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IoT based Paralyzed Patient Health and Body Movement Monitoring System

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Abstract: ***Healthcare systems are a very important part of the economy of any country and for the public health. The IoT-based monitoring system for patients with paralysis, which helps to promote the health condition of a patient with paralysis, in addition to the day-to-day life. India has suffered a stroke, the incidence is much higher than that of the more developed countries, it is home to around 2.1 million Indians suffered from the boom of the (lame) per year. If a patient is suffering from a paralysis attack in all or any part of the body can be turned off in order to move in, which means that their movement is restricted and they can barely communicate with anyone at all, because they can't talk like a normal person. Raccoons will find it difficult to understand what they are saying, and help them deal with their day-to-day needs, such as food, water, etc.). At present, work is in progress on the review of the motion parameters on the legs, arms, and head of the paralytics. This paper investigates the development of an integrated and portable prototype is a model of a system for the monitoring of the various movements of the body, spinal cord injuries, with the help of sensors. The tests were carried out by placing the sensors on the head, arm, and leg of the paralyzed patient the data received from these sensors are sent to the raspberry pi 3 model. In the Android app, you'll receive a verbal warning, and if the patient is in need of help via Bluetooth, which, in turn, is connected to the raspberry pi.***
Keywords: paralysis, accelerometer, raspberry pi, IoT.

I. INTRODUCTION

The recent low birth rates and the ageing of the population, in terms of the decline in the birth rate and increasing life expectancy in developed countries. Low birth rates and ageing populations are expected to evolve in the future, and the lack of employment, medical care, nursing care, it is considered to be a problem. A stroke is known to be a disease with a high morbidity in the elderly, and as the society ages, the number of patients suffering from stroke is increasing more and more and more [1]. One of the most common symptoms of a stroke hemiparesis. For patients who developed hemiplegia, the day-to-day life is difficult. Patients will need to undergo rehabilitation therapy to improve physical function, the sick of the palsy, head/neck, arm, and leg movements of the body. To make an effective repair, rehabilitation, in accordance with the condition of the patient. In the specific case, immediately after the onset of the disease, people who are ill do not actively move of the head/neck, arms, and legs. Hence, the affected area will need to be moved by an external force. When the patients to recover for a period of time, it is necessary for the patient to move the affected area and are not independent. It is important to quantify the symptoms of a stroke, paralysis, and change, regeneration methods, and the in accordance with the assessment criteria. An objective assessment of the stroke, paralysis, and individual differences in the symptoms must be taken into account. The symptoms of a stroke, paralysis, can be divided into static and paralysis, a symptom of which is the hardening of the joints, paralysis, a symptom of the weakness of the bones. This is lame to have contrasting roles, and they need to be evaluated using a variety of methods. In addition, since it is difficult for patients in the acute phase, in order to independently move of the head/neck, arms, and legs, it is best to carry out an investigation, and without moving the head, neck, arms, and legs. In this paper, we propose a new method for the quantification of the stroke, and paralysis. In the proposed methods, and paralysis have been evaluated for certain devices, such as the movement of the head, the arm, the movement, and the movement of the leg. In particular, the paralysis was assessed by means of two-way gear-based monitoring [3]. In the proposed method, the system makes use of the Internet of Things (IoT) with a raspberry pi 3 model in order to collect data from the accelerometer is a sensor that can be shown and measured. The data will be stored and displayed in an Android app, which alerts people to a voice message [4].

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II. RELATED WORKS

This article introduces a [1] is composed of health-care context in which these solutions are designed to help support a patient's loss of motion, in order to his or her lifestyle. At the time, the patient will feel a loss of movement in the whole body or any part of the body is not able to move, all of which contributes to their growth, and that it is increasingly likely that they will not talk to anyone, because they may not be able to communicate with any normal person. The staff at the clinic, and will find it difficult to understand what they need to know in order to go through to the next one, and help them deal with their day-to-day needs, such as food, drink, washing and so on. Every time that the patient has a clear direction for the development of the arms, the SMS message will be sent, so that the signal will be displayed in the alert management alert for social care workers and the need to provide relief to the patient. [1]

In the proposed framework, [2] and regularly evaluate the parameters related to cardiovascular disease, and well-being. Every time a patient to bend their fingers in order to be able to tell you about their needs, and they are going to be in a very important meeting with the supervisor to understand the needs of each patient. In the case that the function is re-arranged a few times, in the event that the case is not met, the framework sends a guardian of a message via the GSM module. So, we made a small effort to try to communicate with the demands of the world. People who regularly undergo a medical examination to rely on others, and even simple tasks such as lighting, a light bulb, a fan is. In order to find a solution to this failure, the user makes use of a gadget-controlled gadget that is worn on the hand. In any case, if the patient is a minor increase in the level of the finger, and the writing of a circuit is activated, in order to determine which of the assistant to turn on the light and the fan. [2]

