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Vehicle Accident Prevention System Embedded with Alcohol Detector

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Abstract: - the main aim of this project is to develop a system that can detect the alcohol content in the air exhaled by the driver and automatically turn off the car if alcohol percentage exceeds the limit. In this project we are using 8051 family (89s52) micro controller. the alcohol sensor used in this project is mq-3 which to detect the present of alcohol content in human breath. alcohol sensor gives out analog data that can't be analyzed by 8051 microcontrollers. The data received from alcohol sensor is converted into digital form with the help of digital converter (analog to digital converter). after that the data is stored in microcontroller and then compared to the threshold values. if the value is beyond its set limits, then with the help of program controller takes appropriate action which controls the ignition system. here we used electro mechanical relays to control the ignition system. in this project by controlling the ignition system, we can prevent accidents that occur due to drink and drive.
key words: - mq3 sensor, microcontroller 8051, relay, lcd display, ignition system

I. INTRODUCTION

The factor of vehicle compactness on the road increased dramatically because of the population in India has been increasing rapidly years by years. Some of the cases of these road accidents may happen when there are drunken driver who driving in dangerous condition. At present the death cases due to the drunken driver cause of themselves have increased radically.

The purpose of this project is to develop vehicle accident prevention by using method of alcohol detector. in an effort to reduce traffic accident cases based on driving under the influence alcohol. This project is developed by integrated the alcohol sensor with the microcontroller. The alcohol sensor used in this project is MQ-3 which to detect the present of alcohol content in human breath. Therefore there is a need to prevent the drunken driver to drive alone in unconsciousness on the road. The vehicle accident prevention system can be one of the solutions to avoid drunken driver to drive as it could detected the BAC through human breaths using alcohol sensor.

II. METHODOLOGY

It consists of two parts which is hardware development and software development. Hardware development involved the designing the circuit of the project and printed circuit board (PCB) works. While the software developments are focused on simulating the circuit before test to the real component and also designing coding to be embedded in the hardware.

A. Effect of Alcohol Content:-

Blood alcohol content (BAC) Blood alcohol concentration is usually expressed as a percentage of ethanol in the blood in units of mass of alcohol per volume of blood or mass of alcohol per mass of blood.

BAC Level in g/100ml	Effect	BAC Level in g/100ml	Effect
0.02 to 0.04	Progressive Determination	0.02 to 0.04	Accident risk 7 times as at BAC 0.01g/100ml
0.04 to 0.05	Significant involvement in accidents	0.02 to 0.04	Accident risk 25 times as at BAC 0.01g/100ml
0.02 to 0.04	Domination factor in accident		

Table 2.1 Effect of Alcohol for Highway Safety (Study done at University of Michigan)

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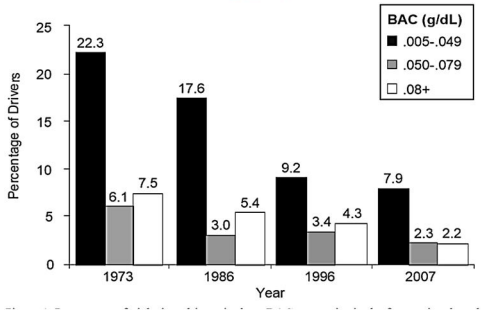

Graph2.1 Percentage of Night time Drivers in Three BAC Categories

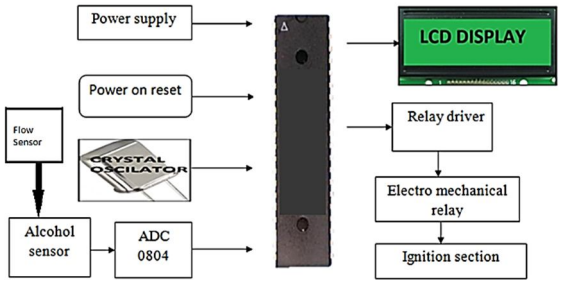

Fig.2.2 Block Diagram of System

B. Description of Block Diagram

Microcontroller is the heart of system. We have used the 8051 (89S52) microcontroller, in which we stored the program which controls the ignition system. Which is executed in keil and performed in Proteus according to the program microcontroller gives the command to the relay.

Power supply, Flow Sensor, Alcohol Sensor, Crystal Oscillator Which are connected as a input and LCD Display, Relay driver are connected as an output microcontroller. When person blow in the flow sensor it detect the person properly blown or not then it gives the next command to alcohol sensor to check the alcohol. If person did not found alcoholic microcontroller gives command to relay person is clean it gives power supply to ignition system and we can start our vehicle.

