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A Waste Segregation Bin

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Abstract: ***The primary idea of this project is to create a waste segregation bin which is equipped with a number of sensors to effectively sense the nature of waste and place it in the correct bin. We are also using a LIDAR system so that it can traverse autonomously from house to house in order to collect the waste sample. The system is also equipped with a RFID module so that it can reward the person who uses it.***
The waste bin would also be attached with an ultrasound sensor connected to a web application using NodeMCU so that the authorities can monitor the level of waste present in the bin.
This would save fuel for them and it would also help the companies requiring those waste products to know beforehand how much waste they will get on a particular day.
The companies will pay the authorities some amount for the waste product. The authorities will keep some amount for maintaining the equipment and building more such items and pay the rest to the persons who provide the waste as the data is already available through the RFID card reader.
It would be a benefit for the companies as they are getting the waste at a lower cost, the citizens would get a reward for throwing the waste in the proper bin. We are also planning to use aluminum instead of plastic as it is more durable so less cost of maintenance.
Keywords: Autonomous traversal, Solidworks designing, Electrical,

I. INTRODUCTION

The primary idea of this project is to create a waste segregation bin which is equipped with a number of sensors to effectively sense the nature of the waste and place it in the correct bin.
The system is also equipped with a RFID Module so that it can reward the person who uses it. The waste bin will also be attached with an ultrasound sensor connected to a web application using NodeMCU so that the authorities can monitor the level of waste present in the bin.
This would save fuel for them and it would also help the companies requiring those waste products to know beforehand how much waste they will get on a particular day.
The companies will pay the authorities some amount for the waste product. The bin can traverse from one location to the other through Bluetooth. So that it can go to the household to collect the waste.
The local government and/or environmental NGOs the project for its successful implementation requires a large-scale association of these NGOs and/or governmental organizations and the company who required this trash product for their further manufacturing. When we implement our project on a large scale, we need monetary support either from the government or material support from the aluminum industries, industries manufacturing PCBs, RPLidar, Jetson, motors with encoders, ubiquity, NodeMCU, Arduino and a plethora of other sensors like inductive proximity sensor, inductive capacitive sensors.
This particular project when implemented will require a lot of support from the local government or the local municipal authorities. It will be local municipality who would monitor the level of waste in the bin and carry it to the industries who are willing to buy the waste product at a particular price.

