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Android Application on Truck Loader: Implementation using Android SDK and GPS for Logistics Support

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Abstract: ***In the current world the prominence is given to the transportation of goods from place to place. This interest of making "transportation easier to the people" can further be extended by providing the comfort of carrying the goods related to the people in safest manner by linking them with the resource (logistic transport medium). If this linking is done through an application that acts as an interface between customers and resource owners then the work becomes simplified and easy. In our Truck Loader application we are creating such an interface using the technologies like Android Studio, Google Maps, etc. This application is accessible by any digital device like mobile, laptops and PC's with an active internet connection. This application if implemented in real-time will result in good valued solution to the logistics related problems.***
Keywords: Android Application, Android SDK, Google Maps, Truck Loader, Owners, Customers, Logistics.

I. INTRODUCTION

In the present scenario the transportation of belongings related to the people in the safest manner is of high priority. Traditionally the belongings of the people were carried from one place to another using goods train or using trucks which are needed to be searched in their nearby locality which was a tedious job and it had many drawbacks.

In order to overcome all the problems there is a strong need / necessity for the development of an application which connects "the needy people with the people who provides the solution to their needs". This was the main idea behind our "Truck loader Android Application".

For truck loader android application, we have implemented the functionalities in both the website as well as in the form of android application. Our main motto is we need to provide quality service to each and every registered customer. We validate each and every truck owners/drivers by taking into account their proper identities and documents. As the first and foremost requirement of any application is to make the customer feel satisfactory and secure by using the application. The higher level implementation is provided by the below block diagram.

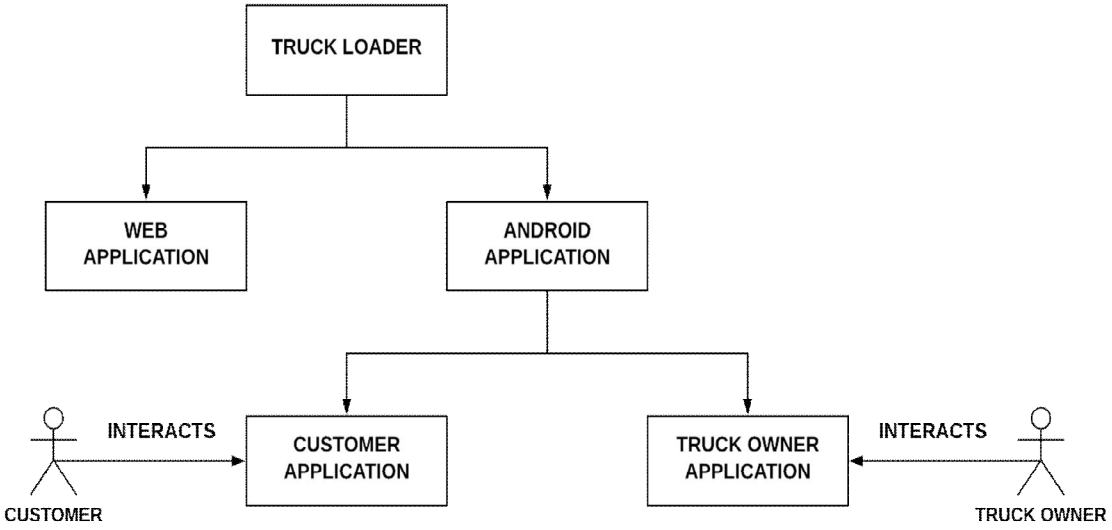

Fig. 1 Block Diagram of Truck Loader Android Application

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In our project the Admin session is handled by the web application. Using this web based application the admin registers the truck owner into the app. There are two different android based applications:

1) Customer Application.
2) Truck Owner Application.

The customer application is accessed by the registered customers. The customer registers with the application and searches for the appropriate truck for their service. The amount transaction is also managed in this application.
The Truck Owner Application is accessed by the registered truck owners. The Owners may accept or decline the request from the customer, the transaction is also managed by the application. As the truck owner needs to get registered by the web application the android application does not have functionality to register owner.
In addition to these applications there is also databases maintained to keep track of records of customers, truck owners, transactions and complaints.
The detailed application related information is explained in system architecture section.

