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Compact Battery Monitoring System

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Abstract: ***The life of any Battery depends on the pattern of charging and discharging, discharging excessively and overcharging severely reduces the battery life. So, as a solution to this problem we have made an effiicient and cost-effective compact system which would measure the battery voltages of multiple batteries, provide the voltages of multiple batteries to the server simultaneously. Also, if the battery voltage of any of the battery falls below the threshold then Local alerts are provided with the help of LEDs and buzzer and simultaneously send alert to the server. This device would be a great alternative for the currently used large sized and expensive monitoring systems. The security, reliability and compactness provides edge to this device.***
Keywords: Arduino, GSM module, Multiplexer, Server, RFID.

I. INTRODUCTION

The Battery Monitoring System (BMS) is an electronic circuitry that monitors a rechargeable battery (cell or battery pack), such as monitoring its state, analyzing the secondary data, reporting that data, authenticating it.

A. In The Compact Battery Monitoring System we Have Used

1) Arduino UNO Module: Stores the received data from the multiplexer, initializes GSM to send data to server
2) Multiplexer: To select 1 input from a stack of 8 batteries and send it to Arduino.
3) GSM Module to send data from Arduino to the server.
4) Server to collect information received from the GSM.
5) RFID RC522 so that only intended users to have the access and control over the device.
6) Electronic circuitry with Multiplexers, LEDs, Buzzer, Resistors.

The need to work on this model is to improve the battery life and analyse the behaviour of different batteries. Therefore, we considered the objective to design a compact Battery monitoring system which could serve as a power manager.

