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IOT based Restaurant Automation System

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Abstract: ***The purpose of this project is to develop a Touch based food ordering system that can be used to transform the traditional ordering system. Generally, in restaurants menu order system is actual provided in menu card format so the customer has to select the menu item then the waiter has to come and take the order, which is a long processing method. So we design Touch Screen-Based Food Ordering System that displays food items for customers on their available devices such as user phone, Tablet etc. to give input their orders directly by touching. The system automatically completes data display, receiving, sending, storage of data and analysis. It is provide many advantages as great user-friendly, saving time, portability, reduce human error, flexibility and provide customer feedback etc. This system required large numbers of manpower to handle customer reservation, ordering food, inquiry about food, placing order on table, reminding dishes of customer. "Intelligent Automated Restaurant" it is all about getting all of your different touch points working together—connected, sharing information, speeding processes and personalizing experiences. Here we will use RFID module to transmit data to the RFID reader. E-menu is an interactive ordering system with new digital menu for customers.***

Keywords: Database, E-menu, Intelligent, RFID, Touch based food ordering, CRM.

I. INTRODUCTION

The IOT stands for Internet of Things. Now-a-days, IOT platform is trending on in IT sectors .Basically, the IOT represents modern approach towards the world which will help to make world digital. IOT represents the boundaries between real domain and digital domains. So now IOT domain is ready to give us such platform where physical devices will be ready to transform in smart device to provide smart services. All things in the IOT such as smart devices, sensors, etc. have their own identity. They are combined to form the communication network and become actively participating objects. These objects include not only daily usable electronic devices, but also things like food, clothing, materials, parts, and sub-assemblies; commodities and luxury items; landmarks; and various forms of commerce and culture. All IOT devices can monitored, tracked and counted, which are significantly decreases waste, loss, and cost. The IOT introduces a variety of applications for future. The IOT is global infrastructure for the Information Society, enabling advance services by interconnecting physically and virtually with the things based on, existing and evolving, interoperable information and communication technologies. Now a day, many restaurants around the world using the manual food ordering system. This food ordering system using a waiter with pen and paper and take order from the customers. Actually the system is depends upon the lager number of manpower to manage the customers inquiry, ordering food and placing order in restaurant system. This method is one kind of time consuming. When there are number of customers are coming at a time in restaurant in such condition switching of orders is possible. It causes a misunderstanding between the customer and waiter and it also gives the extra work to the cashier to record whole transaction. So to overcome such problems we are introducing new system i.e. Automated Restaurant System. The aim of this project is automated the food ordering system and billing system in restaurant management as well as to increase the restaurant experience of client or customers. So we will discuss about designing and performance of Automated Restaurant with a Touch Screen Based menu ordering system with Real time customer's Feedback for restaurant as well as to provide extra information to customers. So system will provide user-friendly nature. In this system, user table have all the details of menu. The order details from the table are updated and sent to kitchen and manager also. After ordering process, the RFID card will be swiped (Recognized to the system or web server) for total amount deduction. The restaurant manager can manage the menu modification easily. The Touch screen provides fast access to any digital media. Faster input means the better quality of service.

II. PROBLEM STATEMENT

The traditional food ordering system is totally a manual process which includes pen, paper and waiters. The customers are always waiting for waiter to take the order. The waiters note-down the order from the customer. These orders provide to the kitchen department, update them in records and again make the manual bills. This system is very simple, but it includes the errors while note down the orders and also making the calculations. It is sometimes difficult to translate the handwriting of waiter. To overcome these limitations in manual system, using Automated Restaurant ordering system. The ordering system is made more systematic and helps the manager to avoiding human error and increase business development with the help of this system. In this system, order

transaction is step by step process to make transaction more efficient and system can helps the staff to avoid any order mistake. The transaction between customer to waiter and cashier will be more efficient. Other than, this system gives the better quality of service to customer and also attracts the more customers to get this quality of service.