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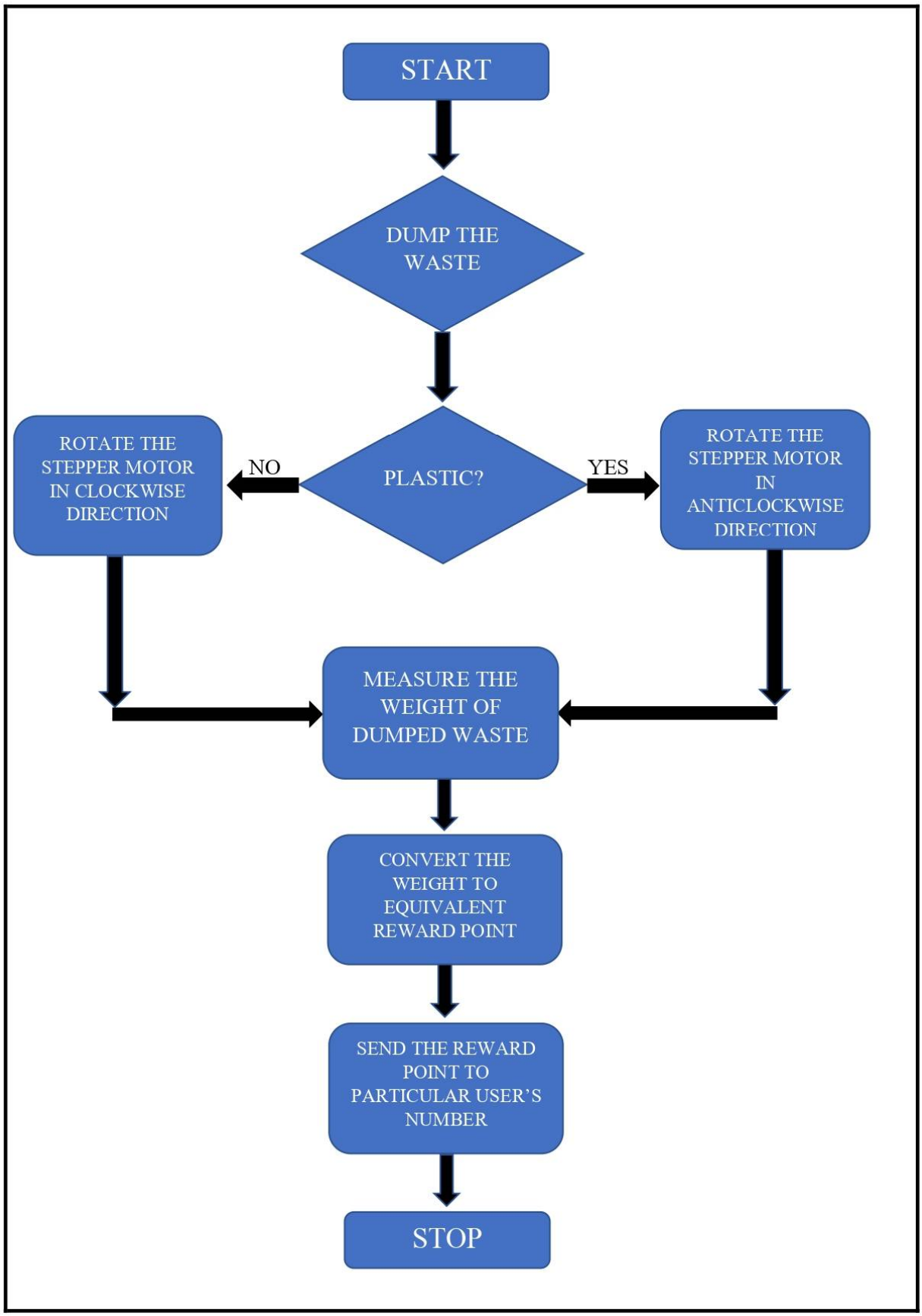
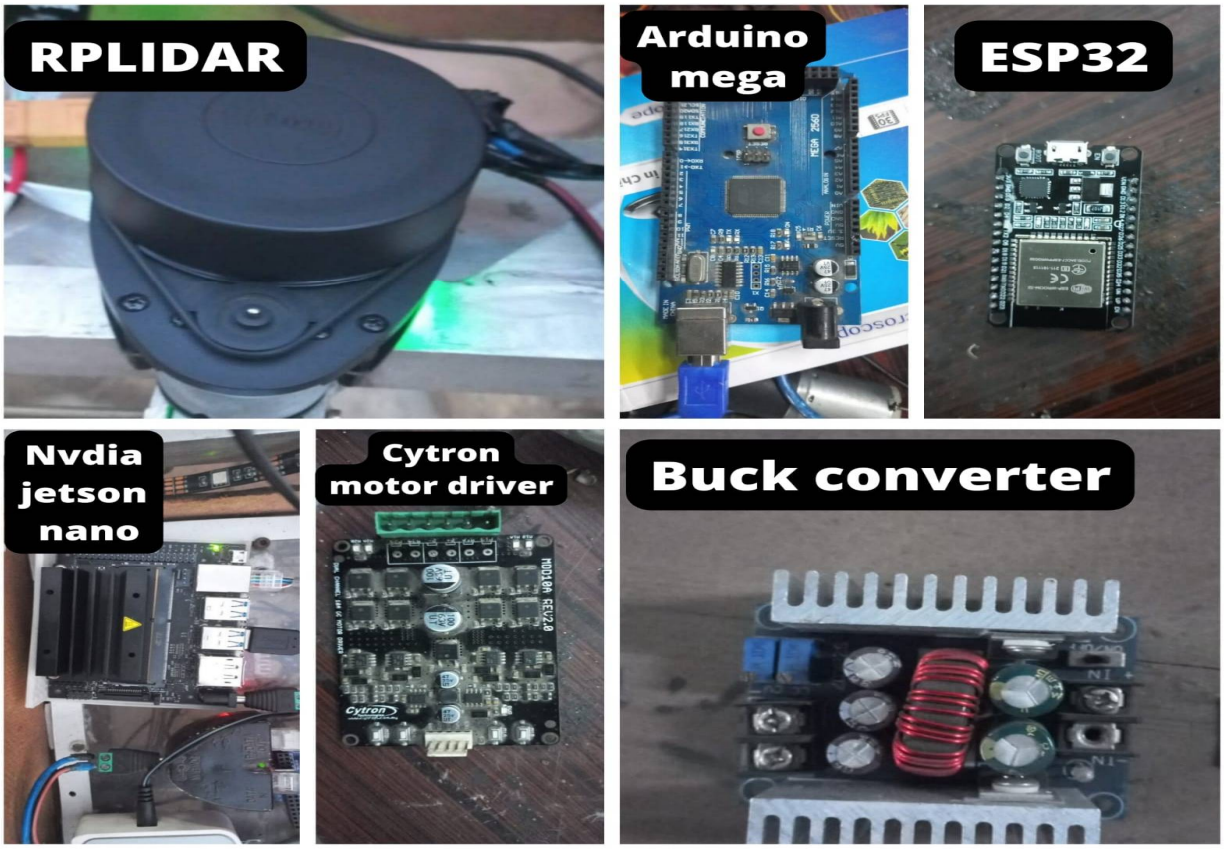