II. LITERATURE SURVEY

A number of approaches to vehicle tracking, monitoring and alerting system has been proposed so far. Various authors have described different technologies and implementations related to vehicle tracking, security and monitoring.
The main purpose of one of the paper is to review the past work of vehicle tracking, monitoring and alerting system. They have encountered various problems about the vehicle system.
Few of the problems encountered are to know proper real time location, managing the tracking system, controlling the GPS trans-receiver, etc.
Radio Frequency Identification (RFID) is one of the technologies they have implemented for monitoring the vehicle. Global System for Mobile Communication (GSM) is used to find the location and information of the vehicle for alerting system. As these technologies provide the location of the vehicle, which is used for safety purposes. Say, when the vehicle is stolen, immediately we can find the location, so tracking gets easier.
Web application is used for tracking current location via SMS and GPS tracking tools. This system focuses on predicting exact arrival time and position of vehicle. It is a user friendly application built with minimal cost [2].
Another paper proposed Real time GPS Tracking System for Transport Operations. In the recent times, auto-fares have gone high as few drivers make use of faulty meters.
This application mainly focused on fairness in the price. By making use of GPS, person travelling can track the route. It chooses the best route by using the optimal path and calculates the fare of vehicle by using Android SDK and GPS. The application asks the user to provide his destination address and by using GPS, it tracks the user's current location with the help of navigation system. By using the current location of the user, the application requests the central server for apt fare results as it consists of fare charts of various cities.
Thus, application provides the fare rate to the user. User can lodge complaint and give feedback for the same [4].
A paper proposed a project which was done to ensure an effective vehicle tracking, online monitoring, data storage, sharing of transport and other features like security in a single system. Android application and website both are available to check for availability of trucks and book it if needed. Many-a-times, trucks travel longer distances having fewer luggages and more empty space, thus sharing can be done. It reduces the number of vehicle travelling, thereby reducing the pollution. It is also cost effective as it uses the BINDING concept. It mainly focuses on the tracking and protection of the vehicle. The security feature is handled by providing the SP Tracking ID, which tracks the live location of the vehicle [5].
GPS based vehicle tracking system is used to find the vehicle location with a range of features. In this paper, they have used a GPS unit, GSM Modem and MCU units for completing the design. The main objective of this project is to track the location of the vehicle remotely by switching on and off the ignition system. Here, the design phases are divided into basic, intermediate and advance. Short text messages (SMS) are sent at each design step. Mainly, a webpage is designed by using the Google maps, to view the location of the vehicle. In this tracking system, positioning and navigation of a vehicle can be done with a distance accurate up to 10m. For positioning, they have used latitude, longitude and exact position of vehicle by using Google maps. The system tracks the location of particular vehicle on the user's request and responds to the user via S.M.S [6].

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III.SYSTEM ARCHITECTURE

This section comprises of detailed explanation of the design of our application. As mentioned earlier in the introduction section our project comprises of a web application and two android applications, one is customer application and the other is truck owner application. The figure below gives the structural information of our application.