III.LITERATURE SURVEY

The system is compared to advanced food ordering traditional methods such as, traditional pen and paper methods, KIOSK technology which is used for self-service and to enable transaction automation, and PDA's(Personal Digital Assistant) based system brings advancement in the field of food industry by automating the system through mobile and wireless technology. It has the possible to attract customers and changing their view about dining experience in a better and efficient way. [1] The system consists a user phone at the customer table contains the android application with all the menu details. The user phone, kitchen display connects directly with each other through Wi-Fi. Orders made by the customers will quickly reach the kitchen module. Integrating advance features of all the hardware components is used to develop in systems. Presence of every module has reasoned out and placed carefully, contributing to the best working of the unit. [3] It is able to keep track of user food orders and have performed some data mining techniques for analysing the data with respect to future perspective. [5] An Automatic food ordering system which is able to keep track of users order and have implemented some data mining techniques for analysing the data with respect to future perspective for better performance of restaurant system. Different types of algorithm related to data -mining has been used in this system such as Apriori and K-means which are complex to understand. [9] System is developed to reduce the number of manpower and at the same time reduce the monthly cost for the restaurant. Customers give their order through the system and directly stored to database. These system is designed using Microsoft Visual Studio 2008 and Microsoft Office Access 2007 to give a better solution for the manual system. [10] Some of the restriction of the PDA i.e. (Personal Digital Assistant) based food ordering system and proposed the Multi-touchable E restaurant Management System as a solution for the customers. The actual system is consists of the multi- touchable mutual dining menu that allows customers to give their order conveniently on the developed multi-touchable dining table during the busy hours. Orders gave by the customers will be updated instantly to a database and subsequently reach to the cashier and the kitchen module respectively. [12] Some efforts have already been taken to carry the process of ordering in hotels by using hardware components like Avr16 Micro controller, LCD display module and Zig bee module. The Existing system is fully dependent on hardware and it is very difficult to club all the components to make a system. In addition to that understanding and operating the system is very difficult for some users and this system is not going to manage the business model properly. [13] The integration of touch based technology in restaurants using android system. The tablet at user table contains the android application with the detail information about restaurant and menus. The user tablet, kitchen display and cashier counter connects directly with each other by using Wi-Fi network. [14] Application of integrated restaurant management systems by web services technology is presented through Touch based system. Digital Hotel Management integrates lots of techniques in hotel industry such as Ordering System Kitchen, Order Ticket, Billing System, Customer Relationship Management system (CRM) together. [15] Intelligent Restaurant a Graphical User Interface programmed by embedded system is used for food ordering system. It is required customers to order through Touch Screen device that placed on each table in the restaurant. Customers view the menus, price of food and making order directly using this touch screen device available on table in the restaurant. Then customer order will sent to the database and cash counter computer and also viewed on the computer screen at the kitchen for food preparation. [16] Touch based system interfaces can be effectively increases the operator accuracy, reduce training time, and improve operational efficiencies. Transmission of data which is necessary and performed through Zig-bee which is a wireless technology developed as an open global standard to address the unique needs of systems [17].

IV.METHODOLOGY

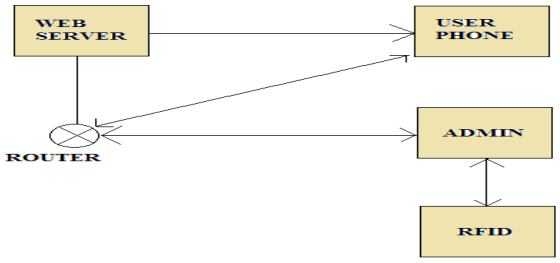

Fig.1 Block Diagram of system.

The proposed system of project is based on RFID (Radio Frequency Identification) module. The flow of the system will be start with web server .Web server plays role of GUI (Graphical User Interface) and stores all customers' data safely. The web server will be connected to the router. Router provides free network service to the customer who is available in the restaurant. So the customer will order the food. The food will be orders by user's phone after connecting to the router of the restaurant. Customer can view Menu Card of the restaurant and can order the food of their choice. Through this process router and user (user phone) will be interconnected for good services of the restaurant. Now, the food order by customer can be view by Admin who will be the manager of the restaurant system and Chef who will cook food for the customer. Admin will go through all the food orders of the customers and can manage the bills of it. Admin can view all the details of customers food order by them and customer can add the order after first ordering .So it will be added to manager screen and it will help for billing .RFID will be helpful for Admin of the system which will be used to collect all the information of the customer through electrically. So the customer data can be saved in it.