II. COMPONENTS USED



1) Arduino board - The Arduino Uno is a microcontroller board based on the ATmega328 microcontroller from Atmel. It contains 14 digital input output pins, including 6 PWM output pins and 6 analogue input pins. The Arduino Uno can be fueled either by USB or by an external power supply.
2) NodeMCU - NodeMCU is an open source IoT platform with a low cost. It came with firmware that ran on Espressif Systems' ESP8266 Wi-Fi SoC and hardware that was based on the ESP-12 module at first.
3) LIDAR - (Light Detection and Ranging) is a remote sensing technique that measures ranges (varying distances) to the Earth using light in the form of a pulsed laser. When these light pulses are integrated with additional data collected by the aerial system, exact three-dimensional information about the Earth's shape and surface properties is generated.
4) Inductive proximity sensors -An inductive proximity sensor uses electromagnetic radiation to identify metal targets without requiring contact. An inductive proximity sensor's sensing range varies depending on the type of metal detected.
5) Capacitive proximity sensor - Changes in capacitance between the detecting object and the sensor are detected by capacitive proximity sensors. Capacitive proximity sensors work by detecting a change in the capacitance read by the sensor, as the name suggests.
6) Jetson - Makers, learners, and embedded developers now have access to the potential of current AI. The NVIDIA® Jetson NanoTM Developer Kit is a compact but powerful computer that allows you to run multiple neural networks in parallel for image classification, object recognition, segmentation, and speech processing. All of this is contained within a user-friendly platform that consumes as little as 5 watts.
7) Lidar - Lidar is a range-finding technique that involves using a laser to target an item or a surface and measuring the time it takes for the reflected light to return to the receiver. By altering the wavelength of light, it can also be used to create computerised 3-D renderings of locations on the Earth's surface and ocean bottom.
8) Aluminium Sheets

