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Bio-Medical Waste Management System

Harsh Bhandari[1], Jayesh Mulay[2], Bhushan Gangurde[3], Mr. D.M. Shinde[4]
[1, 2, 3, 4]*Department of Electronics and Telecommunication Engineering, Pune Institute of Computer Technology, Pune Savitribai Phule Pune University, Pune, Maharashtra*

Abstract: ***Sorting of products is a very difficult industrial process. Continuous manual sorting creates consistency issues. This paper describes a working prototype designed for automatic sorting of objects based on the colour. We are using Pi camera to detect the object and the Raspberry Pi microcontroller was used to control the overall process. The identification of the biomedical Waste is based on the image processing using Pi camera module. Two conveyor belts were used, each controlled by separate Servo motors. The first belt is for placing the product to be analysed by the pi camera module, and the second belt is for moving the container, having separated compartments, in order to separate the products. The experimental results promise that the prototype will fulfil the needs for higher production and precise quality in the field of automation.***
Keywords: Raspberry pi, Servo Motor, Pi camera, Programming

I. INTRODUCTION

In day-to-day life most of the people need to take medicines which was not there in past couple of years and the reason behind this is diseases are increasing in large amount. So sooner or later many people come in contact with these diseases. Some diseases are temporary diseases while many are permanent life threatening diseases. We need to be in advice of Doctor who tells us to take desired pills in desired way so that patients face problems like forgetting pills to take at right time and also when Doctor changes the prescription of medicine patients have to remember the new schedule of medicine. This problem of forgetting to take pills at right time, taking wrong medicines and accidentally taking of expired medicine causes health issues of patient and this leads to suffer from unhealthy life. To ensure health safety, we will develop a medicine box signed with 2 portable trays, one tray for one time of the day i.e., morning and night time. Using controller and Wi-Fi technology, the trays will be opened on exact time as set by user and will be closed after provided time delay. At the time of tray opening, we will be providing a Voice module which will announce audio of the medicine prescription in 3 regional languages such as English, Hindi and Marathi because not everyone understands English language following Spelling, Name and color of the medicine. Also, using LCD, spelling as well as color of the particular medicine will be displayed on it. As everyone is well known with colors, it will be advantageous by audio announcement even if anyone is illiterate and unable to get the exact medicine. The medicine box will remind the people to take medicines on time. The whole system will be monitored and controlled using android application through Wi-Fi with dynamic time setting so that user can set time as per need. In android application, there will be timers for time setting of each tray. User can set time of tray opening and closing as per their need. The traditional pill box was designed for a day or a week for loading pills without falling out of the container. An electronic pill box can be a reminder to the user via setting an alarm but the price is much higher than traditional pill boxes. The population aged over 65 has reached 12.51% of the total population in 2015 in Taiwan. Rapid population aging has become a common global trend, and so there is a need to raise awareness about promoting health and well-being or the quality of life of the elderly. The issue is how quality care can be provided to those with reduced access to providers. Recently developed applications feature integrated individual sensors as part of a sensor network, which relies on modern wireless communication technology. Some of the smart pill boxes are just reminding or monitoring devices without any interaction between the elder person and his/her family.

II. LITERATURE REVIEW

iWaste: Discovery and Division of Video-Based Medical Waste is the title of a paper published by the National Institutes of Health. Waste auditing is important for effectively reducing medical waste generated by resource- intensive operating rooms, according to authors Junbo Chen, Jeffrey Mao, Cassandra Thiel, and Yao Wang. We propose a system called iWaste to detect and classify medical waste based on videos recorded by a camera- equipped waste container to replace the current time-consuming and dangerous manual waste auditing method. We created a motion detection-based preprocessing method to extract and trim useful frames from a video dataset of four waste items (gloves, hairnet, mask, and shoe cover) in this pilot study. We propose the R3D+C2D architecture, which combines features learned by 2D and 3D convolutional neural networks to classify waste videos. On our challenging dataset, the proposed method showed promise (79.99 percent accuracy).