In Automated Restaurant Management System, using Node MCU Microcontroller data can be transformed through analogue and digital waves .These microcontroller includes 9 pins .Out of these 9 pins we are going to use 4 pins for data send, data receive and data control (D0,D1).Data sending and data receiving can be easy with the help of microcontroller.

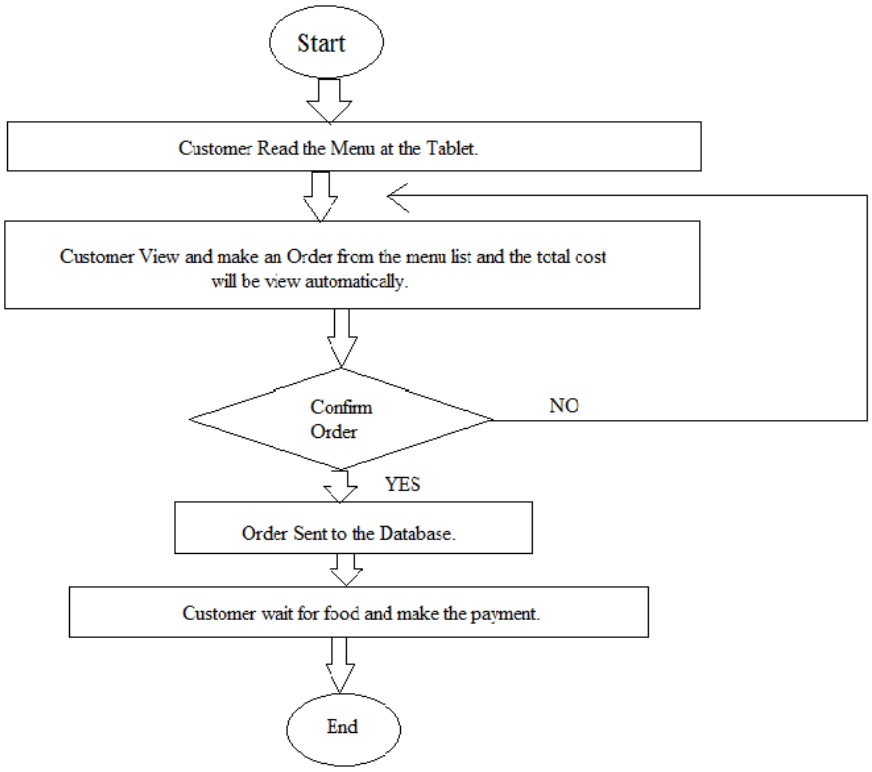

Fig. 1 Flow Work of System.

A. Ordering from Table

There may happen a situation where customers are ready to order their choice of food but their servers or waiters are not available sometimes. This makes customer impatient and frustrated. Those who do not have sufficient time to keep waiting for their waiter to arrive for them, order from the table would be the most exciting part and IOT makes such things possible. This system is highly advantageous for restaurants as customers gives to order more quantity from the table. It is beneficial for servers in time when they are busy to take orders.

B. Improvement Restaurant Operations

IOT hits great improvement in restaurant working. It use tablet to the customer table where they can order their favorite food and drink. Here need of menu is eliminated. When the particular restaurant app is provided to them, they can give their order to the server else can continue to options for table side services. The main aim of this concept is to leverage more options and faster services to the peoples.

C. Easy Take Away

Ordering from tablet allows customers to place an order earlier that makes it easy to take away your parcel. There are applications that truly leverages and that's were IOT comes into the picture. It encourages customers to order food where they can earn extra loyalty points and offers through mobile ordering.

D. Smart Menu with IOT

At weekends or holidays, there is a rush of people found in the restaurant. When all servers are busy attending consumers and possibilities to serve all at the same time is negligible. Putting already confuse customers on long hold would loss of business. IOT based menu or E-menu helps restaurants to quickly satisfy Customers demand that eliminates needs of servers.

E. Smart Kitchen with Restaurant Application

Transformation of business depends heavily on reviews or feedback given by clients. Getting notifications of a user like: "Feeling was awesome" is amazing. One of the main aim of this survey is to maintain the consistency of cooks and their cooking skills.