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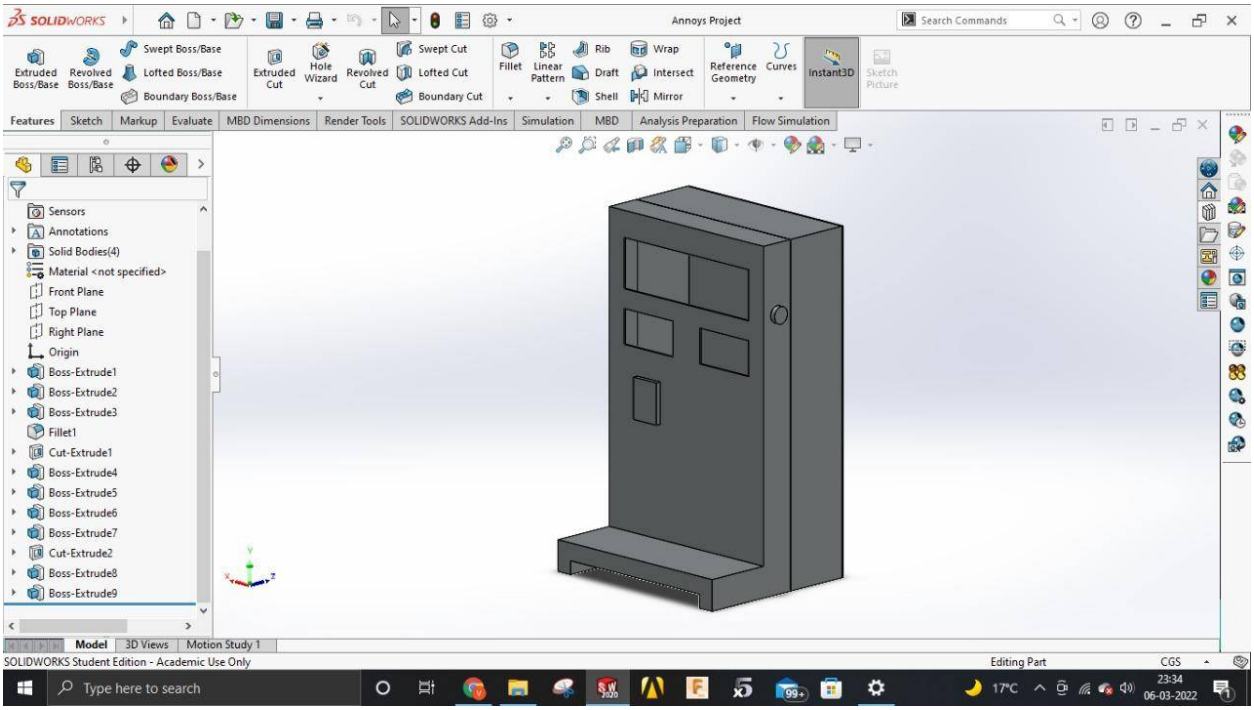
