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RFID and Fingerprint Based Smart Attendance System

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Abstract: ***The advancement of a semi-self-governing insinuation framework to guardians about the nearness of their kid in school or school grounds is the goal of this Project. General framework is important to record and track understudy's participation. The framework must able to record students" participation utilizing intelligent info, producing reports, seeing students" and lecturer" profiles, and giving understudies timetable. On the off chance that an understudy bunked his/her class or snatched from school or school, their folks may realize that after 6pm as it were. Here we proposed another answer for send speedy hint to their folks about the nearness of understudies through school or school transport at 9.30am. For this we are utilizing a RFID peruser, fingerprint sensor, GSM module alongside an Arduino mega and its product. RFID perusers can read the RFID labels of the understudies. GSM framework is utilized to send their nearness to their folks through SMS. The framework is connected to record participation utilizing RFID innovation. RFID innovation has a considerable measure of favorable circumstances, for example, synchronous gathering of vast amounts of information with high exactness, contactless, and so forth. RFID is the shortened form of Radio Frequency Identification. RFID is a remote recognizable proof method which is utilized for the ID of physical items like items, people and so on by the utilization of radio recurrence. It is substantially quicker and it has two segments i.e. RFID tag and RFID peruser. Utilization of biometry i.e unique mark sensor gives aunthentication, so that lone approves client is permitted to enter the class or grounds. GSM system is utilized to send SMS to guardians about the understudy's detail. Short Message Service (SMS) is a content informing administration segment of telephone, web, or portable correspondence frameworks, utilizing institutionalized interchanges conventions that permit the trading of short instant messages between settled line or cell phone gadgets. GSM system can interconnect and wander everywhere throughout the nation, and its system capacity is extremely solid, the client will no need another system***
Keywords: ***RFID technology, Fingerprint sensor, GSM module, SD card, Arduino mega.***

I. INTRODUCTION

Today the current framework is taking participation physically by calling the move numbers by educator himself and denoting the participation. The most widely recognized methods for following understudy participation in the classroom is by authorizing the understudies to physically sign the participation sheet, which is typically passed around the classroom while the instructor is leading the address. For example, speakers with a vast class may discover the bother of having the participation sheet being passed around the class and the manual marking of participation by understudies are troublesome and in all likelihood occupy them from educating and getting complete consideration from the understudies. Plus, as the participation sheet is passed around the class, a few understudies may coincidentally or intentionally sign another understudy's name. The primary case prompts an understudy passing up a great opportunity their name, while the last prompts a false participation record. Another issue of having the participation record in a printed copy frame is that a speaker may lose the participation sheet. As far as participation examination, the instructor likewise needs to perform manual calculation to acquire the understudies' participation rate, which regularly expend a great deal of time. In today's cutting edge world guaranteeing security for school going youngsters has turned into a pivotal element of assent. The proposed arrangement of Participation administration for school/school youngsters and working representatives utilizing RFID has utilized the intelligible component how the RFID tag is perused by a peruser in the kids in security zone and keeps up the participation at classroom level. Vital favorable position of this framework is a solitary equipment usage brings about outlining two unique modules.

II. LITERATURE REVIEW

Qun Hou et al. [1] tells the establishment of remote monitoring platform based on a GSM short message mode that can monitor and

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control the remote communication between the central monitoring station and remote monitoring stations. The remote monitoring station can send the short message because GSM network can interconnect and roam all over the country, and its network ability is very strong; the user will no need another network.

T.S. Lim et al. [2] expressed low cost RFID Based Attendance System prototype, the system provides several advantages over conventional method of taking attendance in class. The prototype developed in this project is compact and light weight. Besides, it can run using power adapter or battery power. Therefore, it is very portable and can be carried to the class for taking the attendance.

