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Driver Assisting Feature for Collision Avoidance, Sign and Traffic Signal Detection

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Abstract: ***Theme of the project: Solving problems faced in one's day to day life and make life easier. The Problem: If the driver is tired of driving continuously, he may get disturbed and may cause accidents. Lot of accidents is taking place which are causing several deaths. The team's approach to solve the problem: Sign and traffic signal detection: Using Raspberry Pi Camera with image processing technique the signs as well as traffic signals are detected based on which the motors of the vehicle are functioned. Using image processing all the decisions will be taken by the raspberry pi and it is semi control device.***
Obstacle Avoidance: Using ultrasonic sensors connected to an Arduino board the obstacle distance is calculated.
With the help of sensor the vehicle stops at a certain distance and accidents can be avoided. Object detection takes place by which object can be avoided without collision with the help of this accident prevention is done.
Keywords: Sign and traffic signal detection, Obstacle avoidance, Lane detection, Raspberry Pi, Arduino

I. INTRODUCTION

Robots are part of Science and Engineering. It uses machinery, electricity and other forms of engineering. Nowadays the use of robots is evident in a variety of activities. In India in particular we are seeing more and more road breaches increasing day by day. Due to the lack of information and driver laziness many accidents occur. To avoid this we have come up with the idea that drivers help features that will help drivers with more things. Traffic light acquisition and awareness are essential for independent driving in urban areas. A camera-based algorithm for the detection and recognition of real-time headlights was developed, and was designed primarily for private cars. While reliable algorithms for the recognition of reliable robots work well, most of them are designed to be located in a fixed location and the effect on autonomous vehicles under real-world conditions is still limited. Other methods get higher accuracy in private vehicles, but they cannot operate normally without the help of a more accurate map. The flow of image processing can be divided into three steps, including preprocessing, detection and recognition. First, the red-green (RGB) space is converted to hue-saturation-value (HSV) as the primary content for preprocessing. In the detection phase, the transcendental color method is used for initial filtration, meanwhile, pre-existing information is performed to scan the location to quickly establish the constituencies of the candidates. The proposed system in our private car was tested. With voting schemes, the proposal could provide sufficient accuracy for private vehicles in urban areas. Light traffic awareness plays an important role in traffic control and collision avoidance. Road accidents are the second leading cause of car crashes, which are only caused by rear crashes. The robotic monitoring system can alert drivers who are disturbed by changes in oncoming lights, or trigger an automatic response from the vehicle itself. Robots produce one of three colors - red, yellow, or green. The basic idea of color blocking is to limit the image where these colors are. Any image in red, yellow, or green is set to zero (black). In order to properly distinguish the colors we like, there are a few important things that need to be covered: the color space, the boundary is determined, and the variety of lighting. Normal images are represented in the RGB color space. However, RGB mixes color and size information across all its channels. This makes the RGB format sensitive to changes in light. If our goal is to find robots, we cannot be different from light (e.g. sunny, rainy, cloudy, etc.) We set our limit on choosing the right colors. To combat this, many prefer to switch to color spaces that separate chroma, or color information, Luma, or image intensity. Other notable examples well represented in the literature are HSV, HSL, CIELab, and YCbCr. The idea of this method of finding that robots will appear much brighter than their surroundings. The image is converted to a gray scale and a white hat filter is applied. The top hat filter highlights areas that are much brighter than the surrounding areas. The method of obtaining color light is powerful with a variety of lighting because the component (kernel) is used locally. Which means that unbalanced background lighting is not a problem? We can start by cutting the lower part of the image because we know that the robots will always be from the upper part of the image. Every camera setup is different, but in Bosch data set the safe starting number is 45%

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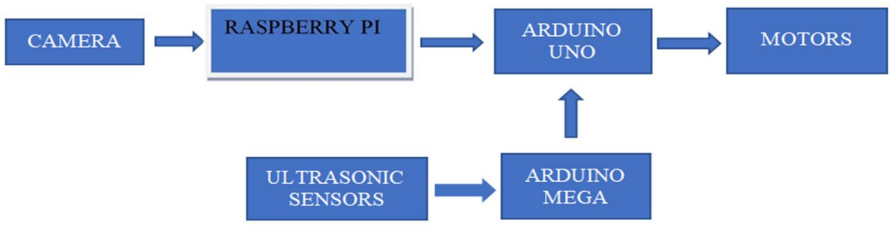
II. LITERATURE REVIEW