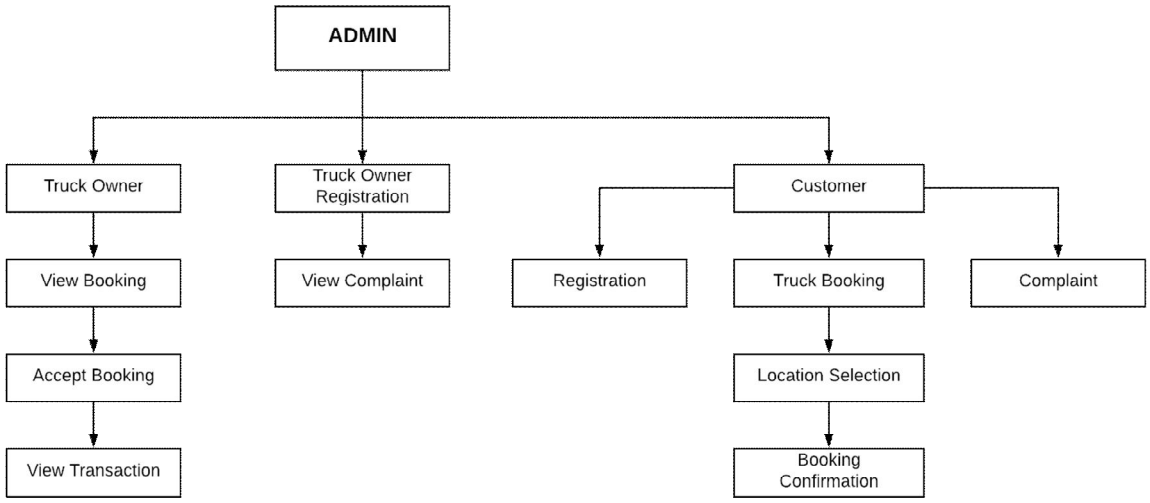

Fig. 2 DFD – System Architecture

The working of Truck Loader Android Application mainly works with three separate sections:

A. Admin Session

Admin logs into the web application by providing his credentials. The credentials will be validated and after successful validation he can perform the following operations:

1) He can register a new truck owner through the web application by verifying his provided details and generates his account using truck owner's user id and password which can be applied by truck owner to use services of our application through Truck Owner Application.
2) He can check the complaints received from the customers in case of unsatisfied services. The complaints booked will be maintained in a separate database table m_complaints.

B. Truck Owner Session

Truck owner logs into the application by providing his credentials i.e. user id and password respectively. On successful login he performs the following tasks:

1) He can accept/reject the request made by the customers.
2) He can view his transaction history through our application the database table is maintained for the same.
3) If he needs to update any of his profile details he can proceed with the help of the admin through web application. In addition to these facilities he can also change his password in timely manner for security purpose.

C. Customer Session

As our application is mainly customer oriented mentioned early in the abstract part our main motto is to provide quality service to the customers. Similar to the truck owner the customer also needs to log in to the application by providing suitable credentials. On successful login the customer can perform the following tasks:

1) The customer selects the suitable type of truck required among the four different varieties of trucks available in our application such as mini truck, dump truck, refrigerator truck, tank truck which is maintained in the m_type table.
2) If the truck is available for the service he enters the source and destination and waits for the acceptance status from the truck owner.
3) The customer can also view his profile from our application and can also edit his profile.
4) He can also file a complaint against the truck owner if the service is not smooth the complaints will be maintained in m_complaints table.

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In the second part of this section we describe the operation of our application.