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Clinical Relevance-iWaste allows for accurate, real-time monitoring of solid waste generation in operating rooms, which can be used to enforce medical waste sorting policies and identify waste reduction strategies. [1]

Automated Medical Waste Segregation Machine Using Arduino Controller is the title of the paper. The primary goal of this presentation, according to the author Mangaiyarkarasi, Aravindh, M.Mohamed Famin, B.Akilandeswari, is to project a novel new way for municipal waste segregation in India, where most waste separation is currently done by rag pickers who mainly separate all waste, including harmful hospital wastes and containers containing harmful heavy metals by hand, resulting in adverse chronic health effects such as tuberculosis, cancer, and heavy Medical Waste Segregation is the subject of this paper. Using an Arduino controller, we are developing a prototype for separating metals from waste materials. The waste will be fed to the conveyor belt via an automatic feed system that includes a hopper and other mechanisms in this system. The waste material on the conveyor belt will be detected by sensors, and the belt will begin to rotate. Following that, metal sensors clamped beneath the conveyor belt detect metal particles such as needles, razors, surgical knives, and so on, and the conveyor belt is stopped. The metal will be extracted from the waste and deposited into a bin by a robotic arm with an electromagnet attached to it. Rapid population growth has resulted in poor waste management in metro cities and urban areas, allowing diseases to spread. In 2016, an estimated 2.02 billion tonnes of municipal solid waste were produced globally. To minimise the risks to the public and the environment, waste must be separated transported, handled, and disposed of properly.[2]

An efficient high-quality medical lesion image data labelling method based on active learning is described in this paper. Jiancun Jhou, Rui Cao, Jian Kang, Kehuaguo Yangting Xu, Kehuaguo Yangting Xu, Jiancun Jhou, Rui Cao, Jian Kang, Jian Kang, Jian Kang, Jian Kan Deep learning technology has changed our lives and brought a great deal of convenience due to the rapid development of artificial intelligence, but it cannot succeed without a sufficient quantity and quality of data. Due to the unique nature of medical data resources, medical systems require professional input from doctors for labelling and screening, which comes at a high cost. However, if these data aren't put to good use, money is squandered. To address this issue, this paper proposes an effective high-quality medical lesion image data labelling method based on active learning, which uses artificial intelligence to label the most representative and high-quality medical image data. For all unlabeled images, we first created subregions and predicted their classifications. Second, all of the images were subjected to multifactor calculations. Finally, the top-ranked images were selected and labelled with artificial assistance, using the values of multiple factors to sort all of the images. The steps above were repeated until a sufficient number of datasets were labelled. The experimental results demonstrated that a model trained on the labelled high-quality dataset could achieve the same quality as a model trained on all of the data while saving a significant amount of time on manual labelling, demonstrating the method's effectiveness. To reduce labelling workload and avoid wasting data resources, the method ensures that the labelled data is valuable, high-quality, and rich in information. [3]

The Optical Subsystem for Empty Container Recognition and Sorting in a Reverse Vending Machine is described in this paper. Andrey N. Kokoulin, Dmitriy A. Kiryanov, Andrey N. Kokoulin, Dmitriy A. Kiryanov, Andrey N. Kokoulin A reverse vending machine (RVM) is a machine that allows people to recycle empty beverage containers such as plastic bottles and cans in exchange for a deposit or refund. In Europe and the United States, reverse vending machines are an important component of container deposit systems. In RVM machines, waste recognition and sorting can be done in one of three ways: by determining the container material (e.g., using an IR spectrometer), by recognizing the container type by its shape, or by barcode identification. Any attempt at fraud is completely impossible with these three basic control procedures. However, it raises the price of the RVM. We can design a new type of efficient and low-cost RVM with the same functionality using energy efficient IoT MCUs with the help of modern computer vision technologies. Some computer vision and image processing approaches, as well as their application to the problem of automatic recognition of empty recyclable containers (bottles and cans) and fraud detection, were discussed in this paper. Because SoC and IoT controllers have memory and computational limitations, the list of available methods and frameworks was condensed. The RVM's job is to sort the images inside the RVM into one of three categories: PET bottle, aluminum can, or fraud (anything that doesn't match a PET bottle or can, even if they are twisted or jammed). Finally, the performance of image recognition procedures written in Python and C++ was examined, and some methods for efficient image processing and RVM structure enhancements were proposed in order to gain competitive advantages.[4]