Amol Jayant Kale and RC Mahajanhave proposed a roadmap to approve road signs that receive a picture of road signs in a moving car. In this paper the draft is divided into two sections. The first section is used as part of the identification that identifies the road sign integrated with the database and the second part is the structured layout which is the hallmark of the prominent signs taken from the main programs. All images are entered into a database. In the diagnostic process, a data image taken by the YCBCR blurring space separates the road signs using the status separation process. Finally the editing module determines the images of the group identified using the Artificial Neural Network (ANN). The entertainment that emerges from this framework creates a consistent release of the image of the area where the signal is located. Filatov et al proposed a method of obtaining and approving road signs that were clearly designed to change and differentiate. In this paper, the framework uses a single PC Raspberry Pi 2 board and a 150 web camera to play the proposed method. The algorithm for determining the location of road signs uses a shading channel with morphological controls and a canny edge index. Identification of image type depends on the multilayer perceptron neural system. The framework takes the basis of a five-dimensional image data to prepare and test the calculation. The built-in framework strongly influences light changes and impacts. It can point to road signs around 20 cm wide from 1.5-2 m m apart. The obstacle to this system is that the accuracy gained and performance at a planned task is low when dealing with a neural system. Ayoub Ellahyani and Mohamed El Ansari have mounted a frame with cameras mounted on the vehicles separating the road signs while the vehicle is moving. The key elements are the ability to teach the driver of seized road signs that may be missed due to diversion or negligence. In this project, a strategy for obtaining road signs and approvals is available. This strategy is divided into three phases, first, using the color separation process to separate the ROI of the scene image. At that point, the image is shown in a polygonal measurement process to identify triangular, circular and rectangular shapes. The last section uses SVM partitions to detect visual signals taken from an object.This methodology was tried on two openly accessible datasets. The kernel models in classifier are very delicate to overfitting the model foundation selection and furthermore restrains in speed and size.Kumar et al have proposed the improvement of traffic framework controller in a street intersection utilizing microcontroller.

III. OBJECTIVE

Our main objective is to establish driver assisting features for the helpful aid of the driver. The main requisites for these are to establish a connection between the raspberry pi camera as well as to detect the sign and traffic light .Also establishing anti-collision feature for the robot to avoid accidents caused by human interface. Our bot is a combination of all these factors functioning together. We will now use a process called transfer learning to create a traffic light color detection system. Transferring learning involves storing the information obtained while solving one problem and using that information to solve another similar problem. We will use the network configuration of the V3 neural network to perform this function. Within the same interface that contains the object_detection.py program, open a new Python program called train_traffic_light_color.py. This program will train the neural network to detect the color of traffic light. The best neural network will be stored as traffic.h5.20% of the images in the traffic_light_dataset folder will be verification data, and 80% of the images will be a set of training data. A set of verification data is used to recover neural network configurations. Nowadays accidents are common on the roads because of carelessness or speeding. If we can avoid this it means we can save many lives. The main purpose of our project is to create an anti-collision system that can be used for real applications. The main features of the project are: ultrasonic sound sensor and circuit power control. This program looks at the distance between our car and any other vehicle or obstacles ahead. If our car exceeds a certain limit, the power will be cut off. • The controller is always waiting for the "Stop-value" (e.g. 23 0r 05) and you enter the value, The controller always monitors the sensor values, if the value comes within a certain limit the car will be stopped and the indicator will be on. if it is near the stop limit it will notify the driver and the buzzer will be on. If the block is gone by then, the car will move normally. To control the movement of the car we use relays circuits.