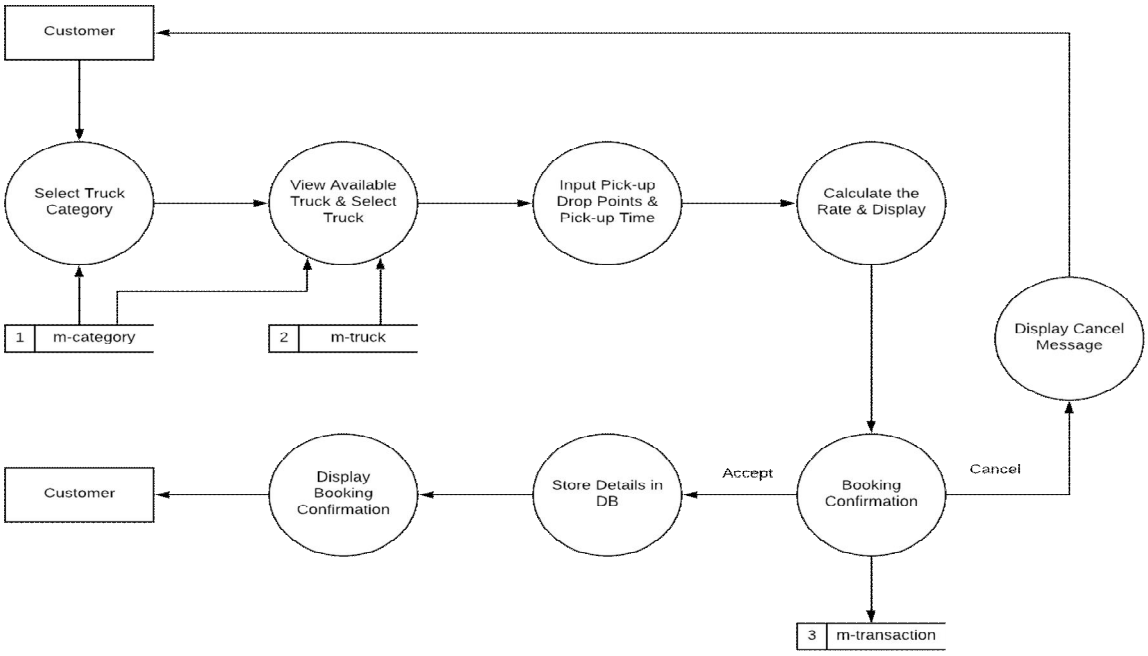

Fig. 3 DFD – Truck Booking Process

Here the above diagram depicts one full session that takes place between customers and truck owners.

a) The customer logs in to the application where he can see the types of truck available. Among these trucks he can select the one suitable to provide him the service.

b) Once if he is confirmed regarding the availability of the required truck type he is directed to the Google maps where he enters the pickup and drop location and once these details are confirmed from customer the truck owner gets message related to this request. The truck owner can accept / decline this request.

c) After truck owner accepts the request the customer gets the confirmation mail along with the estimated cost for this service. This booking detail is stored in the m_transaction table.

D. Information Related to the Database

Our database name is db_truck_loader and it comprises of the following tables:

1) *M_admin*: This table comprises of three attributes admin_name, admin_id and admin_password.

2) *M_booking:* This table comprises of attributes t_id[truck_id], source, destination, user_name and booking_date.

3) *M_charge:* This table comprises of attributes charge_code, charge_per_km, charge_amount and truck type.

4) *M_complaint:* This table comprises of attributes customer_id, user_name, owner_name, complaint and complaint_date.

5) *M_owner:* This table comprises of attributes owner_id, owner_name, owner_usernme, owner_password, owner_address, owner_area, owner_city, owner_email_id, owner_slot_no, owner_mobile_no, owner_latitude, owner_longitude,owner_status, owner_vehicle_type, owner_vehicle_no and e_wallet.

6) *M_transaction:* This table comprises of attributes transaction_no, transaction_date, owner_slot_no, user_id, transaction_in_time, transaction_out_time, total_hours, total_charge and payment_transaction_number.

7) *M_trans:* This table comprises of attributes truck_id, username, owner_slot_no, transaction_date, transaction_time and total_amount.

8) *M_type:* This table comprises of attributes truck_id and truck_type.

9) *M_user:* This table comprises of attributes user_name, user_password, user_address, user_area, user_city, user_pin, user_active_status, user_email_id,user_mobile_no and e_wallet.

10) *M_slot_book:* This table comprises of attributes id, user_name, owner_slot_number, m_selected_latitude, m_selected_longitude, date, time, status, confirmation and owner_name.

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IV. EXPERIMENTATION

In accordance to describing the achieved project, we describe the basic understanding regarding the application implementation. The Android application is developed with the help of Java software used under Android Studio. The web based application follows MVC architecture.

Below we describe the screenshots associated with the entire project that is both web based interface and the android application.

Fig. 4 illustrates the addition of a new truck owner to the application which is handled by the Admin. The owner needs to specify his basic details according to the options given. The latitude and longitude is essential in order to obtain the truck's current location.