In the paper [3] considers the structure of the medical services that may be of help to people with disabilities, and therefore it is in the quiet, in relation to the attack zone. This method was used in this study is based on the theory side of things. The use of a glove is a flexible sensor with three levels, in order to gather information from every mathematical field, and hand movements to stand out and recognize each and every word beginning with a particular character. The attack is one of the important definitions of death for men and women. Most of the most important pieces of equipment that a distinction should be made between a heart-related problem, an ECG device that is to be reliable, it is hard for customers, but it's not enough, it can be used as a cute display to fall. This task has been designed for the purpose of identification, and as long as this is the case, it is, at the same time, as a specialist in the prevention, attitudes, values, and services. [3]

This article is devoted to the [4] and medical clinics, and in non-governmental organizations of people with disabilities. At the time, these people are not in a position to physically grow, relative to the average person. In this case, we have a structure that will help the person to unity, reflecting the message of the direct transfer any part of the body. In the proposed framework, the investigation of the soft part of their clients. This gadget should be placed on the client's finger. At present, the client must be of the gadget, from time to time, to send the message, [4].

In this article, we consider the [5] is a device that is a combination of health and medical sensor technologies for the detection of a wireless communication network, which is designed to observe remote-controlled data in a variety of environmental factors. Mobile healthcare is a Stage of developing a report to health, and the Health of the directory on the Android platform. Once you have gathered all of the information about the patient's physiology of the use of the bow, and the touch screen module is installed. The phone call from the sharp, the terminal will transmit the collected data, and the results are stored in a central locale to server via Bluetooth. In the central background-server-information about the victim's status and allows you to exchange data with other sub-systems. A terminal server that is running on Android mobile data, the contribution it makes to connect to a Wi-Fi network, and data transmission via a connection to a web server in the HTTP protocol. This is an external terminal, medical care, and access to the web server. [5]

In the article [6] it presents the pictures and videos from the Web, Things are different applications that can be used for health, as well as intelligent transportation applications. It is represented in its architecture, through the tracking and collection purposes and for the strength and flexibility of the PID module for the target collection at the base of a sliding window algorithm, the performance of which is up to 20 times faster than an approach that ensures the accuracy and contains the modules for the integrated and complex applications, such as energy recovery, file, and object tracking. A hardware-based architecture, which is a portable graphics compression model in the images, which is increased to video compression in real-time from a secure, digital camera, integrated with a decent graphics compression algorithm. They use a highly effective method of visualization, with the help of the Internet of Things and Simulink ® to prototype, [6].

In the paper [7], the problem of the reduction of the energy consumption, and health monitoring systems. If the number of devices on a network, the energy consumption of the network is at a minimum, it would need to be to protect the health of the monitoring system to be more efficient, and that is a very important parameter in the Internet of Things. The power consumption should be as

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relaxed as possible, as well as the integration of sensors and sensor networks. It has been proven that a sensor is located in the vicinity of the body, and the communication through the human body and is more effective. In this paper, we present the weight of the age, and the reduction of the consumption of energy by the help of non-residential surveillance in the health systems, which use one channel of communication with the human body. This idea can be modified in the intelligent health monitoring systems with the help of the Internet of Things. Simulink is used for project control.[7].

In this article, [8], describes, watches-these are the devices that are becoming more and more popular in the activity tracking device. But this is the hand-held devices are the 3 major pitfalls: There are so many types of sensors can be attributed to the lower power consumption and noise level of another configuration. This article focuses on the tracking of the activities or when motion is detected (by the use of the device by using the 3-axis accelerometer. In this algorithm the system includes three major defects in the wrist, devices that. In the preprocessing phase, the data are processed for the purposes of calculating the Euclidean norm of the acceleration vector. This data will be used to keep track of the device's movement with the help of an algorithm. The data in the filtering phase, after the pre-treatment phase, using a simple low-pass filter to reduce noise from other devices. After reduction, and the third phase of the peak-validation, using the Average of the Threshold method, and the Symbol at the tilt-up Method, which allows for a precise, step-by-step, what's the data under a variety of conditions. With the help of this, the experimental results show that the errors in the transfer of the wrist, devices will drop to 1% or less, in a variety of clinical settings [8].