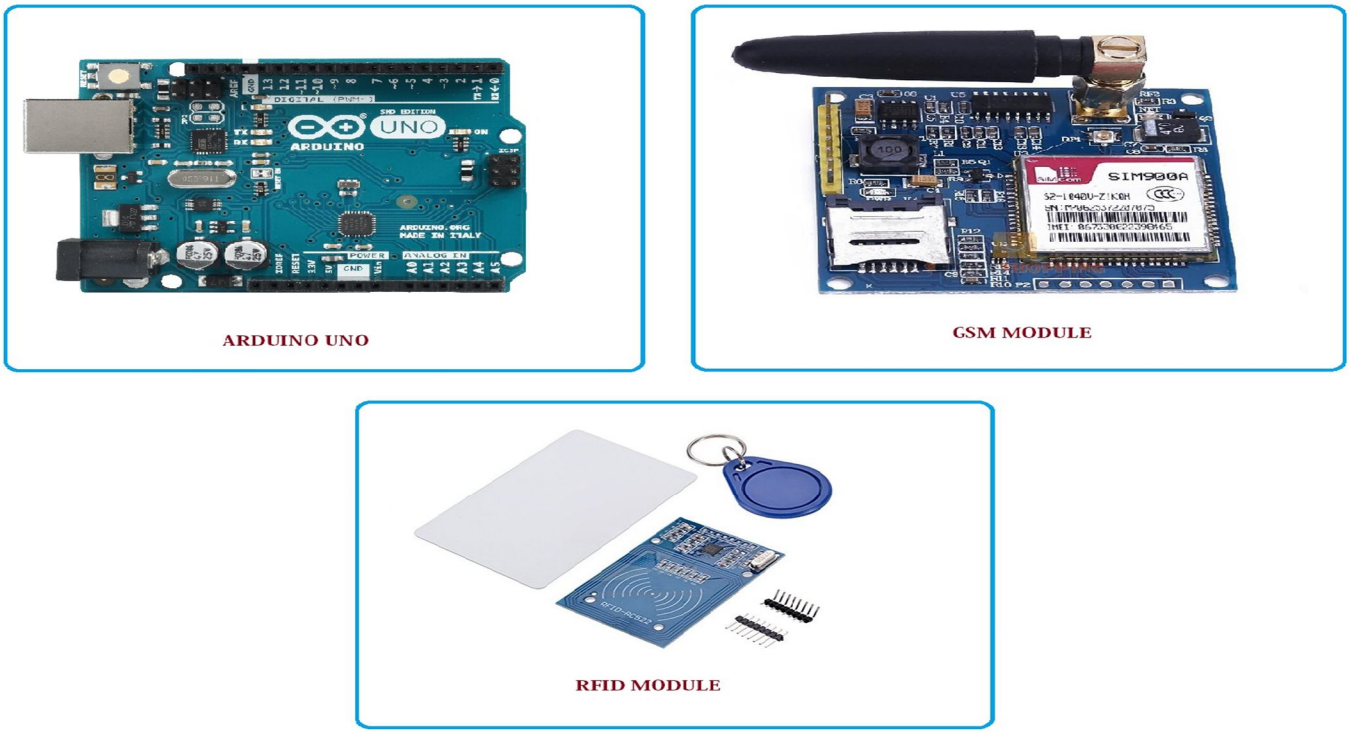
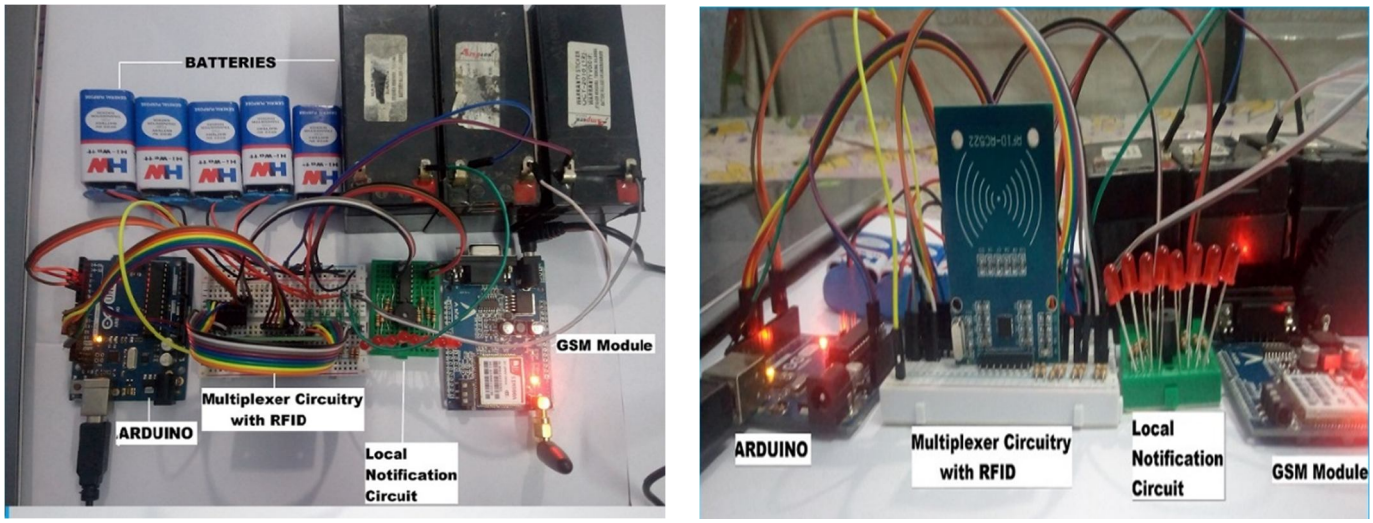


Fig. 1: Major Components of the Compact BMS

II. METHODOLOGY

All the appropriate connections are made between different modules and the electronic circuitry and then the Program is loaded to the Arduino.



(a) Top View (b) Front View

Fig. 2: Electronic design setup for the Compact BMS

The Steps involved in the program are explained with the help of given flowchart.