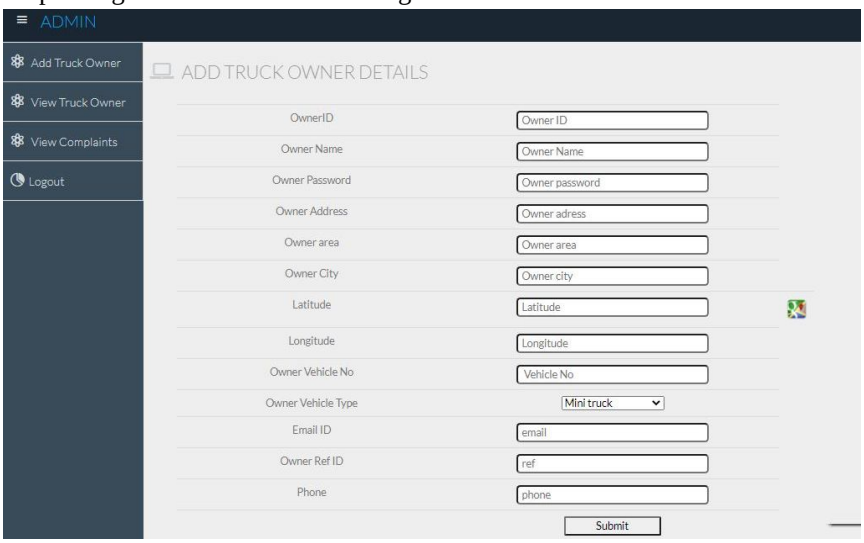

Fig. 4 Add Truck Owner Page

In Fig. 5, we can see the basic user login interface for accessing the User Android Application. The user needs to register through the same Android application and then can login upon specifying the correct credentials.

Fig. 5 User Login Page

Various truck types are available for the services to be provided based on the requirements and the amount of goods that needs to be transported to the destination. Fig. 6 shows the various trucks available. Furthermore upon selection of a particular truck type their location can be tracked using the Google GPS as described in Fig. 7.

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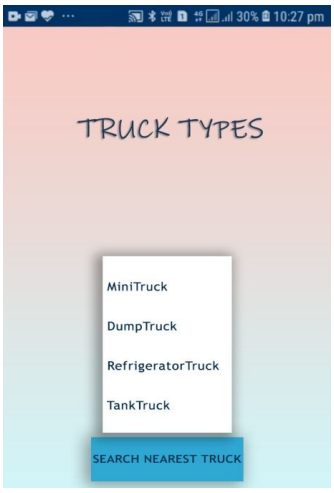

Fig. 6 List of Available Trucks

Fig. 7 Location of Available Truck in the Area

The source and destination for the transportation service is describe in Fig. 8 which will be intimated to the truck owner.

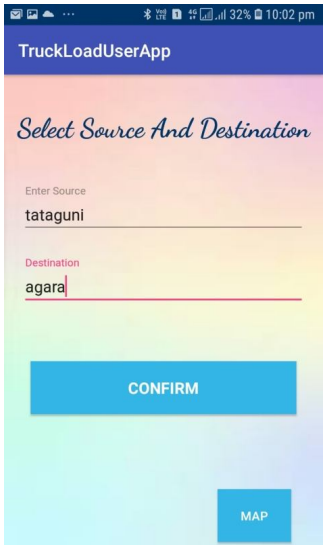

Fig. 8 Describing of Source and Destination for the Travel

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Fig. 9 describes the details regarding the booking request in the Truck Owner's Android application provided by the user for a particular truck type based on the requirements. The truck owner can either accept or reject the request based on his efficiency and requirement.