In [9], as well as devices designed to detect human activity, and human activities have been described. This accelerometer provides an effective probe for human actions and activities. The three-axis accelerometer can also be used as differential, the alcohol level in meters. Accelerometers are used in modern smartphones and tablets. With the accelerometer, in modern smartphones, action, human activity, such as walking or sitting at any given time. This article focuses on a smart wearable activity-tracking device that uses a three-axis accelerometer to track a human stride, and the lump patterns, and to make a definitive determination of a person's walking posture. This set will be divided into eight-meter is [9].

In [10], a device based on a wireless power supply by using a wireless transmitter that will absorb a mobile phone, a container is considered to be. The camera consists of a bass instrument and a floating sensor holder is distributed on handheld fabric, and an electric potential is connected to the wire. This phone has a built-in near field communication [NFC], with a capacity to host a function that can be attached to a bag. These sensors are embedded in the fabrics, threads, with a special pin connector, which is connected with a point-to-point configuration with the help of the sensors. Positioning and mounting of the sensor has been carried out on the base of the bag. A host device that can increase the energy in a variety of antenna nodes that have an ability to aggregate over. These results are in line with the actual use of the social security system without batteries [10]

III. IMPLEMENTATION OF PARALYSIS PATIENT MONITORING SYSTEM APPARATUS: A PANEL ASPECT

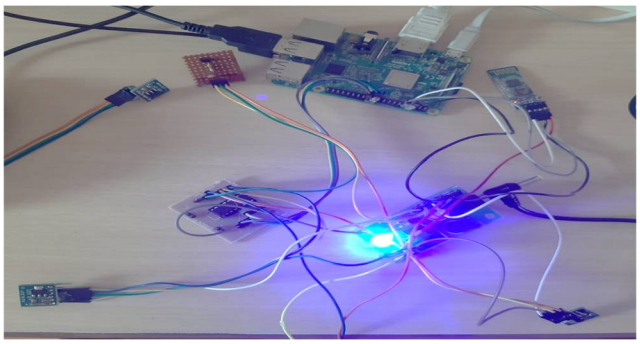

Figure 1. The framework of the paralysis patient monitoring system apparatus.

Figure 1 shows the structure of a device for the movement of the body through the IoT. In this place of the essential information that needs to be protected and to be collected on the touch screen of your device. Archive of the data that has been gathered on the front side of the device will be held in different proportions, to adjust to the untrained merit roaming in some of the connotative merit, pedometers and the 3 accelerators, which can help you to analyze the contents of the base, the arm, the movement of the head. The built-in temperature sensor to detect changes in the patient's temperature. As well as the data from the sensors is below the

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threshold, the MCU sends out an alert to the Android app. The same process is repeated again and again in a pulse sensor, and the data will be sent to you in case of an emergency. The communication between the Android app and the raspberry pi via Bluetooth.

III. DESIGN AND IMPLEMENTATION

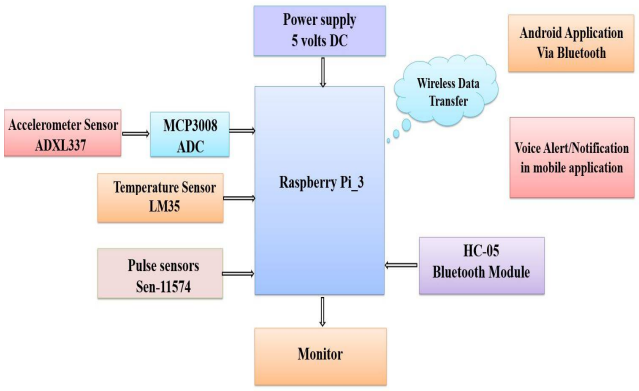

Figure 2. The framework of the paralysis patient monitoring system

Figure 2 shows the model of the design and the implementation of the monitoring system. To evaluate the potential of the human hustle and bustle, exposure method, and a raspberry pi 3 model b is the pin configuration for my prototype, the work is of the pin or a pin to 19-pin, din -, 21-pin, d-out, a 23-pin-the-clock, 24-pin, chip-selection of 14 and 20-pin basis and 4-pin 5v power supply. The Raspberry Pi is not a simple data sources, which means that the use of a large number of available sensors, and a little bit of torture. A prototype is a model, and I wanted to update it to the body of the monitoring system with the ability to use more sensors so as to produce a prototype model, it was decided MCP3008, was the reply. The MCP3008 is a 10-part, 8-channel, analog-to-digital converter (ADC). If you don't have to have a complex interface, and it does not require any additional components. It uses the SPI transport system, which is supported by the name of GPIO of Pi. The use of the SPI bus protocol, which is supported by the Pi's GPIO header. The communication between the Android app and a raspberry pi via Bluetooth wireless technology, like the one shown in Figure 2, and Figure 3 shows a block diagram of the proposed model.