Anon [3], presented a system which is called, Smart School Bus Architecture. The student swipes the card at the RFID reader while boarding the bus, when the RFID reader transmits the student identification to mobile DVR, which will transmit student identification to the CMS server using 2G/3G/WIFI network. The CMS server will send SMS to assigned parents mobile, then the parents will receive the message and then the bus will depart. During the bus is moving, the mobile DVR will record (video/audio) the various school bus spots that will be shown in the CMS server through 2G/3G/WIFI network as well as there is a GPS used for tracking and monitoring the smart bus location at the central monitoring site. School management permits and allows parents to access the monitoring system that enables them to monitor their children via the internet using browse/CMS client. In case of incidents, urgent communication or alarm trigger on the CMS server by the driver and then the CMS administrator will communicate directly with the driver using a mobile DVR system through 2G/3G network.

Zonar [4], has designed the Zpass specifically for school buses for monitoring and tracking the students in a safe manner. Zpass provides accurate and immediate answers. This system uses RFID with a small card carried by the student containing passive RFID technology that records each student's entry or exit automatically when the student passes from the scanner device that located in the school bus.

III. PROPOSED METHEDOLOGY

The Proposed Methodology fuses RFID peruser, unique fingerprint sensor, and GSM inside a school or school premises to give speedy insinuation to guardians about the nonattendance of their youngsters. A Radio Frequency Identification innovation, which comprises of two segments, i.e. RFID labels and RFID peruser encourages programmed remote recognizable proof utilizing electronic aloof and dynamic labels with reasonable reader.A unique mark sensor is client for validation thus that exclusive approved client is permitted to enter the class . Here GSM is utilized to record the nearness of the understudies. GSM framework is utilized to send their nearness to their folks through SMS. Short Message Service is a content informing administration segment of telephone, web or versatile correspondence framework. It utilizes institutionalized correspondence conventions to permit settled line or cell phone gadgets to trade short instant message. By this we can get landing and flight time of the understudy. This framework is proposed to use the GSM short message administration and microcontroller to accomplish remote continuous information checking. Utilizing ease RFID Based Attendance System model, the framework gives a few focal points over customary strategy for taking participation in class. The proposed framework design is appeared in Fig.1below

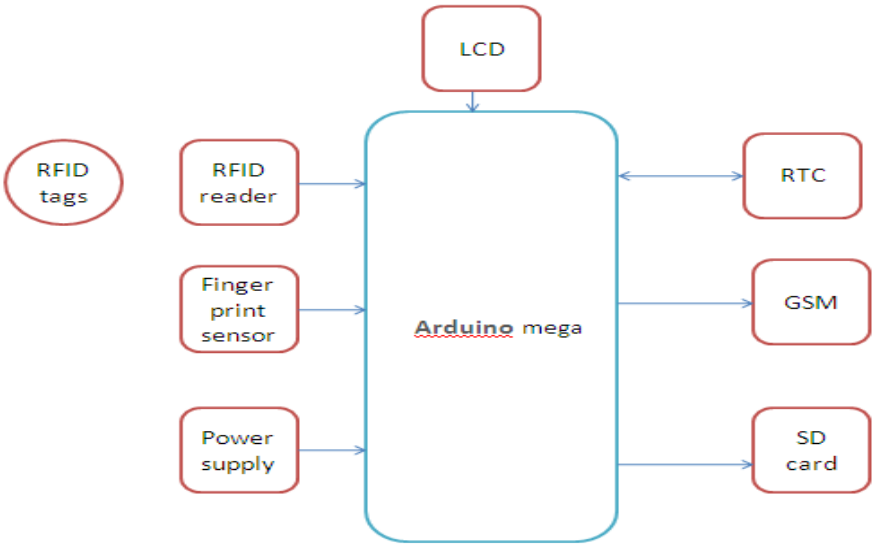

Fig 1:block diagram of designed system

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A. Components required

1) *Arduino mega:* The Arduino Mega is a microcontroller board based on the ATmega1280 (datasheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega is compatible with most shields designed for the Arduino Duemilanove or Diecimila.