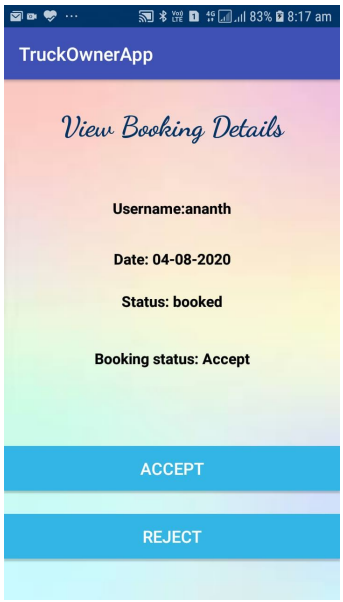

Fig. 9 Booking Details in Truck Owner's Application

Upon successful completion of the transportation of goods, the cost of travel is displayed in the User's Android application. The cost is calculated based on the type of truck chosen for the transportation of goods by the user and also by the total distance travelled from source to destination. Each truck type is associated with a certain price tag and is described in terms of its price per kilometre (km).

Fig. 10 describes the payment interface in the User's application where the total cost for the travel is displayed.

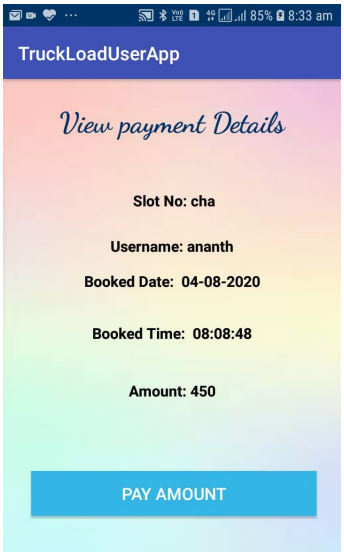

Fig. 10 Payment details of the User

Software testing methodologies are the various strategies or approaches used to test an application to ensure it behaves and look as expected. These encompass everything from front to back-end testing, including unit and system testing. The goal of utilizing numerous testing methodologies in your development process is to make sure your software can successfully operate in multiple environments and across different platforms.

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Below we describe the test cases associated with the project.

TABLE I
Verification of Integration Test Case for Searching Nearest Truck

Test Case ID	Integration Test Case 1
Description	Verify whether the User application is deviating to Google Maps after selecting the truck type or not.
Input	One of the truck type is selected for the nearest truck available.
Expected Output	Nearest truck must be available.
Actual Output	Nearest truck available.
Remarks	Pass.

TABLE II
Verification of System Test Case for Users Booking Confirmation

Test Case ID	System Test Case 1
Description	User's booking confirmation.
Input	Enter the source and destination point.
Expected Output	Nearest truck to the latitude and longitude of user made visible.
Actual Output	The list of trucks nearby is located in map.
Remarks	Pass.

V. RESULTS AND DISCUSSION

In our Truck Loader Android Application we have designed the system by taking into the consideration the various factors like security, accessibility, cost, availability which if not maintained effectively results in the failure of the entire application.

We guarantee that customers enjoys hassle free service by using our application by constantly updating our application and trying to minimize the risk factors which customers experiences by using normal applications. When it comes to the cost factor we always try to calculate the cost which should be reasonable to both the customers as well as truck owners. The messaging system also plays a very important role in the success of our application which gives crystal clear information to both the customers and truck owners. In addition to this as our system contains separate units / applications for owners and customers management of our application is also optimized and our system is also built in the form of bottom-up approach.

Our application also provides guarantee that the digital system which downloads our application will not download any malicious file which harms the system.

In these ways we are providing access to the registered users without actually thinking in the aspect of security issues.

VI. CONCLUSIONS

Truck Loader Android Application is the logistics based android application that we have implemented using the technologies like Android Studio, Google Maps. This application when deployed in real-time environment gives the better results in the field of logistics, as our application can be installed in any hand-held digital device with active internet connection. This can also be called as pocket luggage transfer system.

The future enhancement / update to our application include implementing GPS based positioning system. In our application as we are at initial stage we have included only 4 varieties of trucks, this can be further extended to many more varieties. Instead of customers selecting the type of truck required, a system can also be implemented as a part of application which will suggest the type of truck suitable for customers by taking into account the quantity of luggage.

