressed or pushed. Buttons are most often biased switches, although many un-biased buttons (due to their physical nature) still require a spring to return to their un-pushed state.

G. ARDUINO MEGA 2560

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560 (datasheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega is compatible with most shields designed for the Arduino Due milanove or Diecimila.



H. Assemble Of Hardware



VI. SIGNIFICANT OF THE PROJECT

The study will provide understanding about the projects and policies of the traffic system. It is important to sense that is explores the major problems encountered by the traffic officials, motorists and the public.

VII. ADVANTAGES

A. Increasing the traffic handiling capacity of roads.
B. Reducing collision, coth vehicular and pedestrian. Encourages travel within the speed limit to meet green lights.
C. Reducing unnecessary stopping and starting of traffic – this in turn reduces fuel consumption ,air pollution ,noise and vehicle wear and tear.

VIII. FUTURE SCOPE

The purpose of traffic system is to improve transport operation and transport services profitability, reduce traffic jams and fatalities, provide sufficient driving training, maintain roads infrastructure, and maintain traffic law enforcement.

IX. CONCLUSION

There is exigent need of efficient traffic management system in our country, as India meets with 384 road accidents every day.To reduce this congestion and unwanted time delay in traffic an advanced system is designed here in this project. With field application of this technology , the maddening chaos of traffic can be effectively channelized by distributing the time slots based on the merit of the vehicle load in certain lanes of multi junction crossing.We have successfully implemented the prototype at laboratory scale with remarkable outcome. The next step forward is to implement this schema is real life scenario for first hand results, before implementing it on the largest scale.

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[5] K.Vidhya, A.Bazila Banu, Post Graduate Student Dept of Information Technology, Velammal College of Engineering and Technology,Madurai, India. Assistant Professor Dept of Information Technology, Velammal College of Engineering and Technology, Madurai, India.

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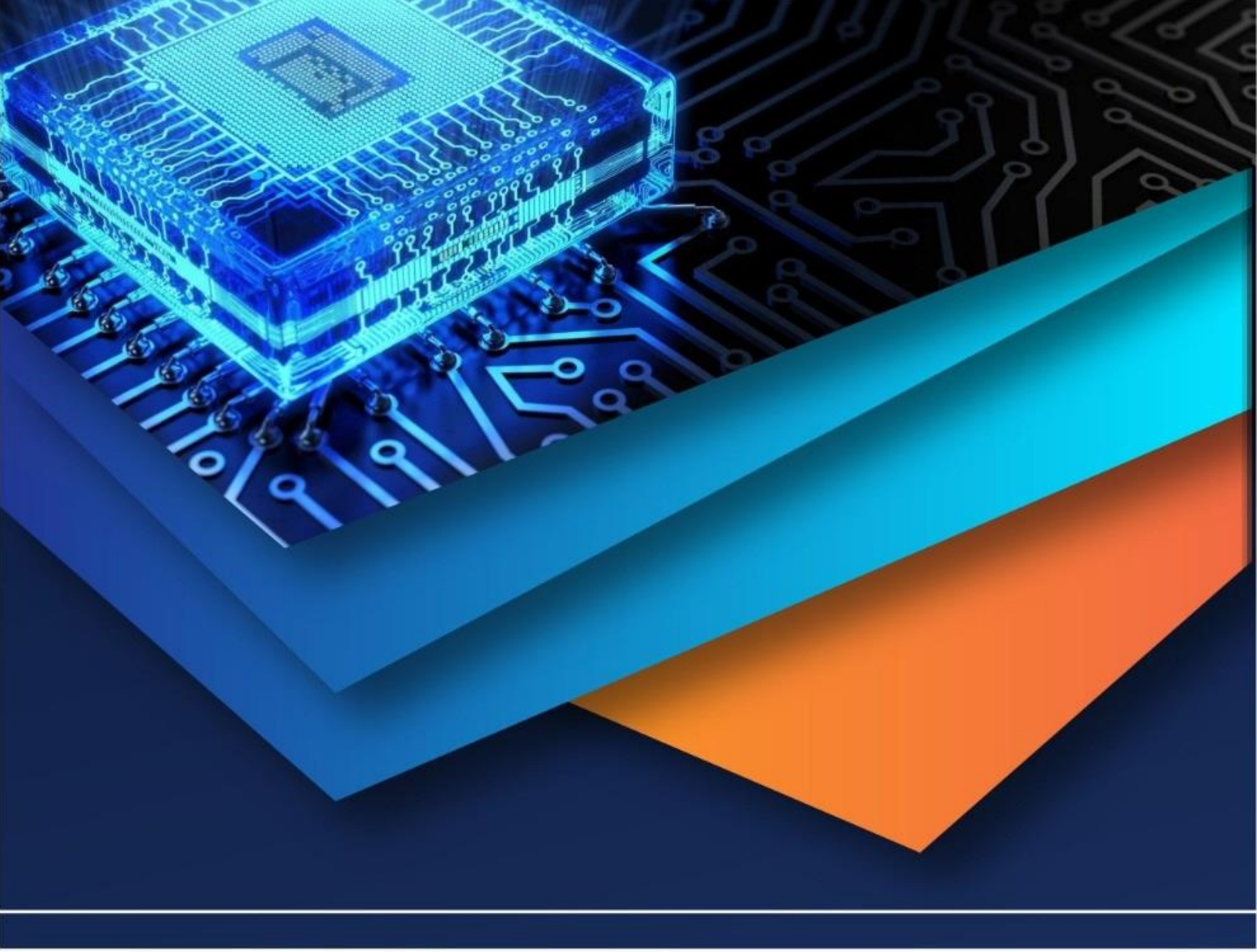

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