The Arduino Mega can be powered via the USB connection or with an external power supply. The power source is selected automatically.

External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.

The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

2) *Specifications*

Microcontroller	ATmega1280
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	54 (of which 15 provide PWM output)
Analog Input Pins	16
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	128 KB of which 4 KB used by bootloader
SRAM	8 KB
EEPROM	4 KB
Clock Speed	16 MHz

B. RFID reader and RFID tags

RFID stands for Radio Frequency Identification which is a technology to electronically record the presence of an object using radio signals. RFID is not a replacement for the bar-coding, but a complement for distant reading of codes. The technology is used for automatically identifying a person, a package or an item. There are two main components: The Interrogator (RFID Reader) which transmits and receives the signal and the Transponder (tag) that is attached to the object. Communication between the RFID Reader and tags occurs wirelessly and generally does not require a line of sight between the devices. An RFID Reader can read through most anything with the exception of conductive materials like water and metal, but with modifications and positioning, even these can be overcome. The RFID Reader emits a low-power radio wave field which is used to power up the tag so as to pass on any information that is contained on the chip.

RFID tags are small transponders (combined radio receiver and transmitter) that will transmit identity information over a short distance. There are several versions of RFID that operates at different radio frequencies. the choice of radio frequency is dependent on business requirements and read ranges. Three primary frequency bands are being used they are

1) *Low frequency (125/134kHZ):* - most commonly used for attendance and access control.
2) *High frequency (3.56MHZ):* -used where medium data rate and read ranges up to 1.5 meters are acceptable. This frequency also has the advantage of not being susceptible to interference from water and metals.
3) *Ultra high frequency (850 -950MHZ):*-offer the longest read range of approximately 3 meters and high speed operationMost RFID tags contain at least two parts. One is an integrated circuit for storing and processing information, modulating and de-modulating a radio-frequency (RF) signal, and other specialized functions. The second is an antenna for receiving and transmitting the signal. There are generally two types of RFID tags.

a) *Passive RFID tags:* Passive tags are generally smaller, lighter and less expensive than those that are active and can be applied to objects in harsh environments, are maintenance free and will last for years. These transponders are only activated when within

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the response range of an RFID Reader.

b) *Active RFID Tags:* Active tags differ in that they incorporate their own power source, whereas the tag is a transmitter rather than a reflector of radio frequency signals which enables a broader range of functionality like programmable and read/write capabilities.

C. Fingerprint sensor

Fingerprint processing includes two parts: fingerprint enrolment and fingerprint matching (the matching can be 1:1 or 1:N). When enrolling, user needs to enter the finger two times. The system will process the two time finger images, generate a template of the finger based on processing results and store the template. When matching, user enters the finger through optical sensor and system will generate a template of the finger and compare it with templates of the finger library. For 1:1 matching, system will compare the live finger with specific template designated in the Module; for 1:N matching, or searching, system will search the whole finger library for the matching finger. In both circumstances, system will return the matching result, success or failure.

D. SD Card

The Secure Digital Memory Card (SDC) is the de facto standard memory card for mobile devices. The SDC was developed as upper-compatible to Multi Media Card (MMC). SDC compliant equipment can also use MMCs in most cases. These cards have basically a flash memory array and a (micro)controller inside. The flash memory controls (erasing, reading, writing, error controls, and wearleveling) are completed inside the memory card. The data is transferred between the memory card and the host controller as data blocks in units of 512 bytes; therefore, these cards can be seen as generic hard disk drives from the view point of upper level layers.

E. LCD

LCD screen is an electronic display device and find wide variety of applications. A 16*2 lcd display is very basic and very commonly used in various devices and circuits.16*2 means it can display 16 characters per line and consists of two such lines.

F. RTC

Real-time clock (RTC) ICs measure time, even when the power of the main device is off. During these times, RTC ICs draw power from an auxiliary battery or supercapacitor. As expected, power consumption is a key factor in most RTC designs, but accuracy and small package size are also important. Most modern RTC ICs reduce package pin count by supporting a serial interface.