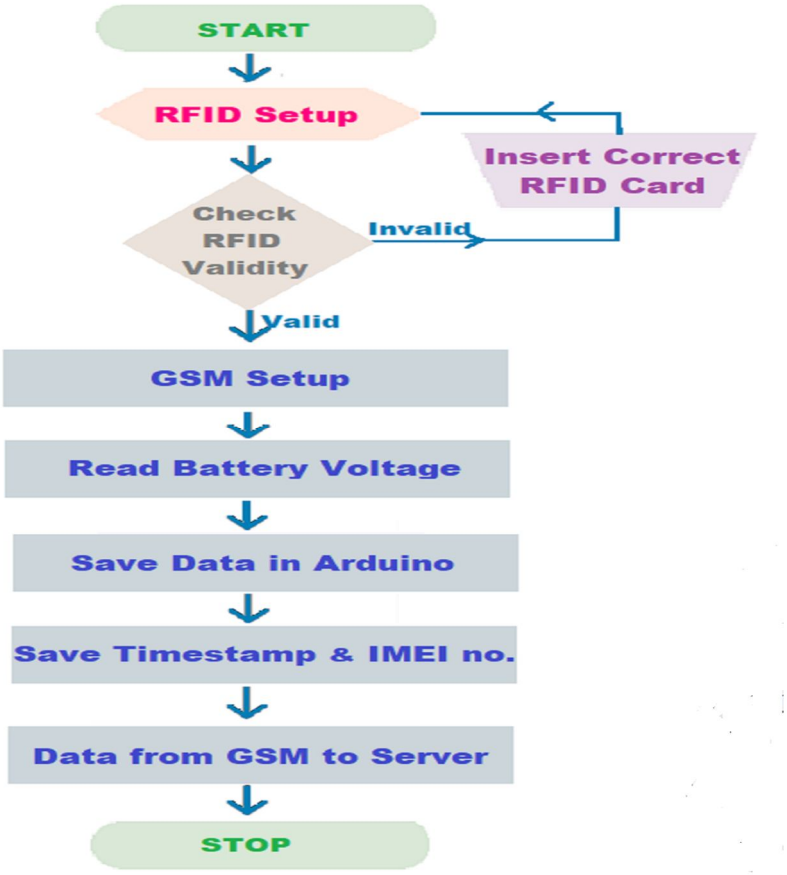


Fig. 3: Sequential steps of running the program for Compact BMS

As soon as the device setup is ready to work, A valid RFID will then allow the device to monitor the battery voltages, calculate Time Stamp, save Hardware IMEI number and provide these set of information to the server. This system comes along with the local notification feature which would provide an alert for the low battery through LEDs and Buzzer.