IV. BLOCK DIAGRAM



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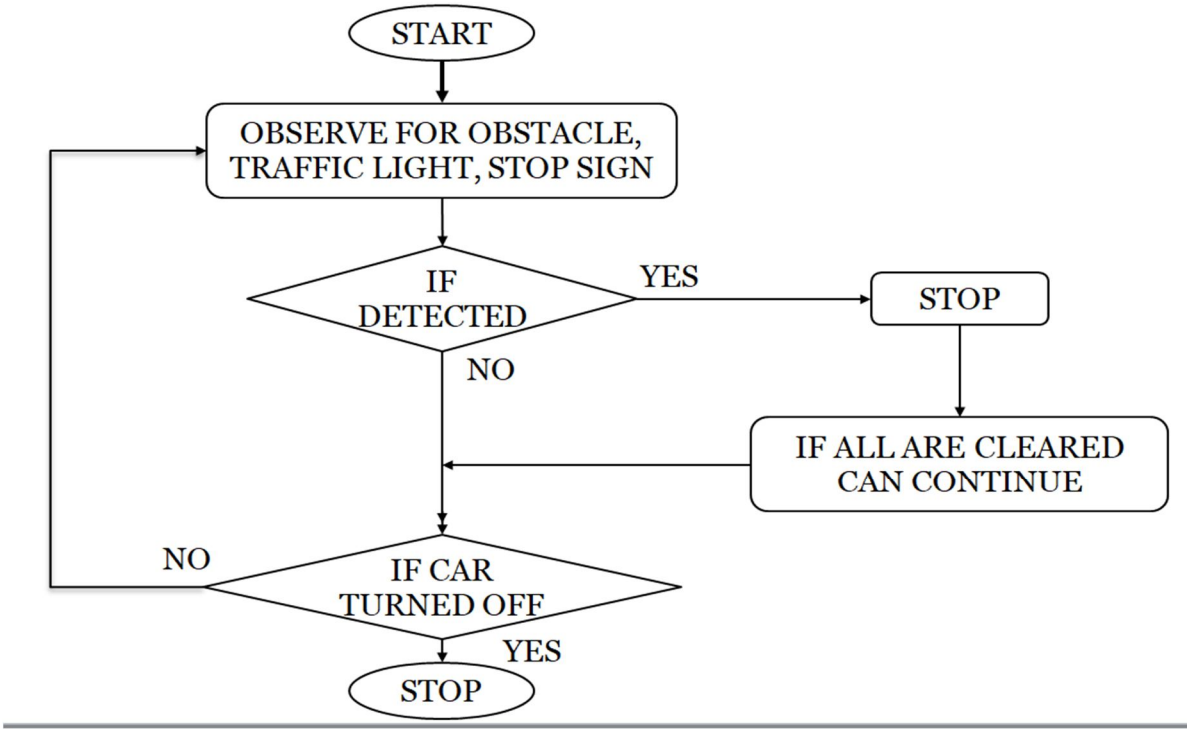
Initially the raspberry pi camera extracts the image and sends information to Raspberry Pi module. From the module the information is sent to Arduino MEGA.

Now for obstacle avoidance the ultrasound sensors collect the information and send them to Arduino Uno and this information is carried to the motors and the wheels function accordingly.

V. FLOW CHART



VI. HARDWARE AND SOFTWARE

A. Ultrasonic sensor

Ultrasonic sensors use sound to determine the distance between the sensor and the object closest to its path. Ultrasonic sensors are actually sensory sensors, but they operate at a frequency greater than human hearing. The sensor sends a sound wave to a certain distance. It then listens to that particular sound wave to jump into an object and return. The sensor tracks the time in between sending the sound and receiving the sound wave.

B. Servo Motors

A servo motor is a type of motor that can rotate with great accuracy. Usually this type of motor contains a control circuit that provides feedback on the current state of the motor shaft; this response allows the servo motors to rotate with greater accuracy. If you want to rotate an object to a certain angle or a certain distance, then use a servo motor

C. Raspberry Pi Camera

This 5 megapixels sensor with OV5647 camera module is capable of 1080p video and still images that connect directly to your RaspberryPi. The latest version of the Raspbian operating system, making it perfect for time-lapse photography, recording video, motion detection and security implementation.

D. Motor driver(L298n)

L298N Motor Driver Module is a high power motor driver module for driving DC and Stepper Motors. The module consists of an L298N motor driver IC and a 5V regulator. L298N Module can control up to 4 DC or 2 DC motors with directional control and speed control.

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E. Raspberry Pi

Raspberry Pi is a series of small single-board computers manufactured in the United Kingdom by the Raspberry Pi Foundation in partnership with Broadcom. The Raspberry Pi project was originally aimed at promoting basic computer science teaching in schools and developing countries. The original model became more popular than expected, selling out the target market for robotic applications. It is widely used in many areas, such as climate monitoring, because of its low cost, order, and open structure. It is widely used by computers and electronic hobbyists, due to its adoption of HDMI and USB devices. of technology development. The foundation was redesigned as an educational grant to promote the teaching of basic computer science in schools and developing countries. The Raspberry Pi is one of Britain's best-selling computers.