III. PROPOSED SYSTEM

This model uses and evaluates data sets of 3D waste images, obtained from the Raspberry Pi camera to identify types of debris or to direct physical interventions such as syringes and needles or waste disposal at a high point. This procedure was performed by specialists radiologists, engineers, and physicians in order to understand the formation of different groups of people. We realized that Graphic Processing techniques, although slightly complex, were actually suitable for use in a filtering project, which is why we decided to work on the project using various image elements.

A. Block Diagram

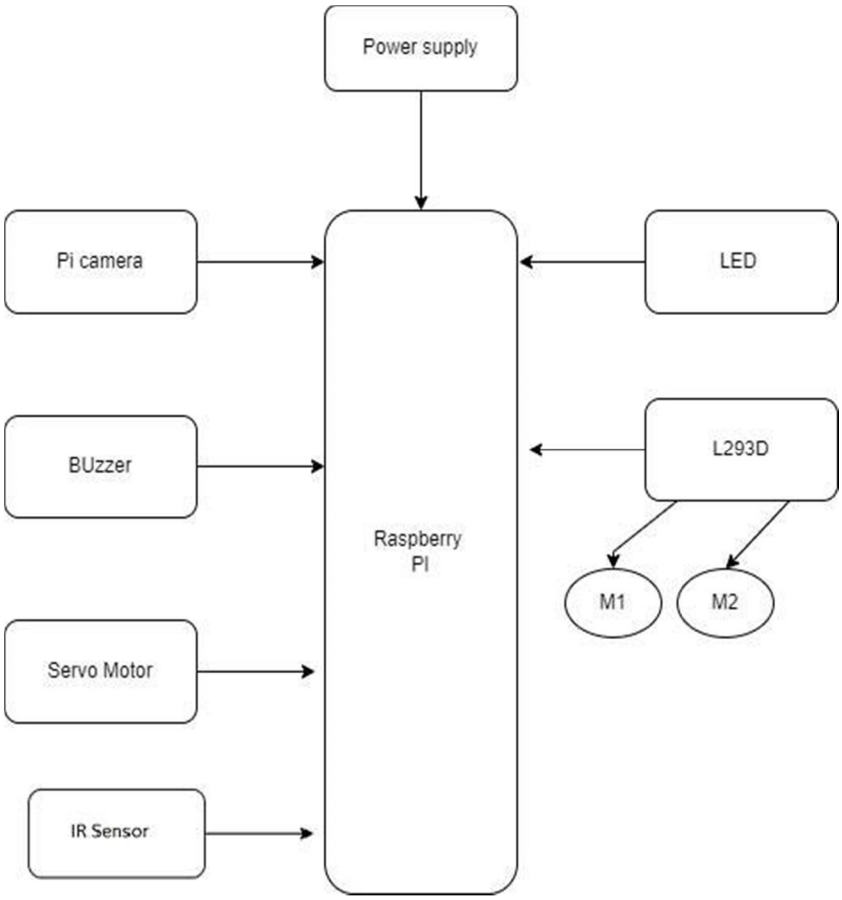


Fig.No.1 Block Diagram Of "BIO-MEDICAL WASTE MANAGEMENT SYSTEM"