III. CIRCUIT DIAGRAM

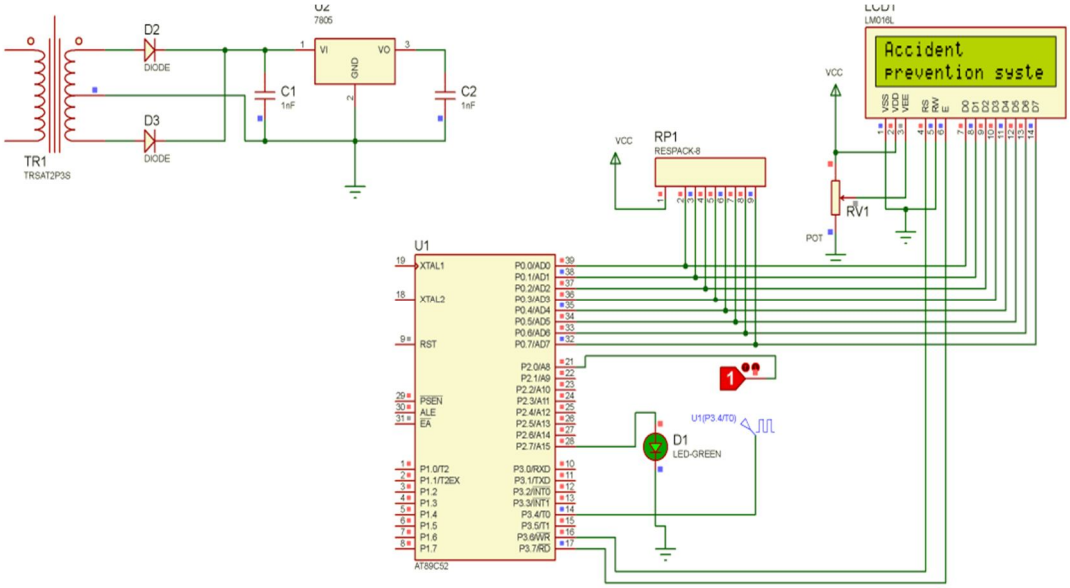

Fig.4.1 Circuit Diagram

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IV. SYSTEM DESIGN

Following are the components in the system

A. *Power Supply*

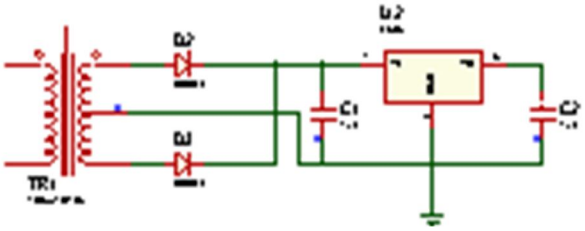

Fig.4.1 Power Supply

Most digital logic circuits and processors need a 5-volt power supply. To use these parts we need to build a regulated 5-volt source. Usually you start with an unregulated power supply ranging from 9 volts to 24 volts DC .To make a 5 volt power supply, we use a LM7805 voltage regulator IC (Integrated Circuit).

B. *Alcohol sensor*

Fig.4.2 Alcohol sensor

It is used as part of the breathalyzers or breath testers for the detection of ethanol in human breath. A little tube is placed inside the sensor. This tube is a heating system that is made of aluminum oxide and tin dioxide and inside of it there are heater coils, which practically produce the heat.

C. *Flow Sensor*

Fig.5.3 Flow Sensor

When air flows the rotor rolls and its speed changes with different rate of flow of air. The Hall Effect sensor outputs the corresponding pulse signal.

D. *Electrical Specification*

1) Working voltage 5-24V DC.
2) Maximum current 15mA @ 5V.

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3) Working flow rate 1-30 liters/Minute.
4) Durability minimum 300000 cycles.