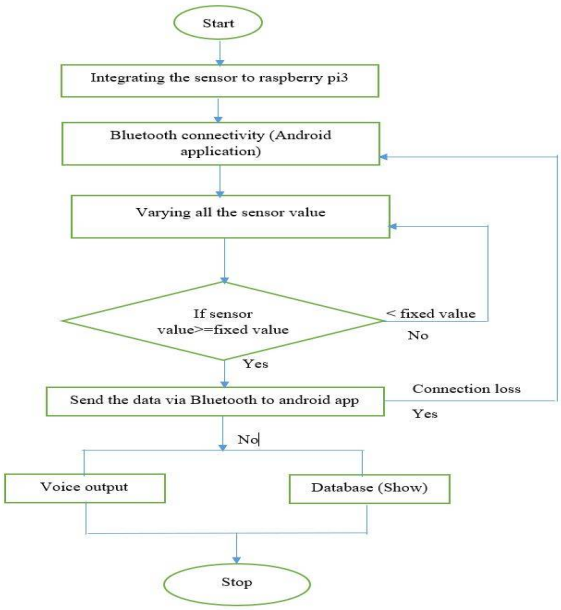

Figure 3 shows the flow chart of the proposed model.

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IV. PROPOSED METHODOLOGY

The system can be fine-tuned with the help of the sensor and the information that was collected using the MCP3008 ADC, and, in a short period of time you will be using a Raspberry PI model 3, and the information gathered has been corrected with the help of the Internet of Things. In this effort, for the genius of the safety and security of the frontiers, in relation to the development of effective care, such as the movement of the body is that of a paraplegic patient, as well as changes in body temperature and changes in heart rate. The temperature threshold has been marked with a 34°C and the heart rate per minute was recorded at 80bpm.If the paralysis, the patient's temperature, heart rate per minute is higher than the threshold, the data will be passed on to the raspberry pi. 3-The ADXL345 accelerometer sensor is installed at the head, arms, and legs, paralysis of the patient. The signals from the sensors on the Raspberry Pi, which in turn transmits the data to the HC-05 Bluetooth module. The Bluetooth module will transmit the data wirelessly to the app, which, in turn, provides the voice alerts to avoid the caretaker / nurse that the patient needs assistance. Here, the experts within the warmth and for the reduction of the proof is to be evaluated with the help of special sensors, and this has been confirmed on the screen of our computer with the help of a Raspberry Pi, as seen from any location on earth with the help of a spring.

V. IMPLEMENTATION AND VALIDATION OF BODY MOVEMENT MONITORING SYSTEM

The implementation of this prototype model is to collect the data from the wearable sensor placed at the leg, hand and head. The MCP3008 to read three accelerometer sensors to identify the body movement of head, hand and leg movement. Raspberry Pi, MCP3008 8 channel ADC- The bits used in the prototype model are with respect to MCP3008 can be connected. It requires 3 GPIO pins on the Pi 3 Header and The CH0-CH7 pins are the 8 analogue inputs. Reading the Data Using a Python Script come to process firstly ADC is 10bit so it can report a range of numbers from 0 to 1023 (2 to the power of 10). A perusing of 0 methods the information is 0V and a perusing of 1023 methods the information is 3.3V. The 0-3.3V range would be equate to Accelerometer sensors through x and y axis. The sensor data is collected from ADC MCP 3008 and then it is collected from Raspberry PI 3 model B v1.2. Based on investigating the activity and interpretation attribute, it stands to the determination abscissa and multiple taxation achieve preferable on-these component. By inspecting the interpretation, it can be perceived elevation can be meaninglessly discovered avail head, hand and leg bustle(movement) net output avail is closer Sleeping, Standing, need food, need water, need to use restroom or any emergency situation alert can be sent to caretaker/nurse by this prototype model since paralysis patient can't talk as normal person. When the assigned accelerometers show any kind to fluctuation in the data the raspberry pi receives the sensory signal and check for the threshold value and compare with the received data if it has crossed threshold value then the data will to transmitted to HC-05 Bluetooth module. The Bluetooth module will check for paired mobile device and transfers the data to mobile. The android application has been installed only on caretaker/nurse mobile. If Bluetooth sends the data to mobile via android app caretaker will get voice and display notification immediately. The caretaker will get alert by the loud voice/sound notification and he/she will attend the paralysis patient.