B. Circuit Diagram

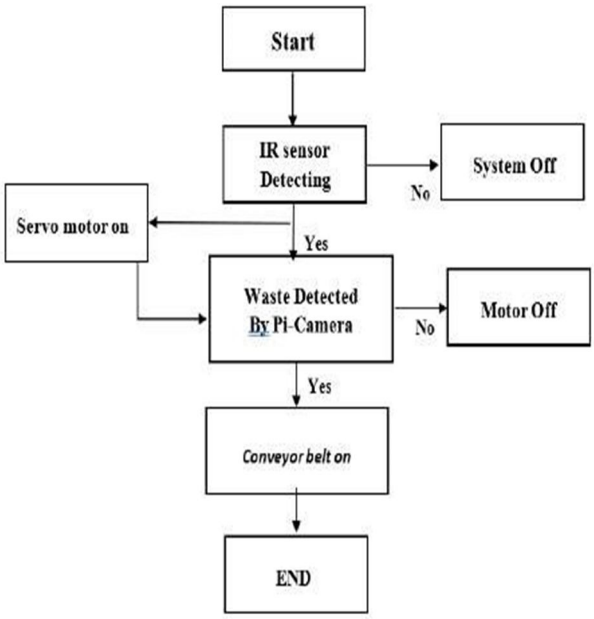


Fig no.2: Circuit Diagram

C. Algorithm

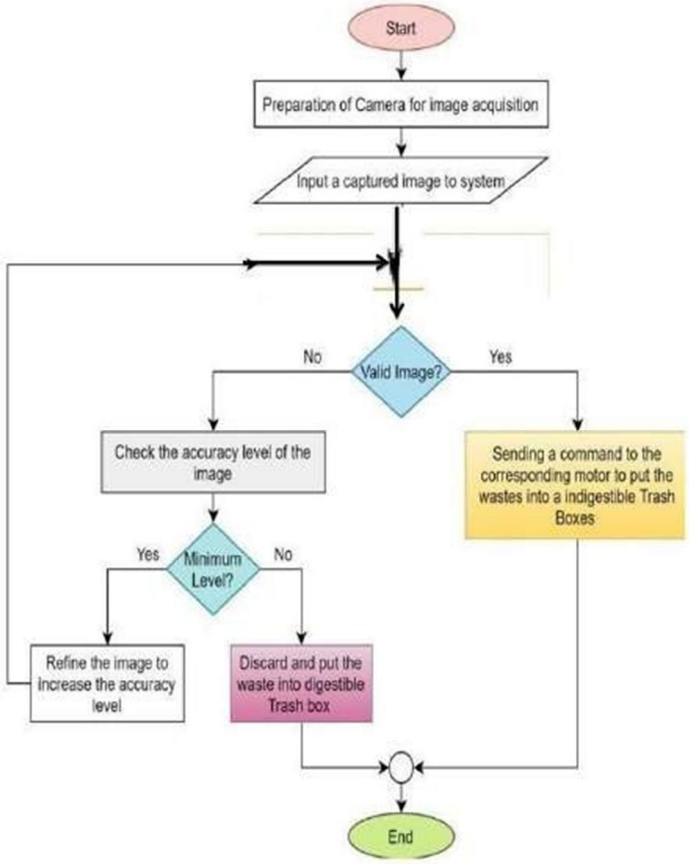


Fig no.3: Algorithm

IV. IMPLEMENTATION AND TESTING

This system was designed for Image Processing. It can control hardware remotely, it can display sensor data, and it can store data, visualize it and do many other cool things. This project is the first step towards a healthier and safer environment even in disastrous/hazardous times.

