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AIOT based Assessment of Covid19 Prediction and Detection using Deep Learning and MQTT-SN

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Abstract: There are several confirmed cases of co-induced diseases caused by current and continuing coronavirus (COVID-19) in humans, with many more likely cases that remain, and as yet undetected because it is transmitted through physical contact. IoMT, together with deep learning and artificial intelligence, began a new era of healthcare possibilities on the internet. This system is being linked to the internet provides it with an extensive array of uses: when paired with usual medical devices and sensors, it enables your body to gather valuable data, which can be then analysed by artificial intelligence to diagnose symptoms detection and diagnosis methods to help with trend analysis. In the last week, Covid-19 killed a lot of people. Internet of Things (IoT) applications (including healthcare and pandemic events) were listed in this paper. An IoT node and machine learning (ML) toolkit (for data processing and diagnostics) will be used, which will be lighter and less expensive. These sensor nodes keep a record of the user's condition, including the user's temperature, respiratory rate, and the amount of haemoglobin in the blood. In addition, Quicker Regions with Convolution Neural Networks (which utilises deep learning algorithms) takes into consideration the environmental and health hazards to make forecasts of the risk of infection at present time of infection in real time. An environment risk is described in virtual terms and delivered to different locations. For the proposed research, three different types of temperature and respiratory rate sensors were used and COVID −19 data was collected. Two hundred and fifty random samples were drawn prior to performing experimental work to recognise the demographic profile: patient's age, sex, and trials the final classification is done utilising SIR mode and is finally expected to match the result using FRCNN.
Keywords: RNN; Covid19; IoMT; Prediction; ML, Healthcare; FRCNN; LSTM

I. INTRODUCTION

The Internet of Things (IoT) is a well-developed scheme of interconnected digital and mechanical devices that can transmit data over a defined network without human intervention. Each of the devices listed has its own unique identification number or code. The Internet of Things (IoT) is a very well established and tested technology that connects real-time analytics, machine learning theory, a slew of strategies, and sensory goods, among other things. Furthermore, IoT is described as the usefulness of products or appliances that serve real-life human needs in a variety of ways, such as home security systems, smart lighting arrangements, and the others that are easy to control through our daily use of smart speakers, smartphones, and other devices.

In the current pandemic situation, all countries, including India, are battling COVID-19 and are also searching for a realistic and cost-effective solution to the problems that have arisen in a variety of ways. Physical science and engineering researchers are attempting to meet these challenges by developing new ideas, describing new research issues, developing usercentered explanations, and educating ourselves and the general public. This brief analysis aimed to raise awareness about this cutting-edge technology and its potential applications in the COVID-19 pandemic.

By 2030, 100 billion devices will be able to "speak to each other" thanks to the Internet of Things, a system that facilitates the automatic sharing of critical information from computers to humans. Small wireless sensors (smart dust) to home appliances to gadgets used in space experiments are among the ‘things' that are being related. Things are classified as low-memory and low-power devices, with memory calculated in bits or bytes and power efficiency low enough for devices to last for years on a pair of AA batteries.

II. RELATED WORKS

Various IoT applications for improving healthcare systems have been suggested over the last few decades. Patients with heart diseases, for example, may be linked to physicians and medical services using the internet of things. People suffering from Parkinson's and Alzheimer's disease also benefited from IoT applications. It can be used to handle equipment and patients in hospitals, and it also provides emergency management for seniors who live alone and need special treatment. In a smart healthcare environment, the Internet of Things (IoT) will aid in medical diagnosis prior to hospitalisation, allowing for more effective treatment. Such AI models would be much more accurate if more data about COVID-19 patients' coughing is available. One of the

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first campaigns to use users' phones to investigate the transmission of an infectious disease. The presence of adjacent Bluetooth devices, GPS communication, location, and flu symptoms are all collected using mobile phones. The information is then sent via 3G/GPRS to a server. The system proposed could be used in rural areas or developing countries where data is transmitted through opportunistic networks and satellite communications. Another recent research looked at how effective active health surveillance and tracing was at preventing infectious disease transmission. P. Pandey and R. Litoriya, writers, provide an overview of the disaster warning system for the elderly (DASE). The framework uses an Android smartphone that is widely available to receive disaster alerts from reputable disaster notification providers, such as the India Meteorological Department (IMD). The regional eco-system of IoT devices remains operational after receiving the warning, and the intimation module begins computing the danger risk associated with an elderly person living alone in his or her home. It's worth noting that merely issuing a disaster alert does not cause the activation of notification systems.