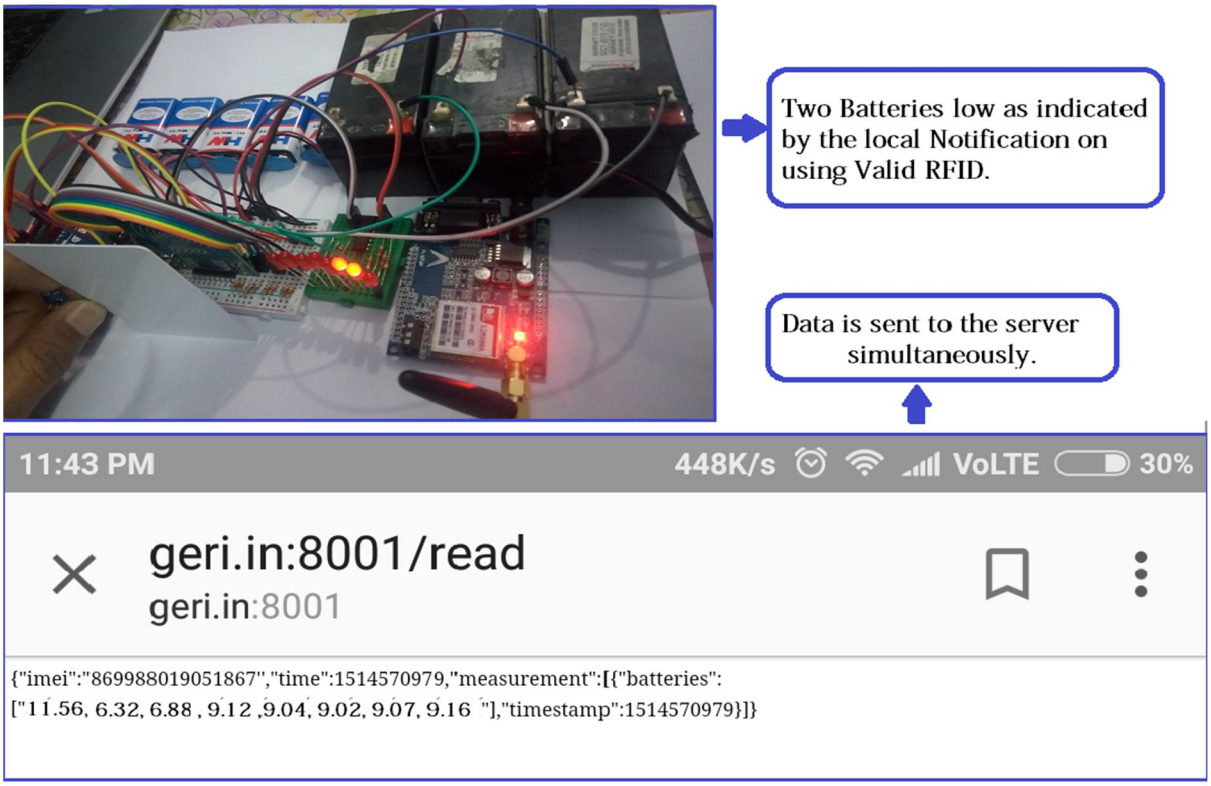


Fig. 4: Outcome of using RFID and data at server

III. CONCLUSION

In this project, the cost-effective compact BMS is developed successfully. Also, For this proposed model using Arduino, the number of batteries to be monitored simultaneously could be increased to 128 by using either multiple multiplexers or a single larger multiplexer. The proposed model would help to maintain the battery life.
Our model would find its major applications in the Data centres, Hospitals, Electric vehicles, Research and development.

Operation	Operating Time(seconds)
Arduino setup	1
GSM Setup	9
RFID Check	2.2
Saving Battery Voltages to Arduino	0.5
Calculating Timestamp	0.5
Identifying IMEI number of GSM	0.5
Sending data from GSM to Server	1
Total	**13.5**

Fig 5(a)