IV. RESULTS

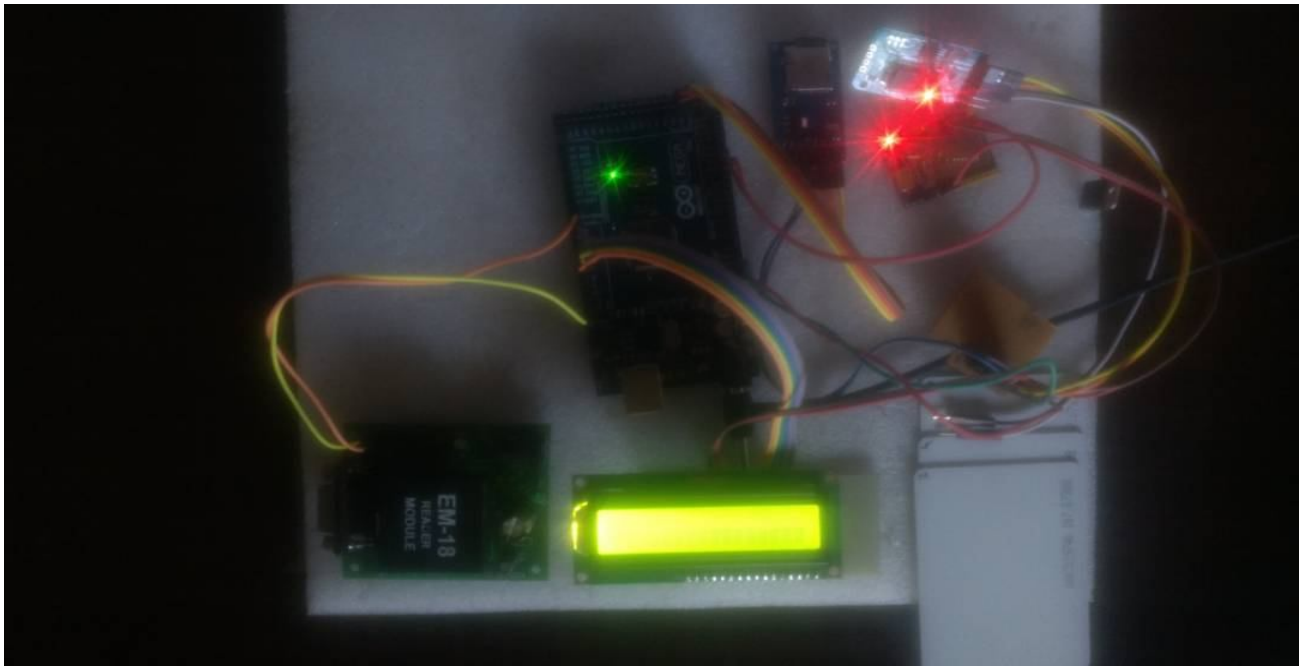

Fig2: Experimental setup of the implementation

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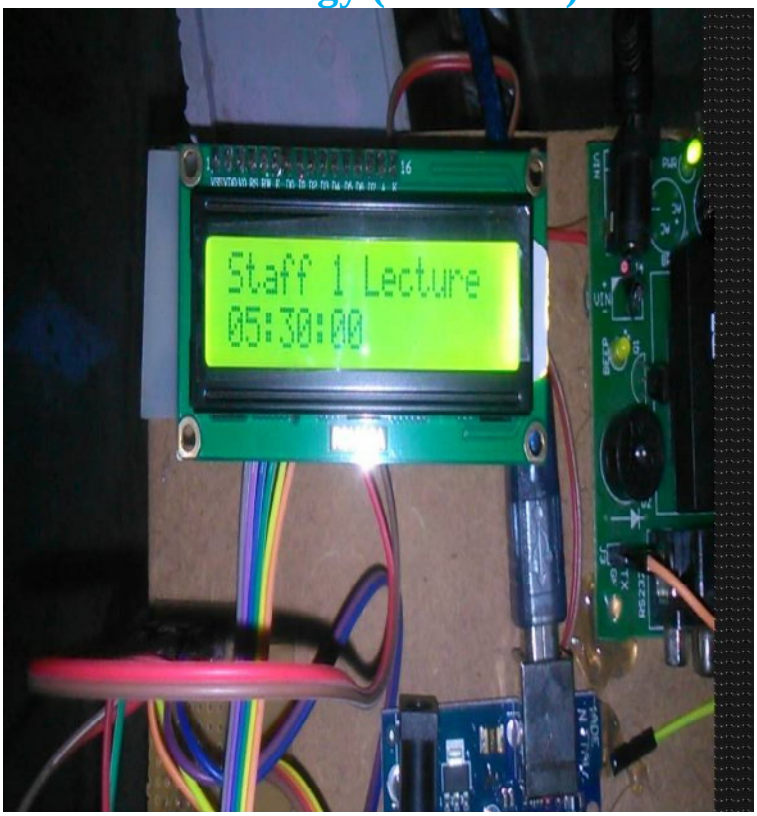