III.PROPOSED METHODOLOGY

Using an FRCNN, the proposed method predicts identified cases, negative cases, discharged cases, and expired cases of Covid-19 corona virus. A FRCNN is a type of neural network model that takes into account both parallelized data processing. Through incorporating memory cells into neural networks, it is possible to model operations that are close to those of the human brain (RNN). Bidirectional RNN (BRNN) is a form of RNN that enters future and past reference in both directions. Long Short-Term Memory (LSTM) RNN and Gated Recurrent Unit (GRU) RNN are two RNN alternatives based on the gating units.
Long short-term memory can be used to make up for a lack of context-based prediction in traditional RNNs (LSTM). The LSTM has a lot of potential for controlling gradient flow and preserving long-range dependencies. GRUs are similar to LSTMs in that their gating units regulate a flow of information within the device rather than using separate memory cells. GRU, like LSTM, does not have memory cells and needs fewer gates, which are enabled using both current and previous output. Resulting in reduction of parameters, GRU has a higher convergence rate than LSTM, and in certain situations, GRU outperforms the LSTM model.
Data is first pre-processed by removing any missing or irrelevant values. After that, data transformation operations are conducted so that it could be fed into Deep Learning Models as input. Three models are developed and presented on the dataset in this paper to check the given estimation results in relation to the available data set. The estimation results are analyzed using output metrics such as accuracy and root mean square error (RMSE). By selecting appropriate parameter values, the precision of such three models could be enhanced. The default settings could not have the best results. To improve the average accuracy, hyper-parameter setting is needed. The RMSE value, on the other hand, should be optimised to indicate a better model. It's worth noting that the dataset includes confirmed, negative, healed, and deceased patients. In the presence of physicians, it is checked in a medical laboratory. For each one of these specific projects, this methodology is utilised. The suggested technique is depicted in the diagram below.

A. Fast R-CNN Pipeline

Now, to learn more about why and how the R-CNN as well as SPP Networks are so much better at general detection, let's take a look at their architecture.
The final ROI pool is replaced by a (K + 1) section soft - max branch, and the other by a category softmax-specific hard bounding box regression. This is also known as "image carving". The characteristics from the last convolution layer are extracted directly from the whole image. If the output size depends on the used backbone, the output features are smaller than the input features. This varies based on the strides of the VGG CNN backbone.
Meanwhile, proposals for items which region has been decided on are obtained using a similar methodology like selective search. When there are CNNs in an image, the image suggests the presence of something; that the object should be rectangular.
All of the pieces of the window's backbone are blended further into ROI Pooling layer.
Only one-level spatial pyramid spatial pooling (ROI) was implemented for the ROI pooling. The layer of selected proposal's features into h/H by w/W sub-wide layer and performs a pooling function in each one. Regardless of the input size, the same width and height results from this design. For the network to be a full-connected layer, H and W are picked which yields a consistent output. H and W's chosen parameters are set to 7 throughout the Fast R-CNN article. Including single-channel pooling, ROI distribution is done in every process.
The resulting features are fed through the FC layers (7 x 7 x N x 512) as well as the softmax and BB branches One of the probability classes produces values for each of each ROI and a catch-all class Regression branch output is employed to refine the bounding boxes.