E. LCD Display

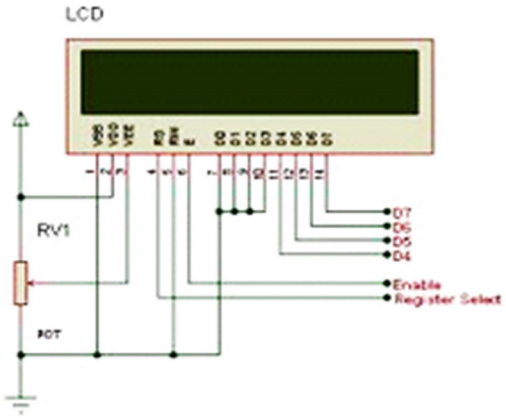

Fig. 4.4. LCD Display

LCD display is used for displaying the message that sent from the remote location. The LCD module is a dot- matrix liquid crystal display that displays alphanumeric, kana (Japanese characters) and symbols. The CMOS technology makes the device ideal for applications in hand-held portable and other battery-powered instruments with low power applications. Above is the quite simple schematic. It consists of 16 pins (8 data lines, 3 control lines, 2 power lines, 1 contrast line and 2 pins for back light LED connection). Data line and control line are connected to the microcontroller. The LCD panel's Enable and Register Select is connected to the Control Port. The Control Port is an open collector / open drain output. At the interface of LCD module, there are three power supply terminals- Vdd, GND, Vo. The LCD is driven by a voltage which is determined by Vdd-Vo. The data bus lines are DB7-DB0.When the enable signal is at the low level, this data bus terminals will remain in a high impedance state. When the data bus is open it produces a high output voltage. When the busy flag is at a high level, it indicates that the controller is in the internal operation mode and the next instruction will not be accepted. The next instruction must be written after the busy flag goes low. The delay should be suitable for most machines. If the LCD panel is not initializing properly, you can try increasing the delays. The LCD module is automatically initialized or reset when the power is turned on using the internal reset circuit. The busy flag holds 1 and does not accept instructions until initialization ends. The busy state lasts for 15 minutes after Vdd rises to 4.5 volts. When power supply restrictions are not met, the internal reset circuit will not operate normally and the initialization will not be performed. In this case, the controller should be initialized by the MPU according to “initializing by instruction”.

F. Relay

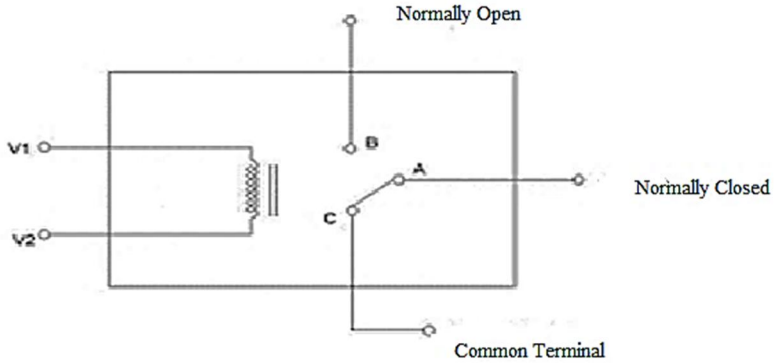

Fig. 4.5 Line diagram of Relay

Relay is one of the most important electromechanical devices highly used in industrial applications specifically in automation. A relay is used for electronic to electrical interfacing i.e. it is used to switch on or off electrical circuits operating at high AC voltage

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using a low DC control voltage. A relay generally has two parts, a coil which operates at the rated DC voltage and a mechanically movable switch. The electronic and electrical circuit are electrically isolated but magnetically connected to each other; hence any fault on either side does not affect the other side.

G. Microcontroller

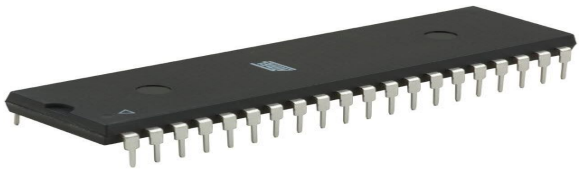

Fig.5.6 Microcontroller

H. Features of 8051 Microcontroller

4.0V to 5.5V Operating Range
Fully Static Operation: 0 Hz to 33 MHz
Three-level Program Memory Lock
256 x 8-bit Internal RAM
32 Programmable I/O Lines
Three 16-bit Timer/Counters
Eight Interrupt Sources
Full Duplex UART Serial Channel
Low-power Idle and Power-down Modes
Interrupt Recovery from Power-down Mode
Watchdog Timer
Dual Data Pointer
Power-off Flag
Fast Programming Time

I. Ignition System

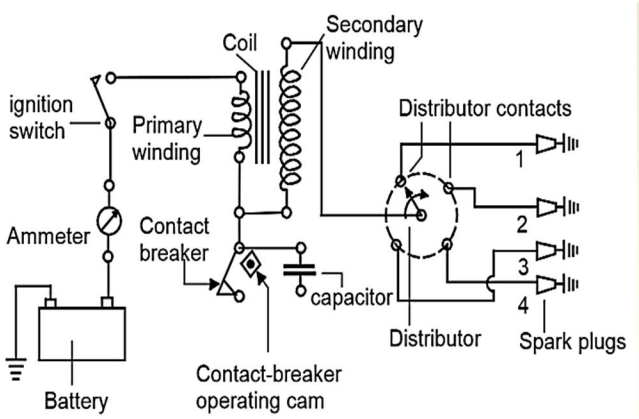

Fig. 4.7 Circuit Diagram of Ignition System

The main purpose of the ignition system circuit is to produce a spark at spark plugs so it can enable or disable vehicle's engine. The AC power supply helps the ignition coil to produce high voltages to the pulse of spark plugs. In vehicle accident prevention system, the ignition system is connected with the high voltage inverter to enable or disable the engine's ignition starter. The relay on this circuit is normally closed and will set to normally open when the alcohol sensor detected the 'drunkenness' level. As a result of this condition the spark plug could not produce the spark or in the real condition hence the car's engine could not start.