VI. CONCLUSIONS

This paper refers to a structure for the mankind body bustle preservation technique to keep track of eventual body movement. The body movement preservation proposed framework is dynamical features hinge on the wisdom guideline. This approach helps to upgrade the overall bustle of the body movement preservation apparatus, in which avail can be grouped effortlessly. This prototype model helps the paralysis patient to get their work through caretaker/nurse.

VII. FUTURESCOPE

The future scope of project in future the system can be made smarter and more efficient by making the goggle wireless for eye blink detection. It can be made by using Wi-Fi technology. For constant patient monitoring some indications for Caretakers/Nurse can be added like buzzer or light indicators and also instead of using Bluetooth we can use ZigBee module to monitor patients' parameters on pc in case of if patient is in hospital**.**

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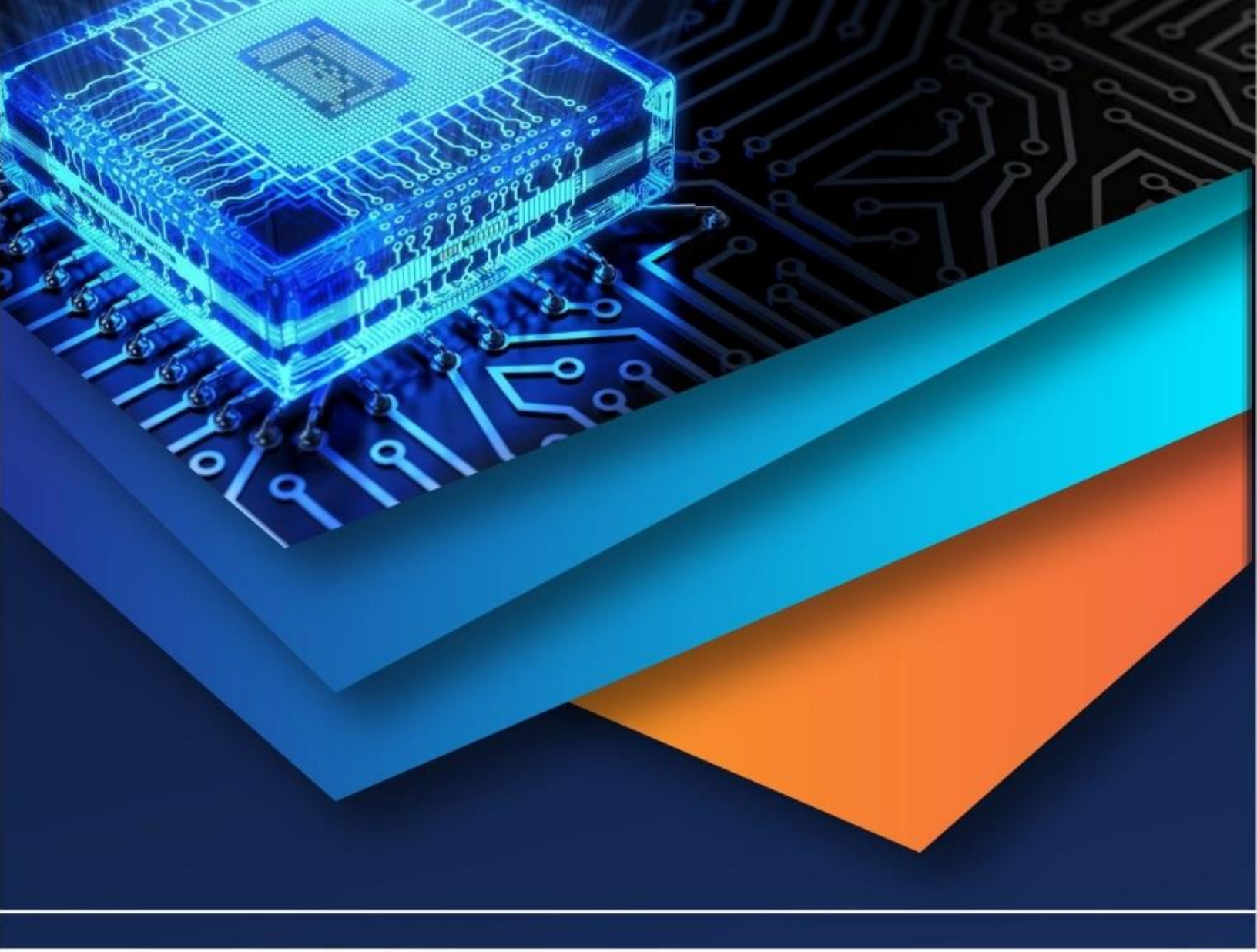

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