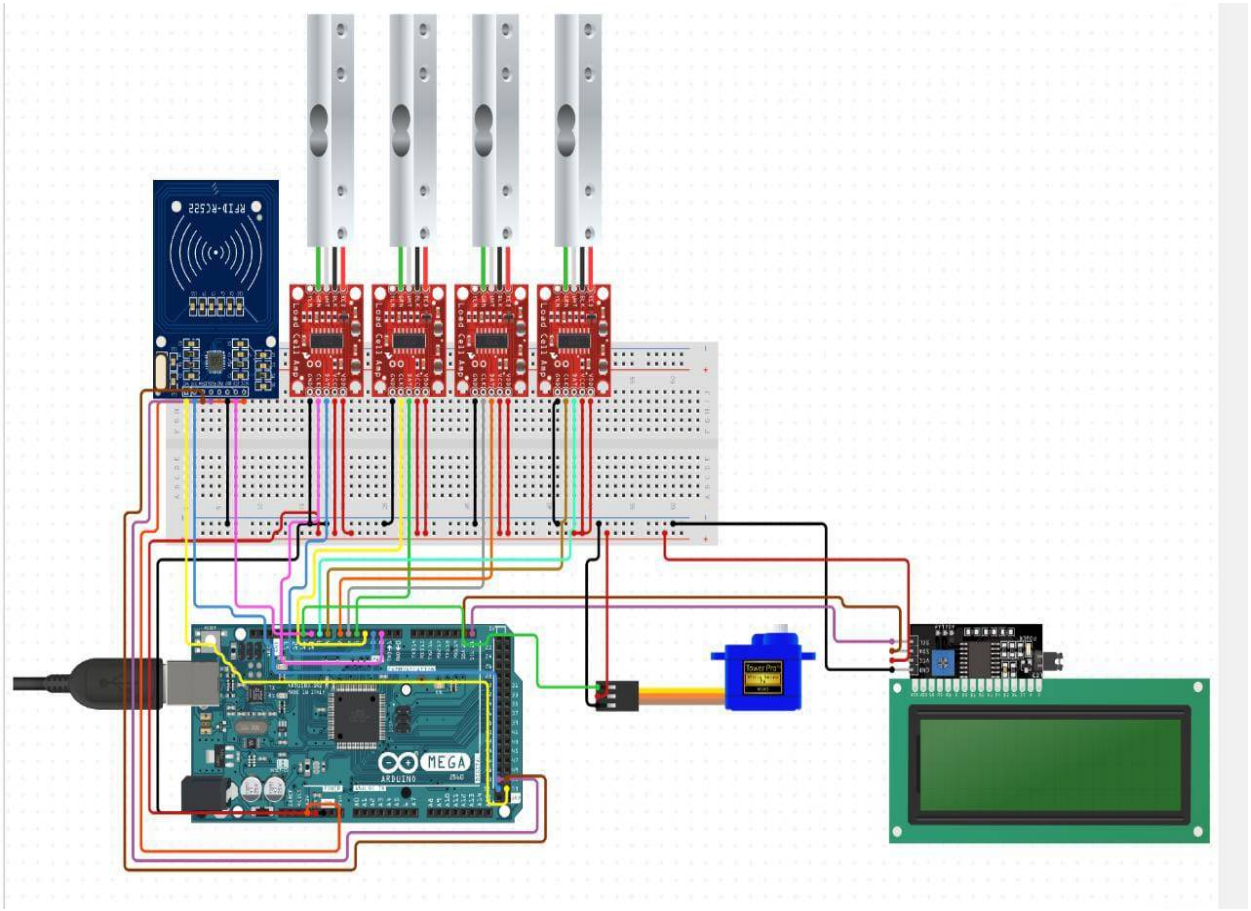
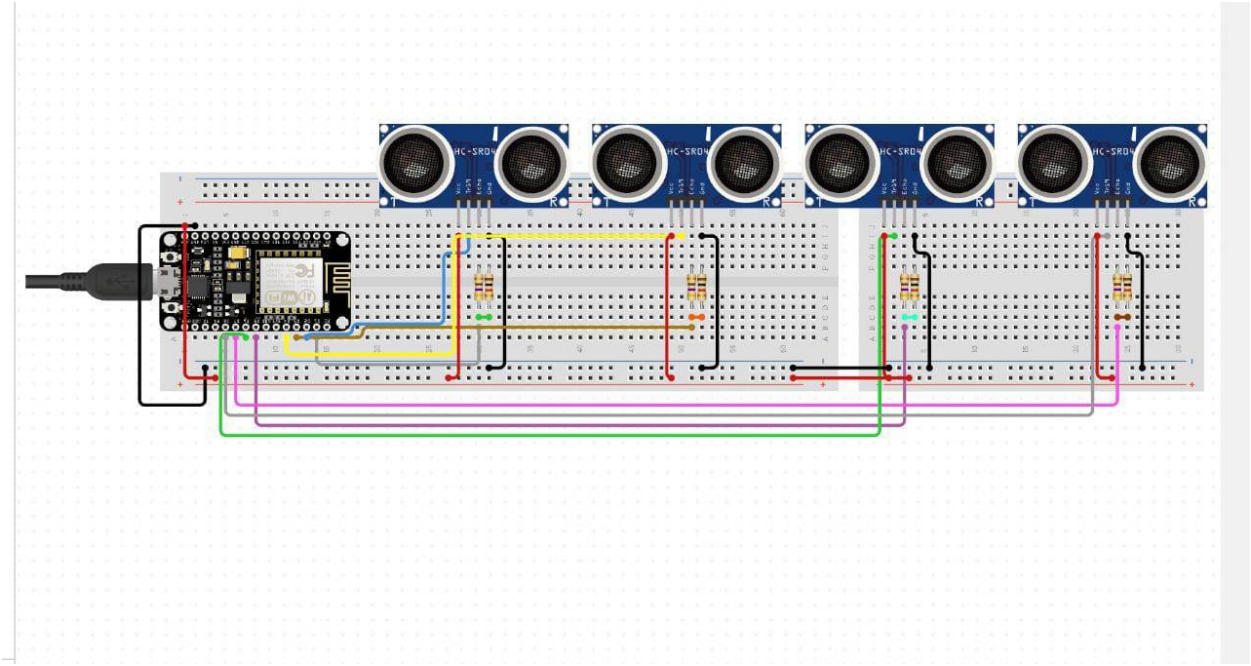
III. DESIGN