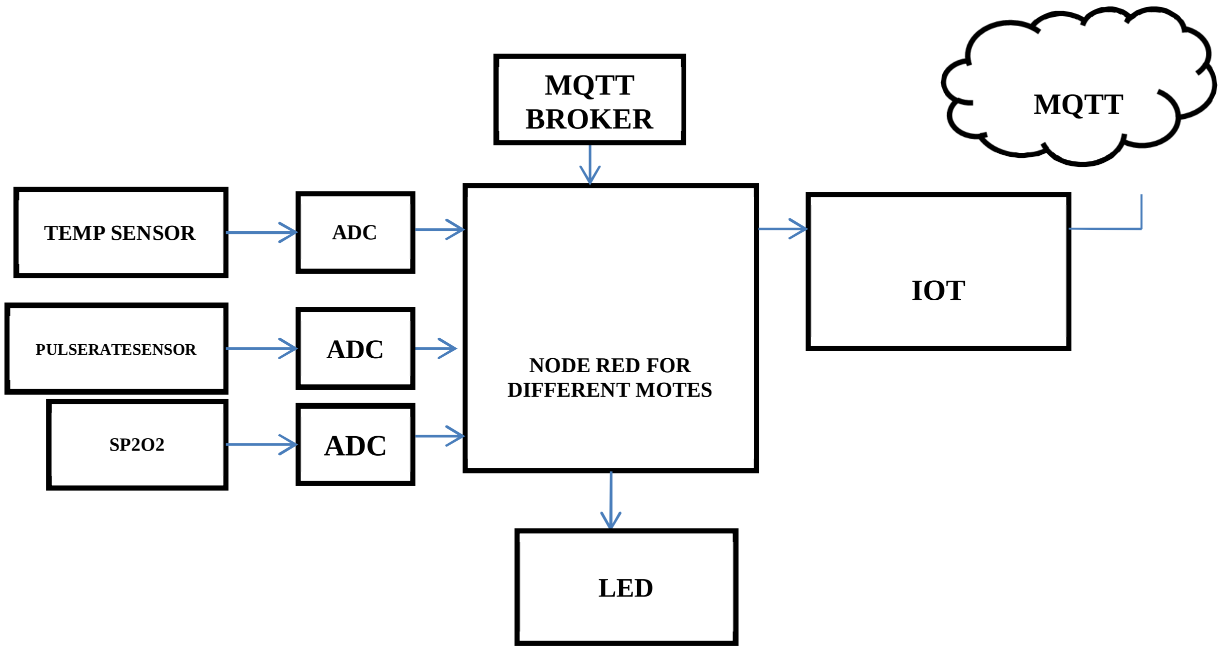

Fig. 1 Block Diagram of the ;p

B. MQTT

MQTT is an industry standard communications protocol that all OIS devices must use (IoT). MQ has been developed as a lightweight message transport suitable for use with small code and minimal network bandwidth. now, MQTT is widely applied in the automobile, manufacturing, the petroleum industry, telecommunications, and numerous other companies.

C. Publish

Message transfer traffic broker (MQTT) clients publish messages as soon as they establish a connection to a broker Means of transportation utilised a topic-based filtering of the messages on the bulletin board." each message must have a topic which will allow the marketer to mail their message to those who are interested on the average, each message contains payload data in byte-for-byte Mutual Theory Trust Theory is unifying. The payload for a client will need has to work with the use case defines the structure of a message. Regardless of the kind of data, the sender (or publisher) decides whether the client (or publisher) should send one of binary, text, or full-blown XML or JSON.

IV. RESULTS AND DISCUSSIONS

Contiki is an OS similar to Microsoft Windows and Linux in terms of how general it is, but it's also focused on IoT-specific. Additionally, distinctive characteristics of an operating system include the administration of programmes and the organisation of resources, the management of memory, and communication between processes. The wonderful part about Contiki OS is that it has a wide range of device and coders friendly functions. This might run on various ARM-based microcontrollers, including 8051 SoC devices Arduino and Atmel are on various platforms with ports. To interoperate with the public networks, while reducing ecological impact is necessary, the company may also wish to use green and more energy-friendly protocols. A noteworthy case of this kind is Rime stack, which uses advanced approach to improve the IPv6 protocol. The Contiki network emulator is Contiki. Large and small network options for Contiki robots are possible when using Coo. The Motes could be emulated there at hardware, which offers less details but is also much less precise. Cooja is a useful tool which enables developers to run the code and systems on the actual hardware before deploying it. When it comes to implementing and debugging the code, developers constantly create new simulations to validate the operation of their systems.

1) *Step1:* To start Cooja, open terminal window and go to the Cooja directory with the command: cdcontiki/tools/cooja
2) *Step2:* Start Cooja with the command: Sudo ant run then Cooja is compiled, it will start with a blue empty window. Now that Cooja is up and running, we can try it out with an example simulation.