F. Arduino MEGA 2560

Arduino is an open source hardware and software application, project and user community that builds and manufactures single-board microcontrollers and microcontroller kits for building digital hardware applications. Its hardware products are licensed under the CC-BY-SA license, while the software is licensed under the GNU Lesser General Public License (LGPL) or GNU General Public License (GPL), which allows for the creation of Arduino boards and software distribution by anyone. Arduino boards are sold commercially from the official website or by authorized distributors throughout the world. Arduino board designs use various processors and controllers in one module. Boards are equipped with sets of digital anchors and analog input / output (I / O) that can be interrupted on various expansion boards ('shields') or loading boards (for prototyping) and different circuits. Boards that include multimedia connectors, including Universal Serial Bus (USB) in some models, are used to load programs. Microcontrollers can be configured using C and C ++ programming languages, using a standard API also known as "Arduino language"

G. Python

Python is a programming language that is translated to the highest level of the this era. The Python architecture philosophy emphasizes the readability of the code with its remarkable application of critical direction. Its language is structured and its object-oriented approach aims to assist editors in writing clear, logical code for small and large projects. Python typed harder and collected garbage. It supports multiple editing paradigms, including structured (in particular, process), object orientation and good performance.

H. Arduino IDE

Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, Mac OS, Linux) written with functions from C and C ++. It is used to record and upload programs to respected Arduino boards, but also, with the help of third-party cores, other vendor development boards. The IDE source code is issued under the GNU General Public License, version 2. Arduino IDE supports languages C and C ++ using special code editing rules. Arduino IDE provides a software library from the Wiring project, which provides many common installation and removal processes.

I. Open CV (Image Processing)

Open CV (Open Source Computer Vision Library) is a library of program functions primarily aimed at real-time computer vision. Originally developed by Intel, later supported by Willow Garage and then Itseez (later acquired by Intel. The library is a platform and can be used under the open source license Apache 2 License. Starting 2011, Open CV installs GPU acceleration real-time performance. Officially launched in 1999 the Open CV project was originally Intel Research's initiative to develop powerful CPU systems, which are part of a series of projects including real-time ray trace and 3D display system.

VII. EXPERIMENTAL RESULT

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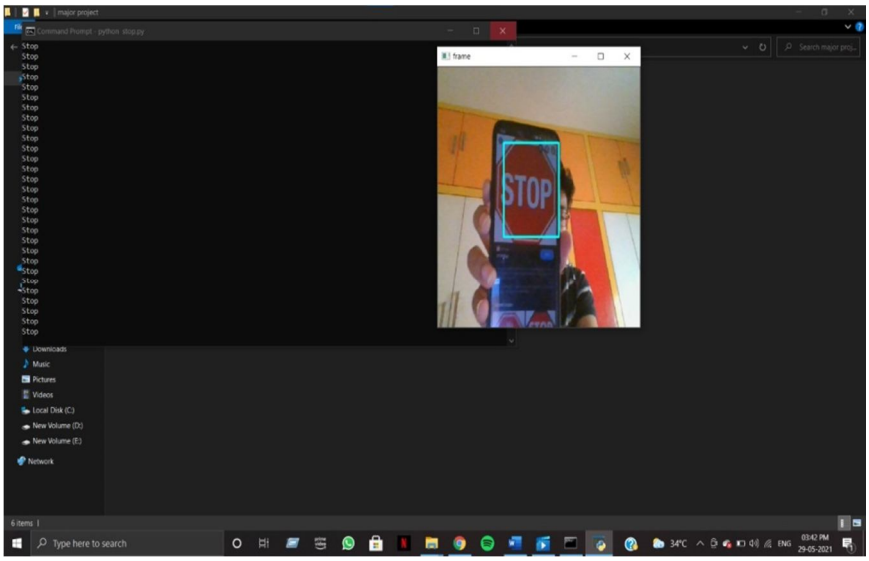

VIII. ALGORITHM

A. Image Processing

1) Detection by camera

2) By the detection the bot reacts.

B. Ultrasonic Sensors

1) These sensors are the input for detecting obstacles.

2) The code dumped into raspberry pi reacts as the input given by sensors.

3) This helps for further movement of bot.

C. Servo Motor

1) The input is the output of ultrasonic sensors.

2) This motor changes the angle of wheels as it requires, which is useful helps the bot for further movement . This changing of wheel angles is done through the code dumped into raspberry pi.

IX. EXPERIMENTAL RESULTS AND CONCLUSION

A. Results

The project consists of an driver assisting features which is dependent of a human but takes his commands as an input.. While on the way, to overcome obstacles it uses ultrasonic sensors placed at a right angle to the bot. And the other two aligning at 25 degrees sideways, if the middle sensor detects the an obstacle it the car stops there itself, if the side sensors detect the obstacle the car turns to the other side and moves on, these movements are pre-programmed. To follow rules at traffic signs we used image processing that detects boards using Raspberry Pi and camera. To mobility of the car L298N motor driver is used for all the four side shaft motors. All these are interfaced by Arduino MEGA, Raspberry Pi and Raspberry Pi camera.