We have designed the dustbin using solidworks designing.



The circuit designing





IV. RESULT

Our segregation bin is capable of traversing autonomously from one location to the other. Using a plethora of sensors we are able to achieve about 60 percent accuracy. We are planning to integrate it with computer vision to achieve better results.

V. CONCLUSION

Approaching the correct stakeholder will be the key. After that has taken place, the team shall convince the stakeholder of the magnitude of the problem and the various issues that haphazard collection of waste causes. We would have to explain that, there are both benefits for the person disposing off the waste (who shall get monetary benefits) as well as the environment shall remain clean. We will also have to communicate clearly with the stakeholders on how the industries buying the back the waste shall be benefiting from it. The Stakeholders will have to be convinced that there is absolutely no competition in this field, and the revenue model in paying back the waste thrower is the first of a kind. The raw material used in the dustbin shall be durable and long-lasting helping save money on maintenance of the Dustbin. Lastly, we will have to make people aware of this new trash barrel being installed in their localities. If we overcome the above-mentioned steps, our final step would be the manufacturing and installation of the dustbins at suitable locations.

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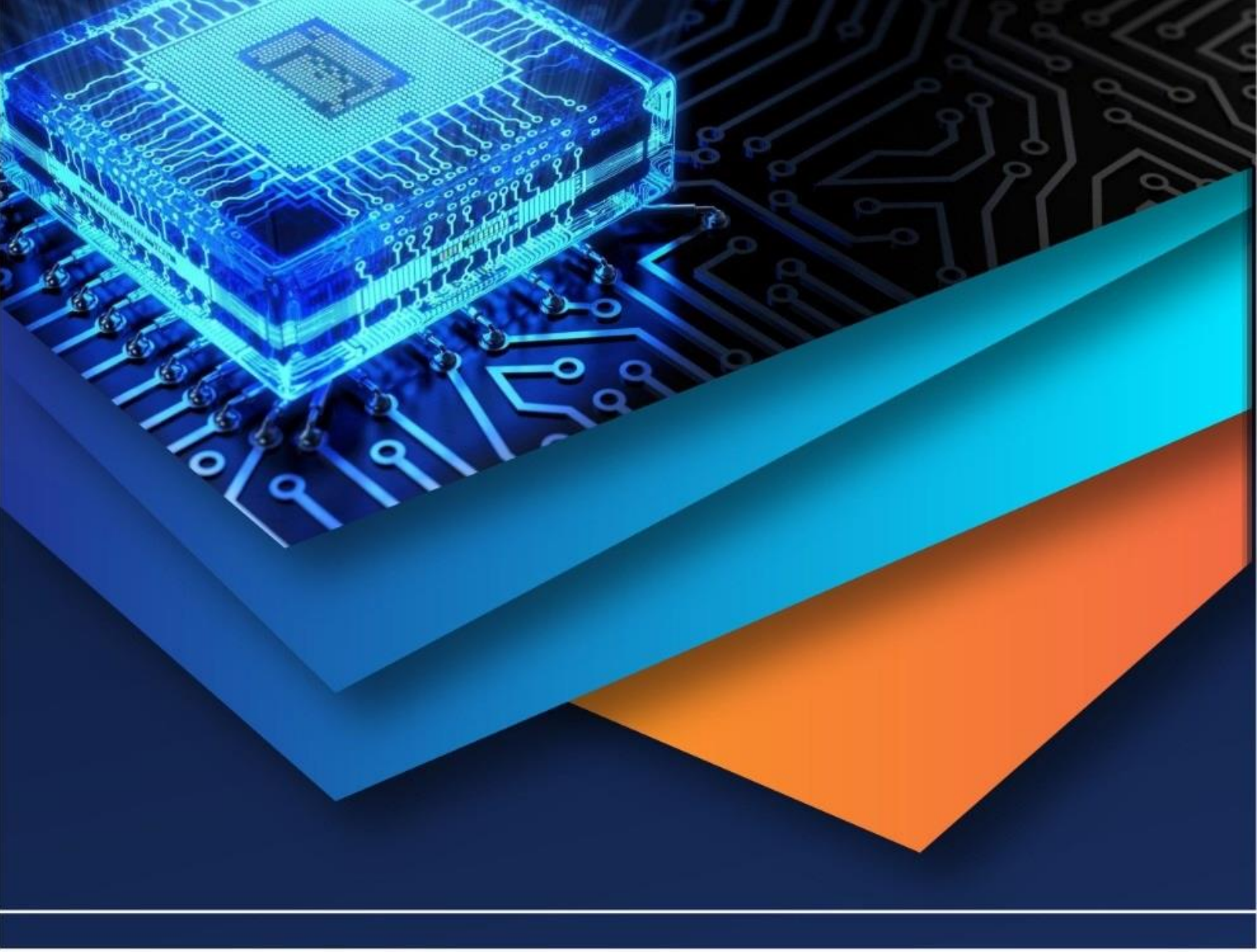

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