1) Algorithm: Delivery Confirmation Algorithm

Input: Plate_tag_id /*Plate's Tag ID*/
Table_id/*Table unique id*/
a) del=SELECT*from Deliveries D
WHERE D.plate_id = plate_tag_id AND
b) D.delivered = false
c) IF del NOT NULL THEN Order=SELECT*FROM Orders O
d) WHERE O.table_id = table_id AND
e) O.id=del.order_id
f) IF order NOT NULL THEN
g) Confirm Delivery for order
h) ELSE
Reject delivery
END IF
i) ELSE
j) Reject delivery
k) END IF

In line1, the application server tries to find a not yet delivered delivery assigned with the plate and reject the delivery if it doesn't find one. But if the delivery record is found if then tries In line 3 to find and order matching with both the table and the delivery to confirm it, otherwise it is rejected. Practically, this look up can be achieved by only one query with the order Id, plate ID as parameters.

2) CRM (Customer Relationship Management)

CRM is Customer Relationship Management System. CRM is approach to be connected with the clients and it helps to manage relationship between customer and manager. CRM is a method for managing an organization's relationships and interactions with customers or users .CRM system help companies to stay connected with client or customer, streamline processes, and improve profitability.

3) Raise a Customer Database

Customer Relationship Management software gathers all information about customers. It also helps customers to develop their profile for which type of people are attending restaurant. A good Customer Relationship Management system gathers customer contact details, demographics, frequency of visits, food choices and preferences. Basically, all information related to customers which help to manager to maintain customer's data.

4) Marketing and Communications

Communication plays very important role in Customer Relationship Management system. Customer Relationship Management system creates strategic marketing efforts with the gathering of data. The Customer Relationship Management helps to segment which are groups of customers to send their specific marketing message to directly via Email or SMS. This segment allows creating messages that will appeal to the customers and send messages at a time that will be the most effective task in CRM.

5) Increase Loyalty and Rewards with CRM

We can say that which will be Loyalty are the bread and butter of the Customer Relationship Management systems, which will be enable to monitor what individual customers purchase, how much they are going to spend per order and how frequently their visits are which will be useful to keep the customers record. It can used to gather information from the loyalty programs to create personalized discounts and rewards for each and every customer, making them feel special and valuable, and encouraging reservation as well.

It will also assemble important feedback. Make use of client database by sending survey and asking for feedback to them. Provide all facilities to the customers with encouragement for participating, such as a discount code or entry into a competition. Happy customers are more likely to gives constructive feedback and can compare customer insights against their profiles. Regular surveys will create a more complete picture of service and can widely spread the restaurants.

6) Reputation Management or Status

With the help of social media, good reputation or status is important. With the help of Customer Relationship Management systems, restaurants can respond to comments, posts and can ratings on social media to maximize positive presence to the CRM and can reduce any negative content that can be damaging to business which will be harmful for management as well as business.

7) Promotions and Discounts

The discounts that you offer can be for membership programs, as well as other campaigns to attractive new customers. Use the Customer Relationship Management software to create new promotions and performance as well which will be good for customer and customer relationship management.

V. TECHNOLOGIES USED

A. Node MCU

The Node MCU is microcontroller which is open-source firmware. Node MCU development kit is used which helps to Prototype IOT product within a few Lau script lines. It is programmable WIFI module. Node MCU is simple and having a low cost. It is perform the smart work. Node MCU provides access to the General Purpose Input / Output. It is Single-board microcontroller.

The Development Kit based on ESP8266, integrates the General Purpose Input / Output (GPIO), PWM, 1-Wire and ADC all in one board. Increase power development in the fastest way combining with Node MCU Firmware. The pulse Width Modulation (PWM) is a fancy term for describing a type of digital signal.

Fig.3 Node MCU

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B. RFID

RFID is a Radio Frequency Identification uses as a technology designed to pass objects, Human and even animals beings to be identified, located, and tracked using radio frequency signals. An RFID system includes three components, a Radio Frequency Identification (RFID) tag, a RFID reader, and an antenna. RFID tags contain integrated circuit and an antenna, which are used to transmit data to the RFID reader.