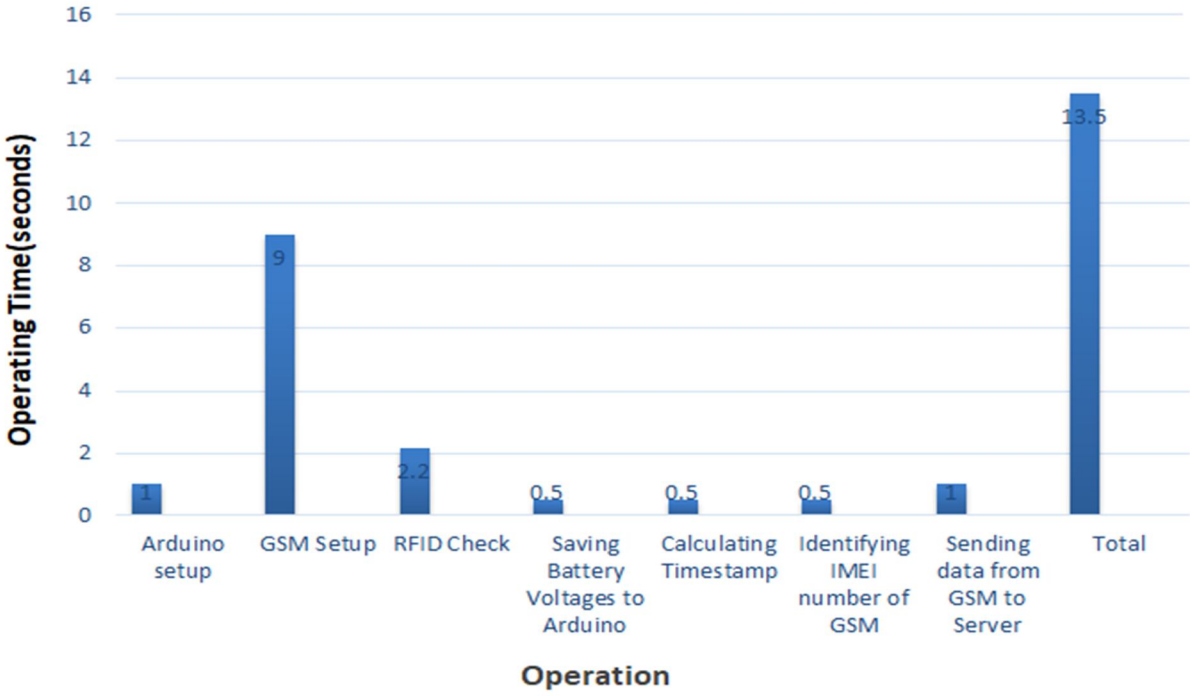


Fig 5(b)