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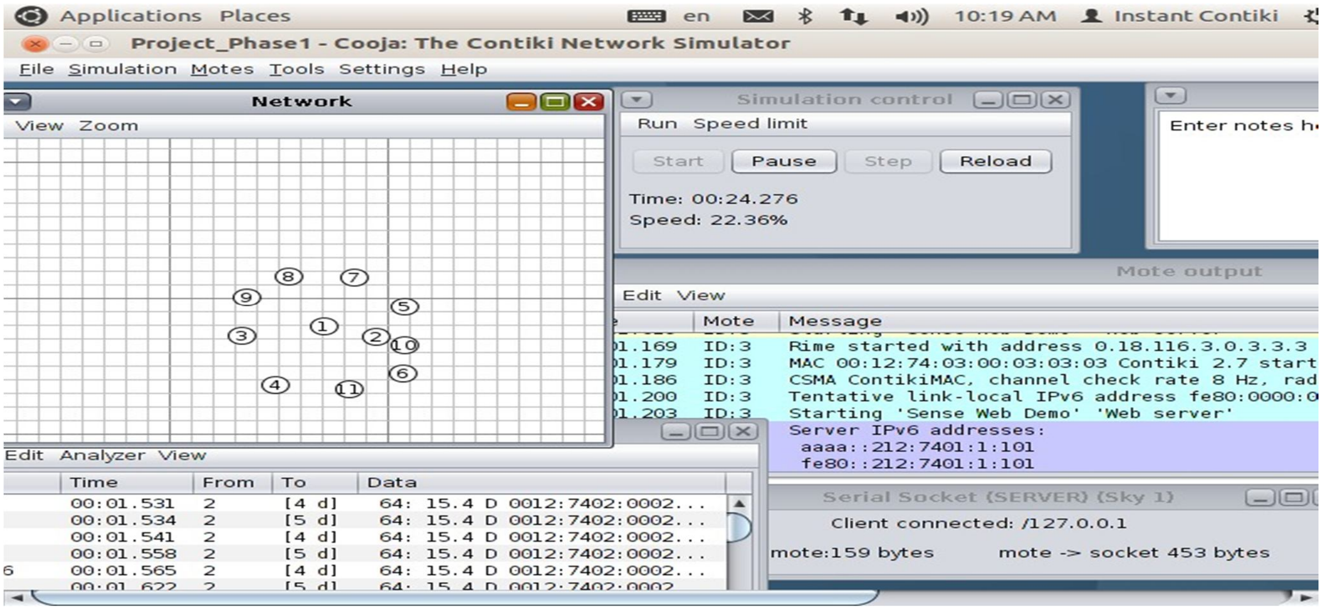

Figure 4.1 Distributions of Motes for Communication

Figure 4.1 shows The distribution of sunshine motes for communications of HTTP and CoAP Randomly apply 10 m-i when placing motes. Next in theNetwork Panel, click on the View button, and then select the resulting dialogue: Share Radio, hardware, as well as Mote ID and address parameters Clicking on a Mote now shows only the green and grey zones, based on the chosen medium model. This diagram shows the network configuration for this demonstration in Figure 1.6. The IPv6 software that this expression uses is compiled into a Border Router APIs and is located in the example folder /examples/ipv6/pl/pl-border-router. node type a left-click the Border Router button, select Mote 1, and click the 'SERVER' then select the border tool and select 'SERVER' This serial port will be created on the router and accessible on the local via UDP port number 60001.