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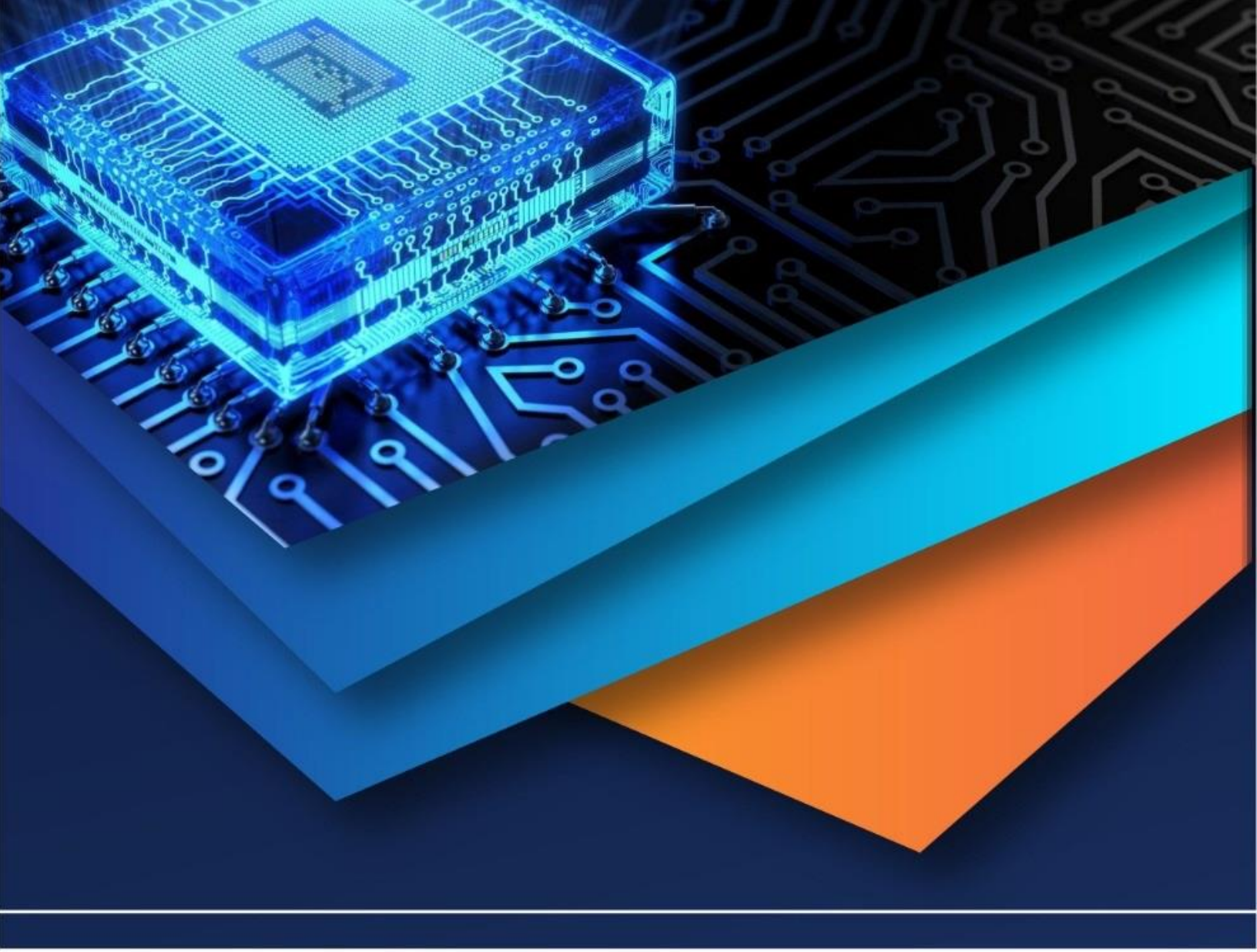

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