Fig. 5(a),(b): Operating times for the different operations of the compact BMS

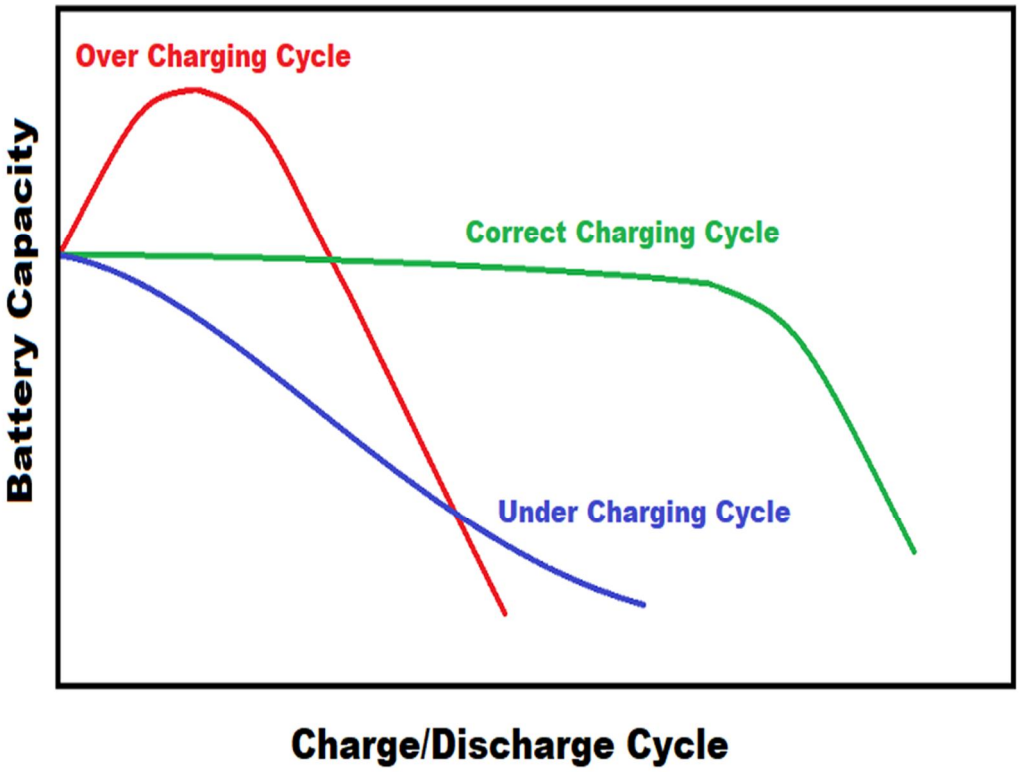


Fig. 6: Battery Behaviour

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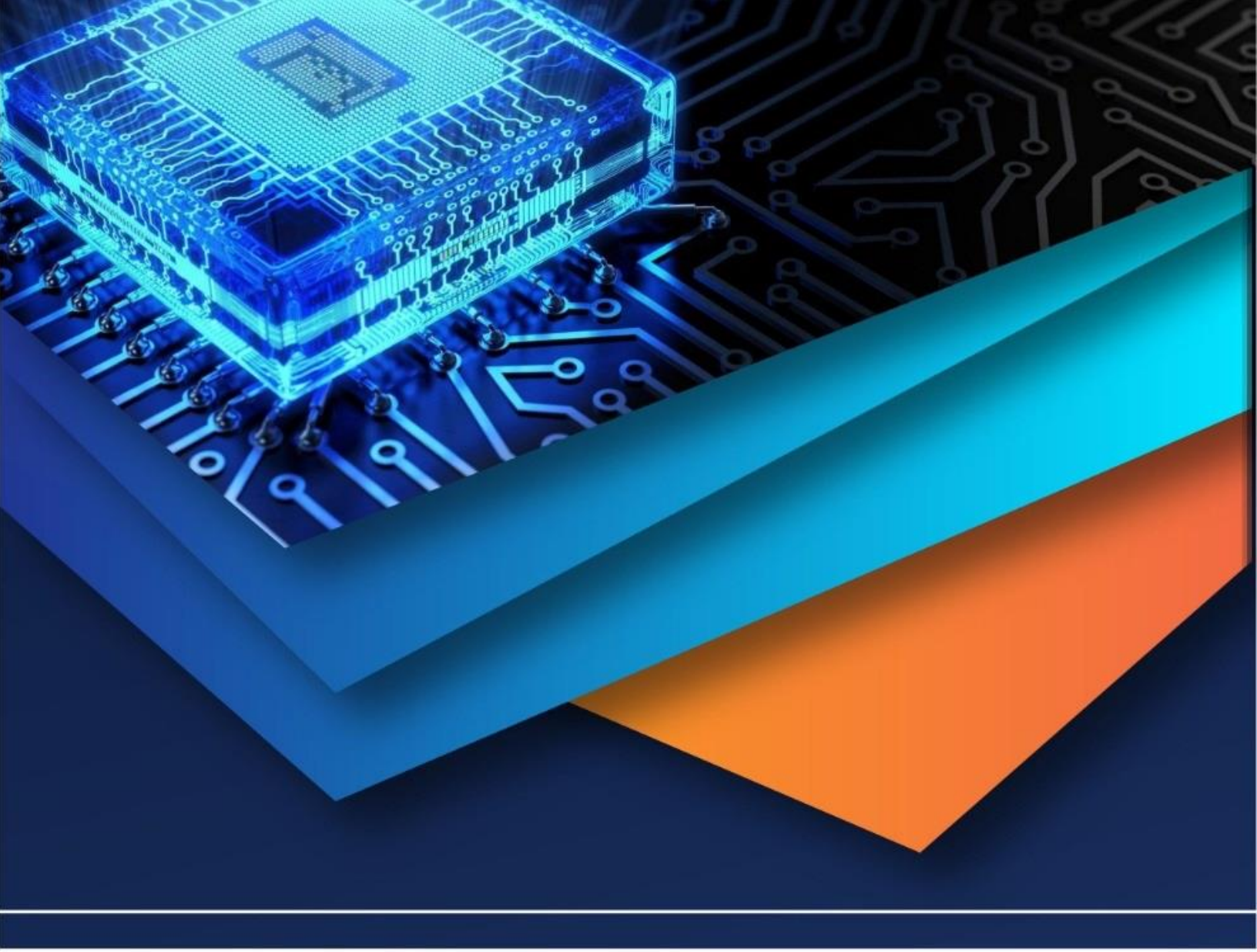

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