Above Figure shows line diagram of battery ignition system for a 4-cylinder petrol engine. It mainly consists of a 6 or 12 volt battery direct current (DC)., ammeter, ignition switch, auto-transformer (step up transformer), contact breaker, capacitor, distributor rotor, distributor contact points, spark plugs, etc.

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V. RESULT AND DISCUSSION

A. Blow Test

Before starting the vehicle driver has to compulsory blow in flow sensor. Flow sensor is set to 0 to50 rpm; it means 50 pulses are going to count.

B. Case 1: With Alcohol Consumption

If person is alcoholic alcohol sensor detect the alcohol, it gives signal to the microcontroller. Finally microcontroller shows the following output on LCD.

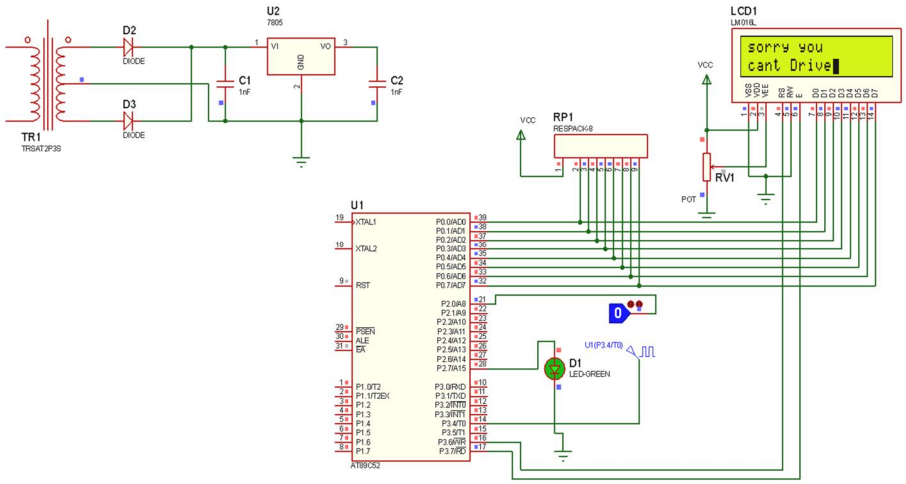

Fig. Case 1: With Alcohol Consumption

C. Case 2: Without Alcohol Consumption

If person did not found Alcoholic, Alcohol sensor send the signal to the microcontroller and microcontroller display the following output on microcontroller.

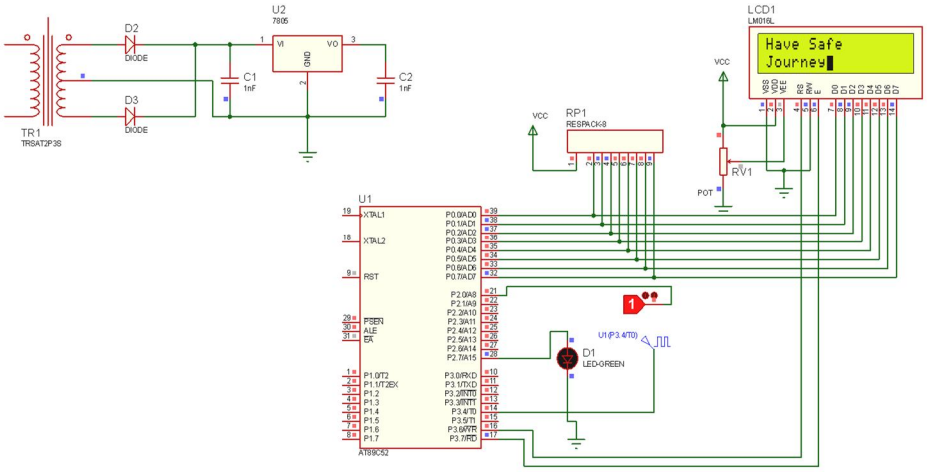

Fig. Case 2: Without Alcohol Consumption

VI. ADVANTAGES

A. Drink and driving and thus avoiding accidents
B. Protect the human life
C. Low cost.
D. Automated operation.
E. Low Power consumption.
F. It provides an automatic safety system for cars and other vehicles as well

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VII. APPLICATION

A. Can be used for security purpose.
B. Same project can be implemented in industry or educational institutes.
C. Can be applicable on all type of vehicle.