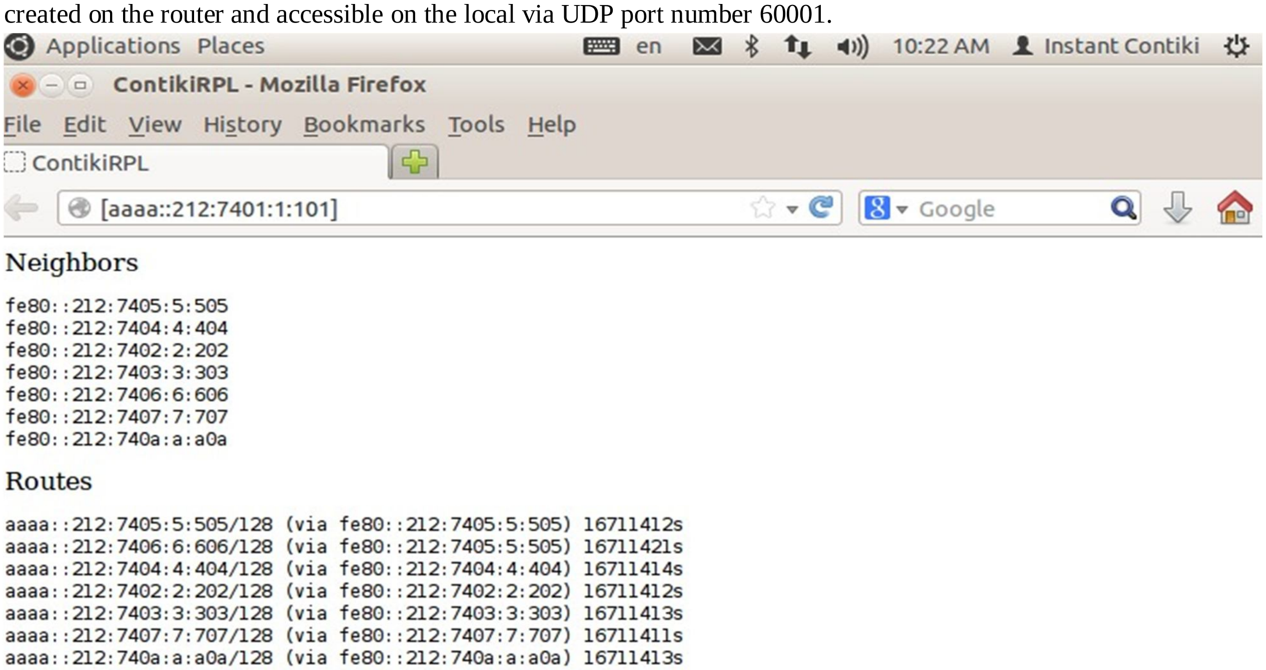

Figure 4.2 RPL Border Routers Routing table web pages for Proposed Model

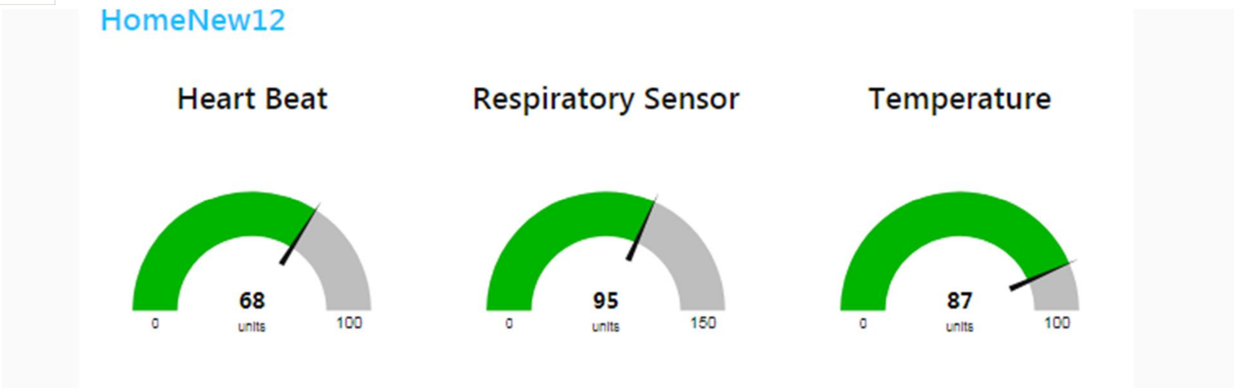

Figure 4.3 MQTT Dashboard

V. CONCLUSIONS

The application of Internet of IoT helps cut healthcare costs while treating patients better Currently, IoT research is dedicated to discovering, discussing, and brainstorming approaches to attack the COVID pandemic. IoT's applications were reviewed and analyzed in great detail. In the end, this has had forced academics, researchers, and even scientists to embrace the search for new strategies in response to the pandemic. Catching an infection from someone in your own crowd is next to impossible. It is the only way to prevent the corona virus from spreading; isolating infected individuals is the only way to keep the virus from spreading. Because of this, IoT temperature monitoring can help us identify the infected individuals. Thus, it will also enable us to avoid intruding on others' privacy and discourage social interaction. The effectiveness of an IoT-based healthcare system is increased though the cloud computing and use of real-time data. It will be fun to test out the framework in the real world as well as investigate on the effectiveness and practicality in smart city environments.