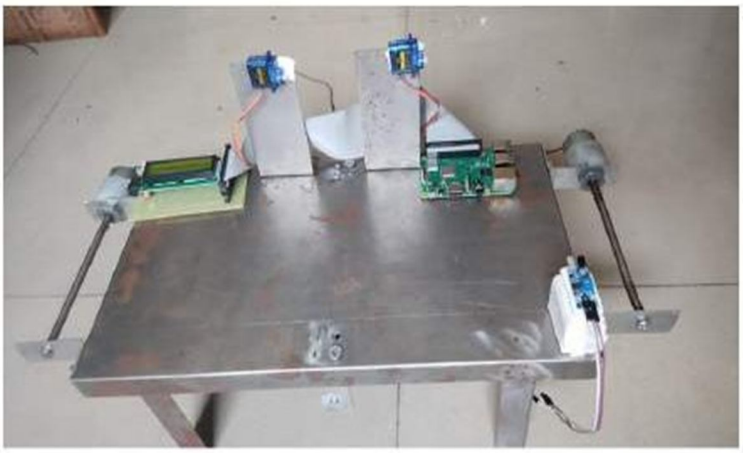
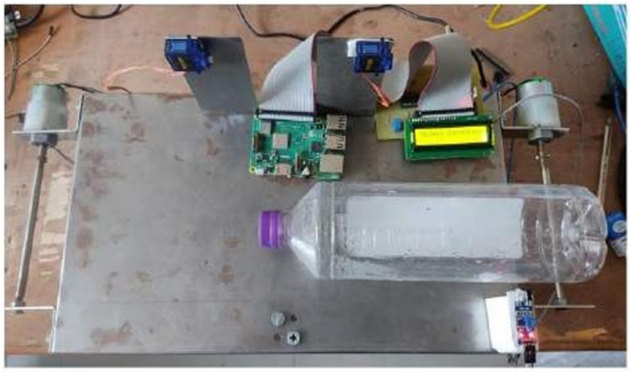
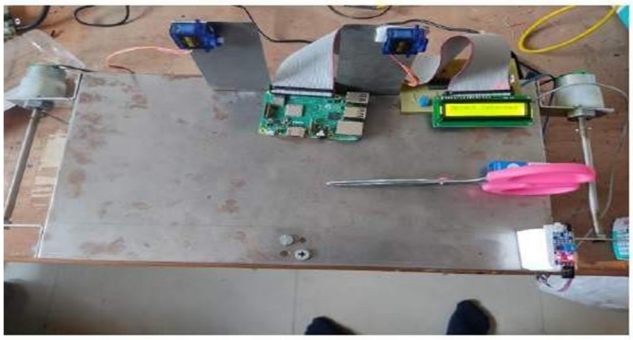
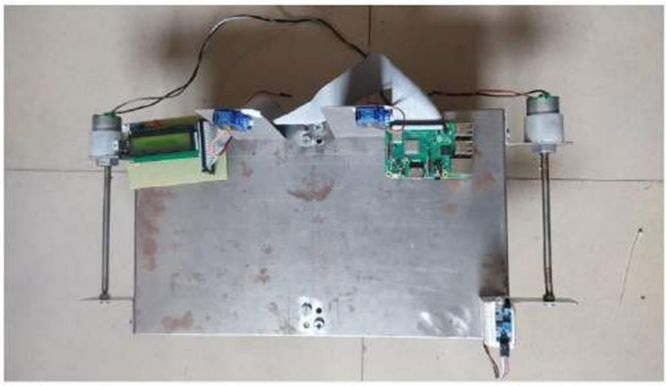


Fig no.4: Waste Management System

V. RESULT







VI. CONCLUSION

Disposal or Treatment Site, Type of Waste, Service, Treatment, and Region are the segments that make up the Global Medical Waste Management Market. Medical waste disposal can take place either offsite or onsite at a treatment facility. Hazardous and non- hazardous wastes, on the other hand, are divided into two categories. Waste treatment services, such as collection, storage, recycling, and transportation, as well as waste recycling and disposal, are also segmented in the market. Chemical treatment, incineration, and autoclaving, among other methods, could all be used to treat this waste. We successfully created a system that could move heaps of medical waste while sorting it all simultaneously with high precision and as fast as possible.