VIII. FUTURE SCOPE

A. This type of system is not available in market so it can be implement on vehicle.
B. This system reduces the work load of police force.

IX. CONCLUSION

In this project we have developed a real time model that can automatically shut off the engine automatically. Tests found that this system is highly effective and it's efficient in testing the alcohol percentage of the
Human beings and if it crossed the threshold value the dc motor will stop working. By fitting this alcohol sensor into the car. We can save the life of the driver and also the remaining passenger.

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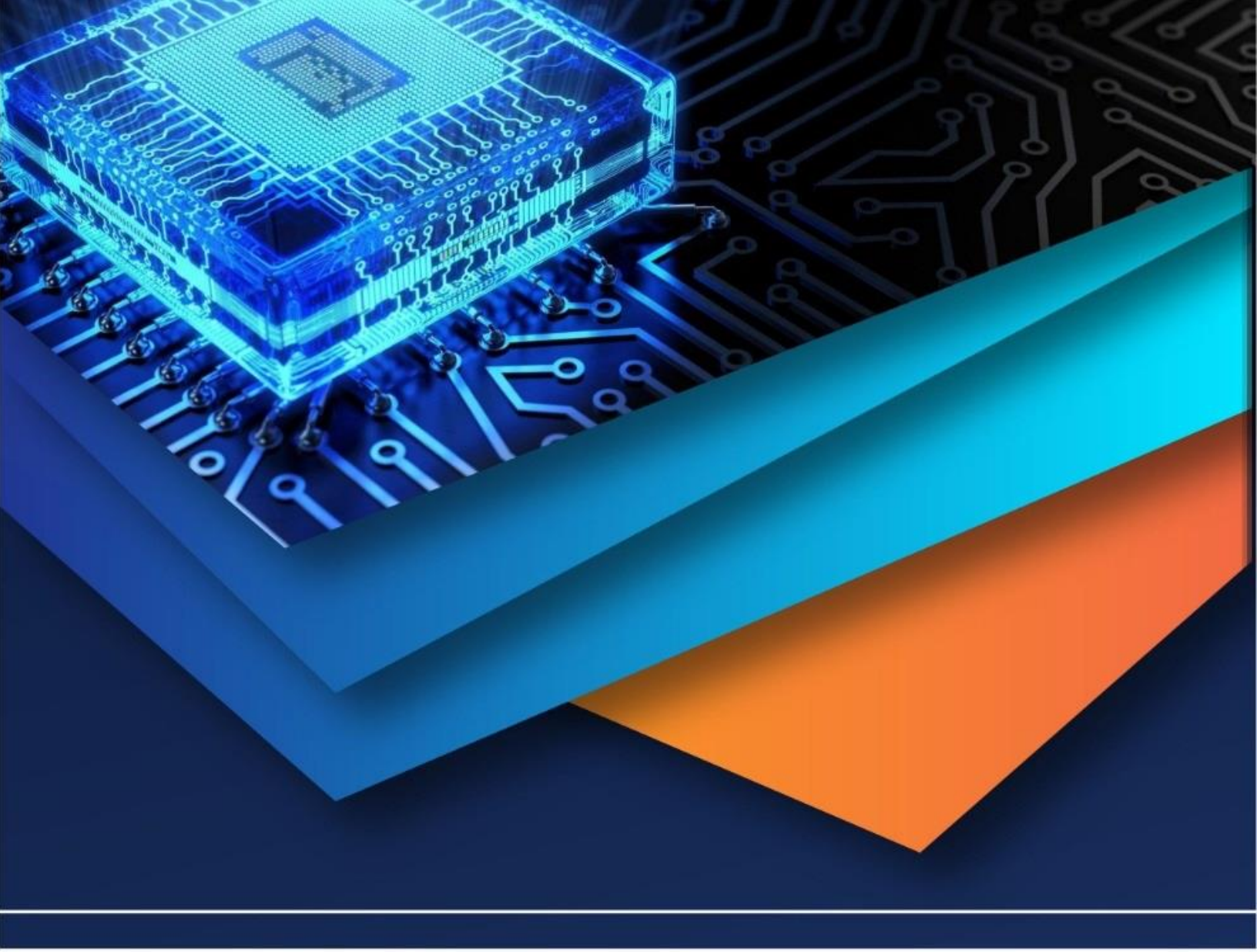

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