Fig 3: Display of staff's attendance on LCD

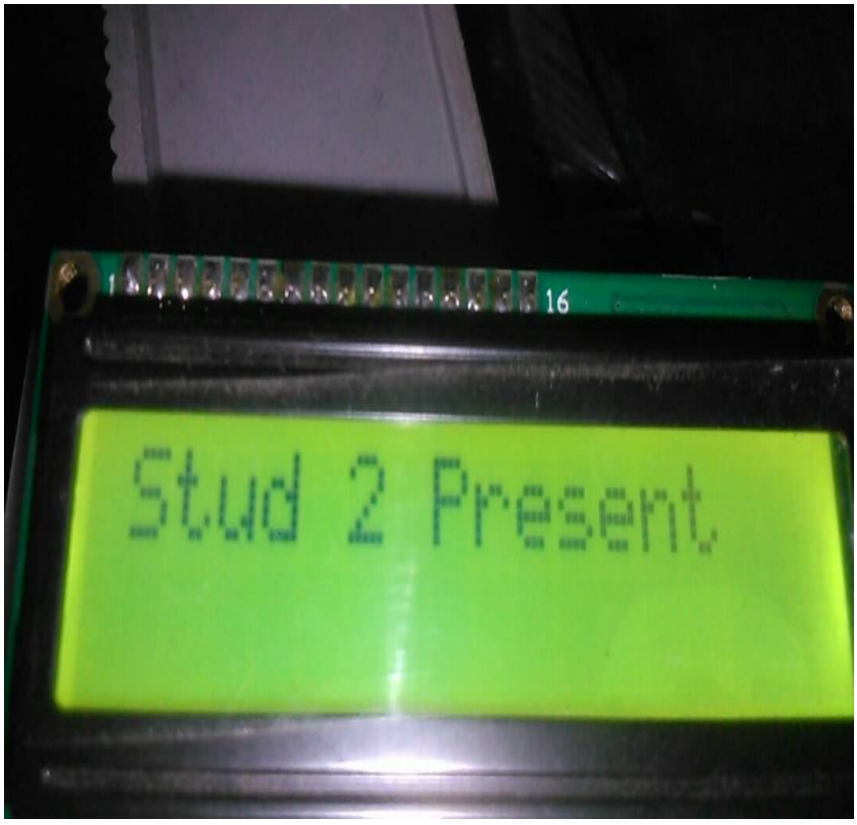

Fig 4: Display of student's attendance status on LCD

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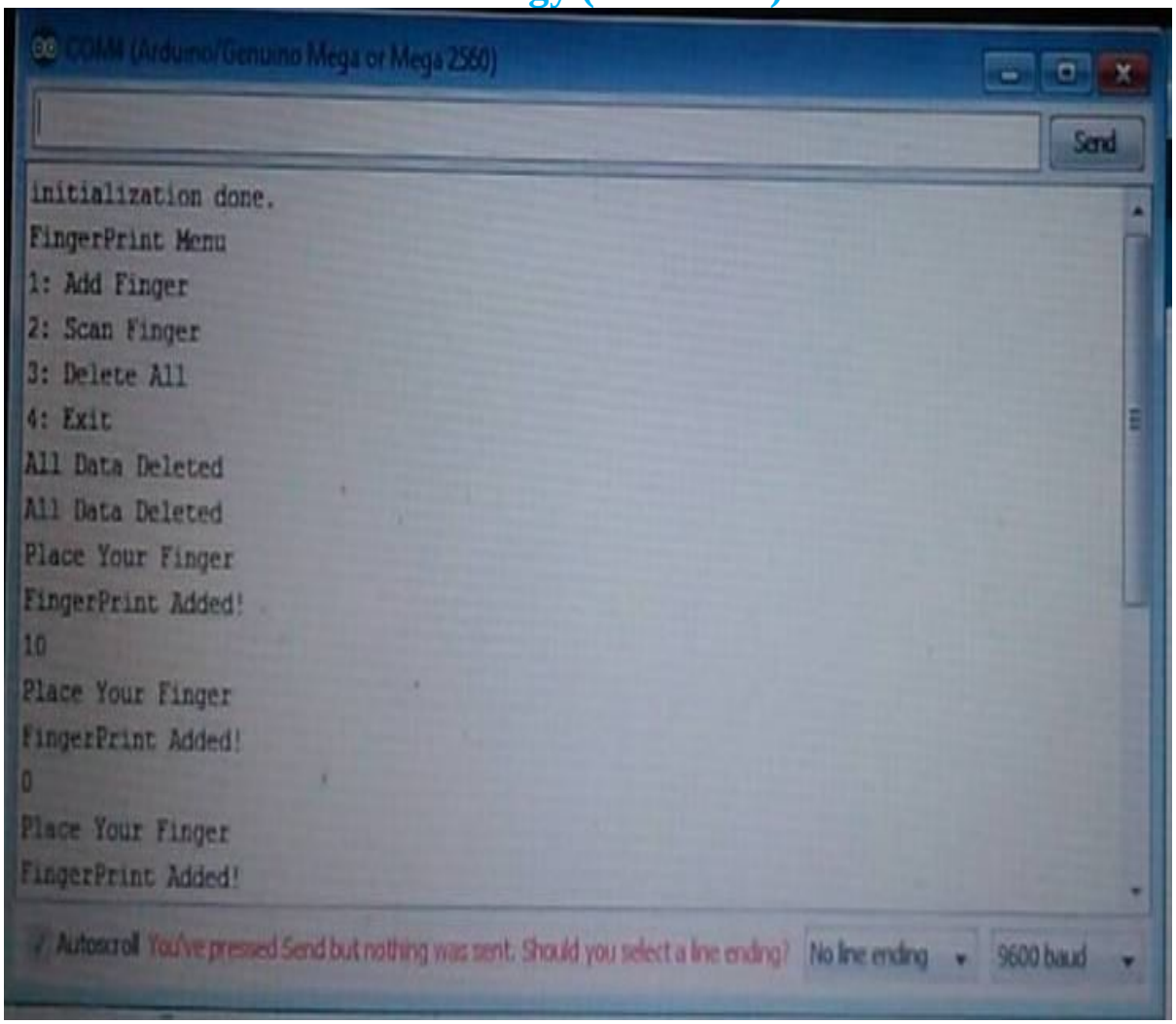

Fig 5: Enrolment of fingerprints shown on serial monitor of arduino IDE software

V.CONCLUSION

By the overall study of this particular project one can easily reveal that the implementation helps replacing a manual attendance system by a RFID and biometry based system which provides easy way of maintaining students as well as staff records .This also allows the parents to track the students presence and absence on a daily basis by the use of GSM module.