This is low cost based Radio Frequency Identification (RFID) Reader Module. It is easy to use and it can be used in a wide range of applications in radio waves. The RFID is a highly integrated reader/writer IC for contactless communication at 13.56 MHz

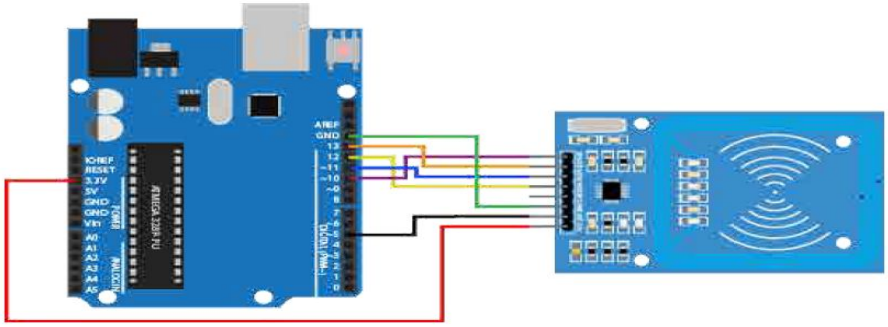

Fig. 4 RFID

C. Resistive Touch Screen

A touchscreen is input device and normally layered on the top of an electronic visual display of information processing system. A Touch screen is a computer display that is sensitive to human touch, which is helps allowing to user to interact with the computer by touching. The resistive touchscreen enables the user to interact directly with what is displayed, rather using a mouse, touchpad. A user can give input the information processing system through simple by touching the screen. A major benefit of touch screen technology is to maintain very low cost. Applying pressure on the resistive touch screen and it will start working. A resistive touch screen is made by two transparent layers of glass or plastic.

Fig. 5 Resistive Touch Screen.

VI. ADVANTAGES

A. Save Time

This kind of arrangement saves the time since it allows automatic capture of data. It reduces turn-around and the time taken to serve the customers. It is directly proportional to customer satisfaction, since it takes less time to communicate, prepare and deliver the order.

B. Minimize Manual Task

It reduces the manual tasks at hand and thus the labour costs are lowered as well. In addition it cuts down the problem of wrong delivery, since it contains the token number, which is present on the bill. This is one of the points that advances customer satisfaction.

C. Real Time Monitoring

It can have a complete control over business through real time monitoring, if having outlets at multiple locations. This becomes possible through cloud back office, which links stores situated at different location.

D. Minimizes Revenue Leakage

Since it can have everyday sales and stock details on your fingertips, it helps in minimizing revenue leakage. For example, you will know the raw materials, which are there in stock and the ones that will have to be ordered. So, there are less chances of duplicate orders. It can also exercise theft control because you can keep a tab on the inflow and outflow of materials.

E. Low Invesment

The billing apps integrated with the feature doesn't require you to invest much. These are usually affordable and rather bring on overall improvement of the business and thus the revenue earned.

F. Food Safety

Food safety is a scientific disciplines which describing handling, preparation and storage of food in the ways that prevent food-borne illness. Food safety is a global concern that covers a variety of difference are of everyday life. There are many time temperature tracking software systems available to restaurant operators which can dependably track temperatures as well as safety on kitchen equipment, log entries for audit review and alert operators. However, these systems become more powerful if exposed to an IOT connected infrastructure.

For example, Radio Frequency Identification (RFID) tag on a case can be tied to temperature sensors in the distributor's truck to insure the case is in temperature during its entire life cycle. The platform can tie recalls and product advisories directly into the restaurant inventory, providing further assurance that products are safe.

G. Better Stock Managent

Customers now demanding farm-to-table freshness in their dinner and a responsibility on seasonal produce, stock and wastage can be an issues. Restaurants are using connected systems where sensors and stock control are managed in the cloud system, producing warning, alerts and smarter stock management systems.

H. User Friendly Ordering Management System

Order management system software should be easy for customer or client and management system to use. The restaurant staff should be able to change tables, change item quantities, change item prices, repeat drinks or menu items, manage tables, and can change order too. Example owners and managers, need to be able to control refunds, voids, comps, and view order status.

I. Better Customer Services

Restaurant technology is an integral part of keeping today's selective dinners happy as well as enjoyable. Inventory Restaurant management system will ensure that never run out of ingredients. Customers or clients won't take too kindly to finding out that their favourite dishes is off the menu or not.