VII. ACKNOWLEDGEMENT

We would like to express our gratitude to our mentor and project guide Mr. Deepak Shinde who guided and supported us towards every step. This work “BIO-MEDICAL WASTE MANAGEMENT SYSTEM” would not have been possible without the constant support of our friends and family who were directly and indirectly involved in the project’s completion

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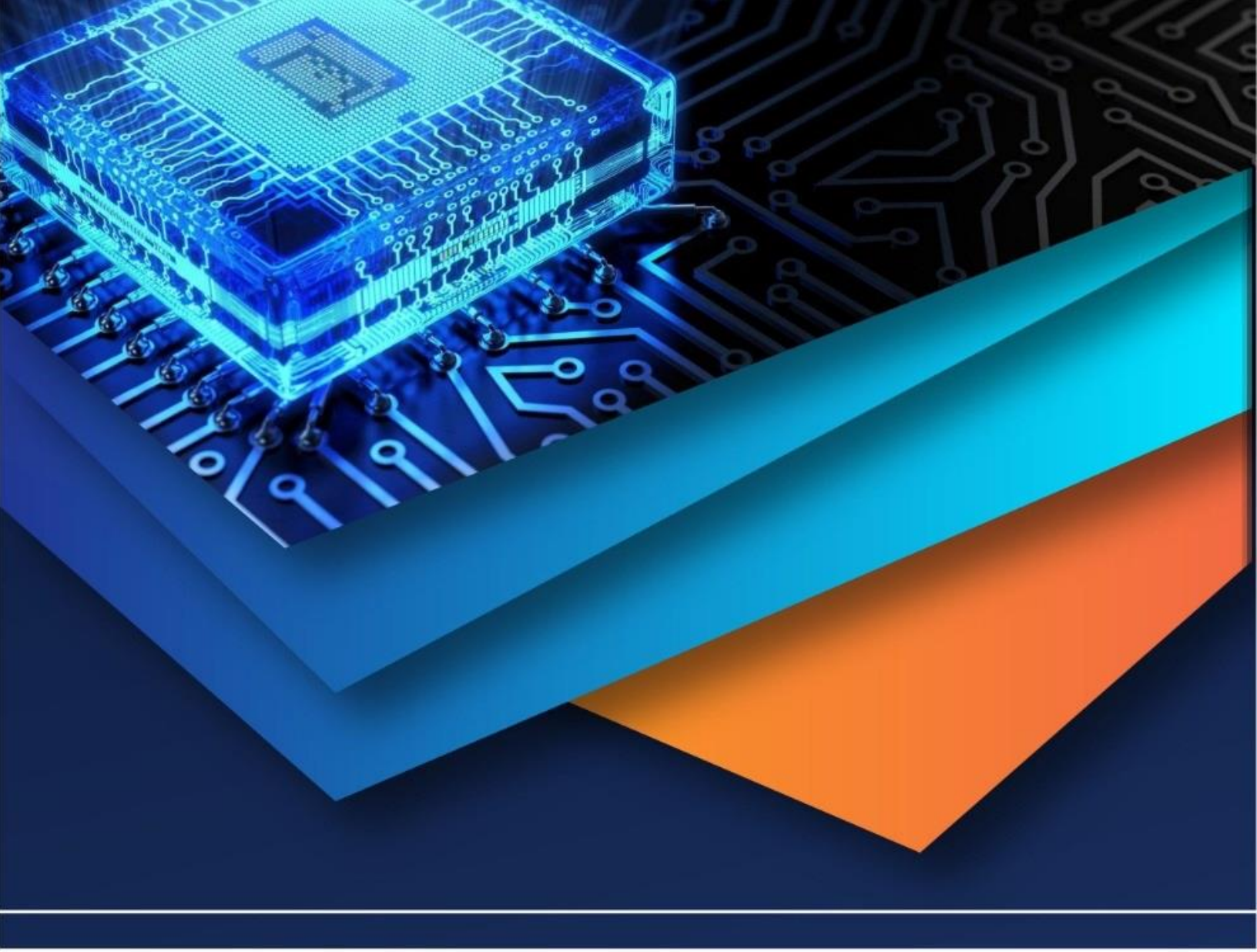

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