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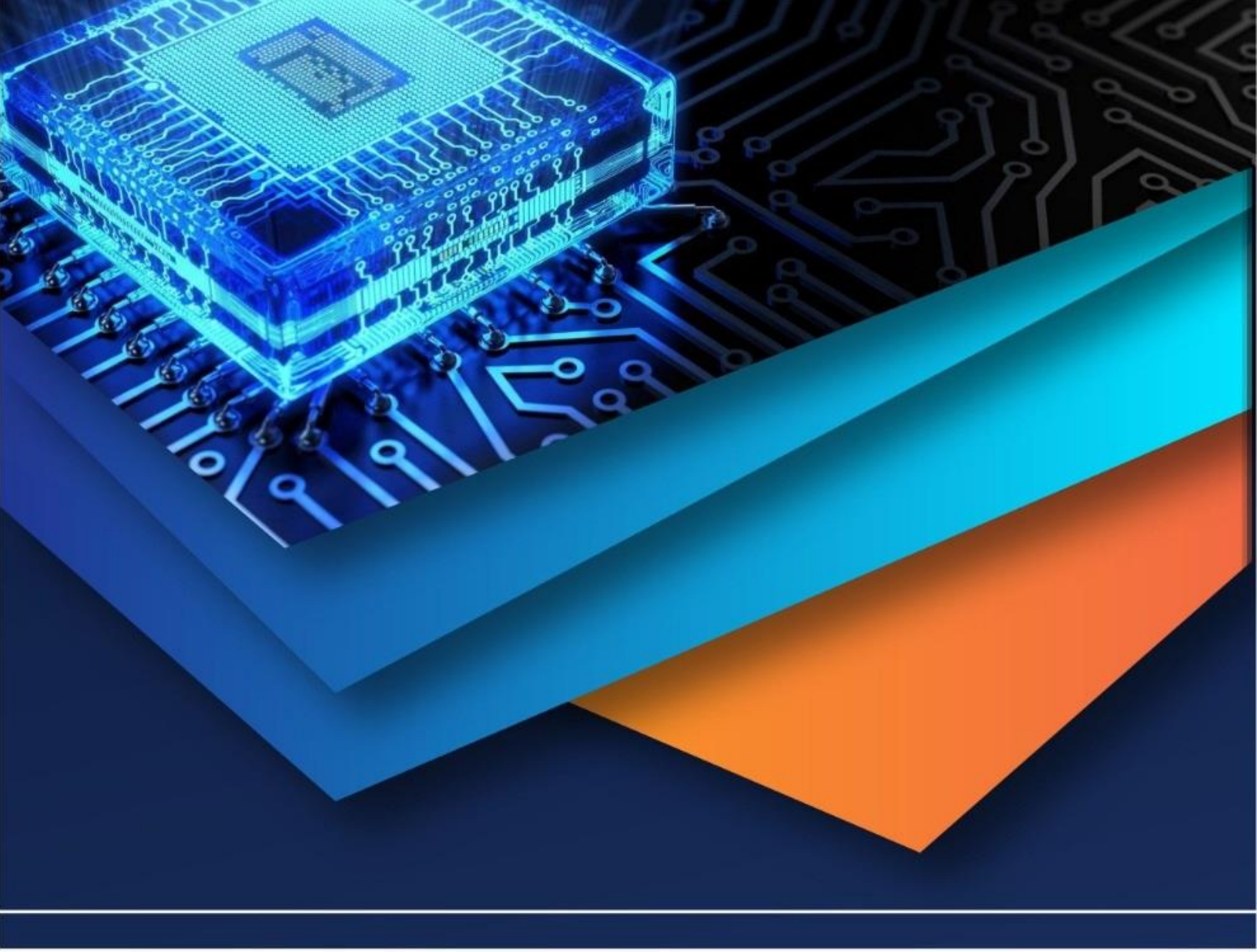

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