VII. CONCLUSIONS

We proposed the automated food ordering system for the restaurant. The system is compared to earlier food ordering traditional methods are pen and paper. Now a day, people are very familiar to touch screen. It will be easier for the users to simply touching the display screen. It is more comfortable and easy for the customer to place the orders of their choice. By using this system, there are no possibilities of human error during the taking order and calculations. System provides efficient, convenient, low cost and easy to use the system for placing the order of food in restaurant. Its saves the time. System is user-friendly and provides good quality of service and customers satisfaction. We also present automated food ordering system with feature of feedback and wireless communication.

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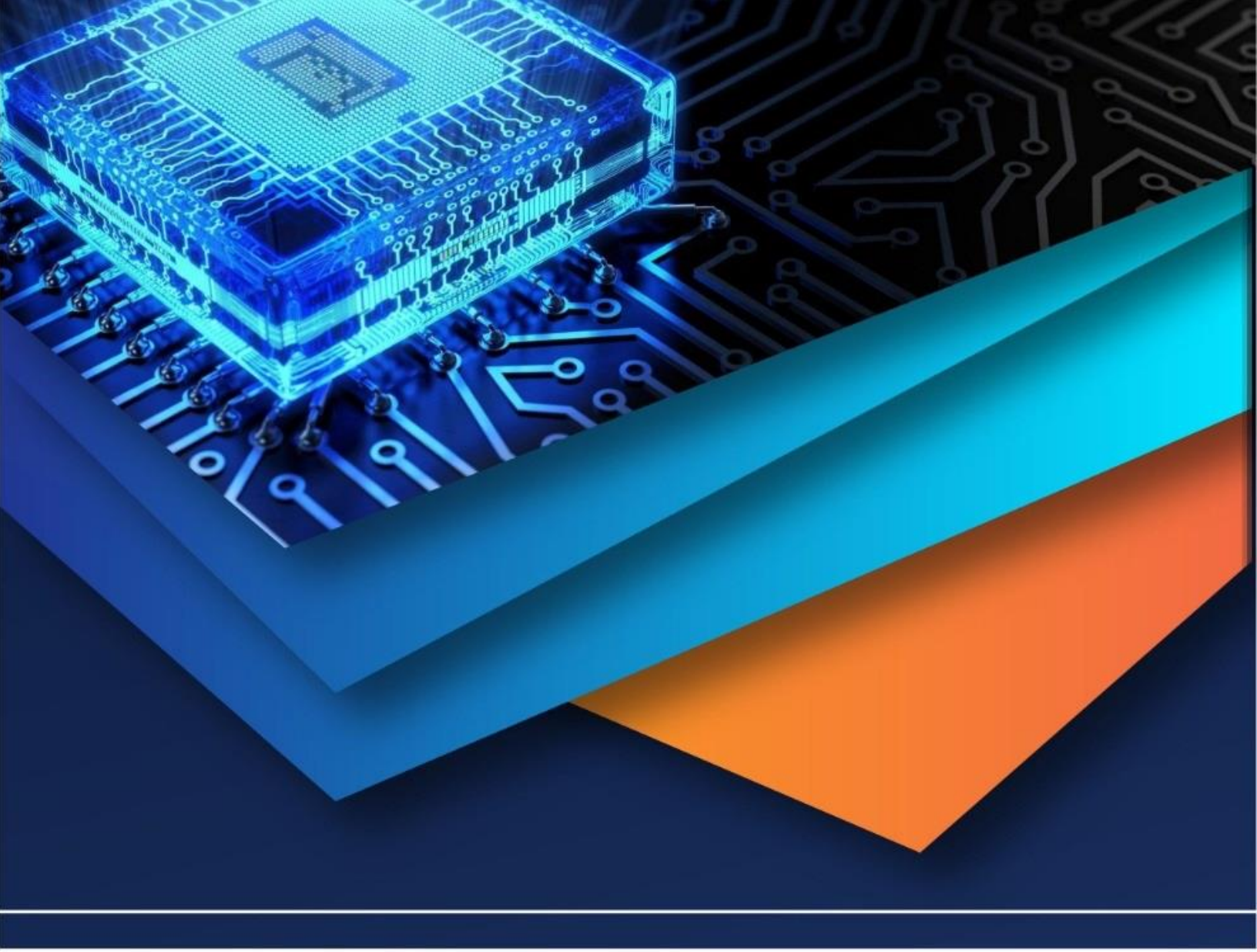

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