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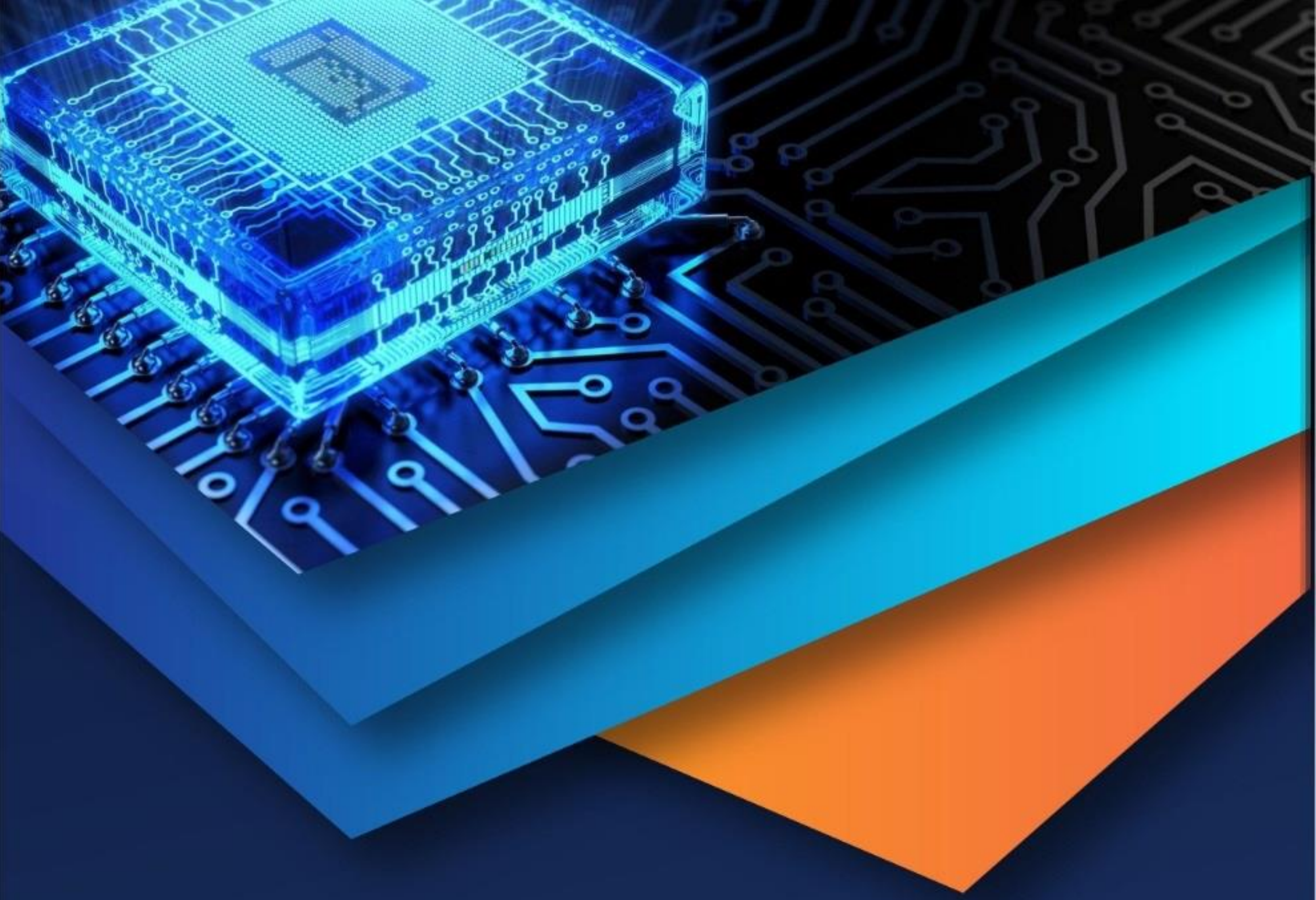

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