B. Future Enhancements

Traffic sign detection can be a key feature for the future enhancement. Lane detection can also play a key feature by assisting the driver to move to respective lanes accordingly .Automatic number plate recognition, and further more features can be implemented

C. Conclusion

We see many people who do not follow proper traffic rules on the road as well as physically handicapped people, unable to move from one place to another place on their own or depend on others to move because of their ailments. These people can entirely depend on this driver assisting features for better driving ability and the car automatically abides to all the rules of the traffic system.

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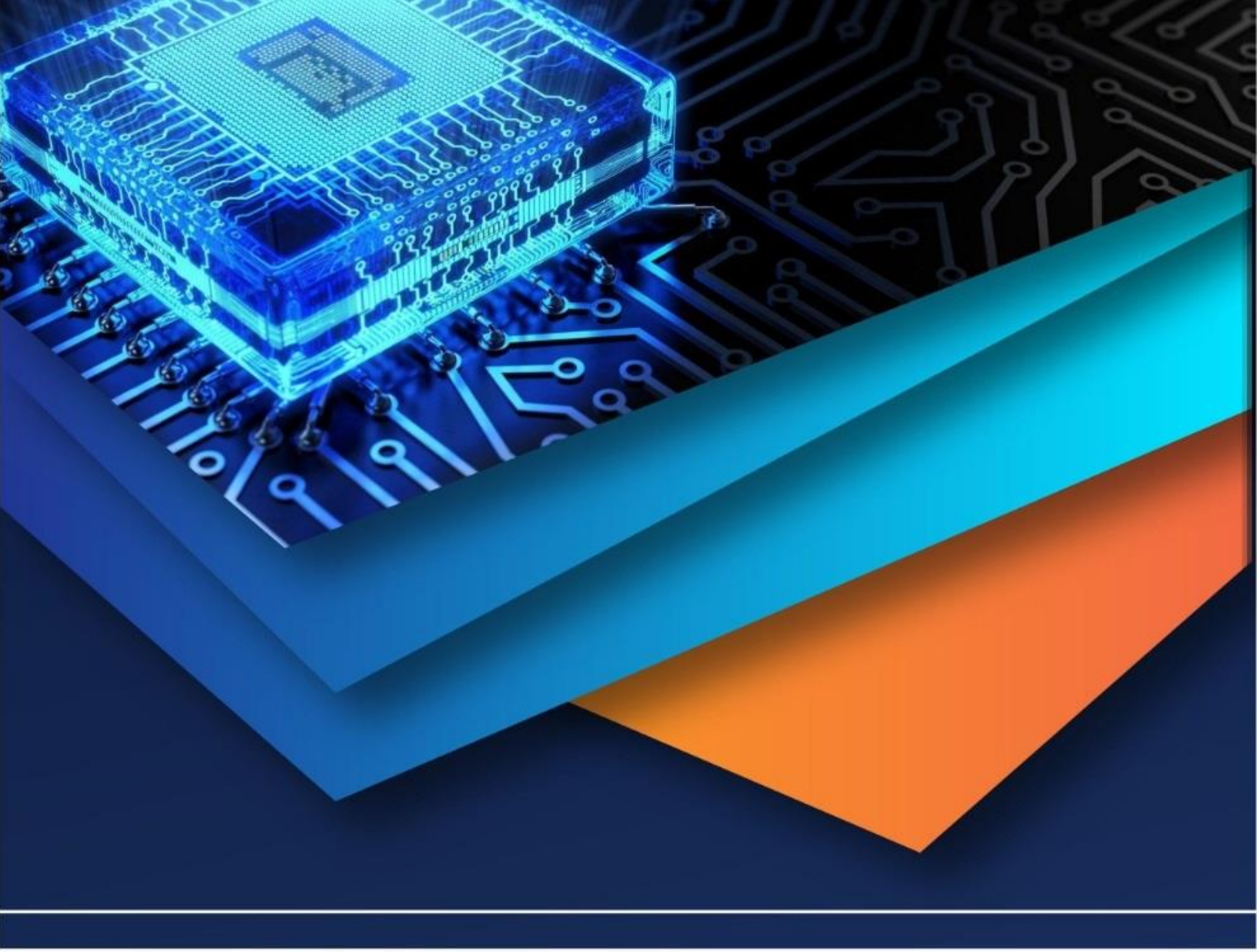

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