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Smart Taxi Booking System

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Abstract: Taxi services are now a crucial component of a city's transportation system. Transportability has grown to be a crucial demand for people in the modern world as they plan how to complete specific jobs that call for travel, time, and distance. The majority of people regularly use taxi services to travel around. Since they make life easier for both customers and the business, unified taxi booking systems are in high demand among taxi companies. There are about 13 million visually impaired people residing in India, according to the 2011 Census. A method of simple and secure transportation for these imperfect persons might be suggested as a result of the development of existing applications and technologies. E-Cab Service provides these voice-activated transportation services in addition to attempting to provide a user-friendly yet visually unappealing website for cab bookings.

Keywords: Visually challenged, E-Cab Services, Transportation Facilities, Speech-to-Text applied science, Customer priorities.

I. INTRODUCTION

Taxis bridge the gap between public and private transportation in modern society, especially in cities [1]. A taxicab is a car service that is either hired alone or as part of a shared pool. It transports people between the chosen places. Taxis offer a hybrid bus/taxi method for public transit where the pick-up and drop-off sites are predetermined by the service provider. By law, all taxis in India must have a fare meter installed. Cabs are an extremely popular form of transportation since they offer a convenient, speedy, and safe trip. We concentrated on how to make the task of booking a cab for those with vision impairments as we designed this system.

When hiring cabs or auto rickshaws, people with visual impairments need a system that is more adapted to their needs. The current transport services, including Ola and Uber, do not have any facilities intended expressly for use by people with disabilities. E-Cab Service's goal is to provide these services to those who are visually impaired by using an application that makes it easy to order cabs. The goal of this system is to assist the visually challenged and other members of society [3] by exploring the producer of developing a system that will make taxi booking services accessible for people with visual problems [2].

Today, people have the perfect opportunity to choose the transport option that best suits their needs thanks to the wider and more open transport options offered by both public and commercial companies. Additionally, more people are able to pay for a taxi as incomes rise. When using cabs, customers experience improved efficiency, comfort, and convenience. Taxis are particularly important because they give people more freedom to pursue certain personalized interests in a variety of contexts, such as at work when shopping, and during leisure activities.

II. RESEARCH METHODOLOGY

2.1 Data and Sources of Data

There are two types for the collection of data:

1. Primary data
2. Secondary data

1. Primary Data:

To collect primary data for the fieldwork, a questionnaire was developed that asked consumers about their experiences with popular online taxi booking services like Ola, Uber, etc.

2. Secondary Data:

Secondary data for the fieldwork was acquired from a range of sources, including journals, academic papers, and websites.

2.2 Theoretical framework

Theoretical frameworks typically involve a set of concepts, theories, and models that guide the development of the project.

2.2.1 Relevance of study

The aim of E-Cab Booking Service is to realize this ability by developing an application that is especially designed to meet the necessity of visually challenged people and make it easy for them to travel around and book cabs. This is made possible by creating an Android-based cab booking app that uses voice-to-text and text-to-voice technology [4]. The visually handicapped may now stand head-to-head with other able-bodied members of society when booking or paying for cabs, which is particularly helpful for them. The primary goal of creating the E-Cab Service system was inclusivity among the general public.

A person who is blind can simply speak to book a ride. They receive information about their ride's location, pricing, driver's name, and much more from an automated voice system. [4] This will make it easier for them to commute or drive far distances every day.

2.2.2 Problem Explanation

There are many blind people in the world today, but owing to technology, they may use apps to enhance their various skills and use smartphones like everyone else. Cab companies like Ola and Uber make it simple for customers to book cabs with just a few taps and clicks, yet for people who are visually challenged, accessing these apps can be difficult. An integrated application is required to make things easier for them. We have created a solution that would help these people and make it simpler for them to use the cab booking service [4]. Voice access will enable them to know what is displayed on the screen and will also enable them to provide voice commands to the device to instruct it on what to do next.

When utilizing current cab bookings apps like Ola and Uber, many customers experience language barriers. Here, we develop an application that supports English, Hindi, and Marathi, among other languages. The user can choose the language of his or her choice.

2.2.3 Existing System

The current cab-sharing service booking system enables users to quickly and easily access any app, such as Ola or Uber. To travel to a designated location, one can reserve a cab or a car instantly or in advance. The app displays the position of the ride, i.e., arriving or already arrived. The OTP (one-time password) and cab/auto number are also displayed when the cab reaches your pick-up location, along with the time and distance travelled. [4].

You can either give the driver your OTP once you have located the ride or you can correlate the given number (which is primarily on the cab's number plate) to the trip. The journey then begins for the driver. You may watch the route the driver is traveling as he travels to your place through Maps. You can also let a friend know how your ride is going. Once at the destination, the driver calls the trip to a close. Cash or a built-in money-sharing API like Google Pay are your two payment options. Additionally, you have the choice to evaluate the driver according to a number of criteria. In the event that you believe you have been overcharged or that your driver has canceled the ride, you may also file a complaint.

We will investigate this method to see if there are any gaps for people who are visually impaired.

a. A vision-challenged person cannot physically complete the entire process.
b. A person who is blind will not be able to see the cab come, thus they will not be aware that it has arrived.
c. By looking at the cab's license plate, blind folks are unable to find their transport.
d. A blind individual is unable to see the OTP that is required in order to start the trip.
e. A blind person cannot see the path the car is taking to get to the destination. Additionally, they have trouble paying the driver after they arrive at their destination.

In order to overcome some of these affairs, we recommend this modernized system that will help visually challenged people to plan rides without the help of others.

2.2.4 Proposed System

With the proposed system, we hope to largely do away with the shortcomings of the existing one. [4] In this scenario, the system will provide the user access to a voice-over feature so they can give voice instructions to the software, like finding a location, which will fetch the device's current location, and then speak the destination's address, which will be transferred into a text pattern.

After the customer requests to reserve a trip, the app will search for the closest taxi, and the booking will then be firmed. A series of warnings will also let the customer know if the cab is going in the mistaken direction. The e-billfold can immediately finish the payment when a driver chooses to "stop ride" on their mobile.

2.2.5 Technology

I. Software Specification:

- Operating System: Windows 10(64bit)
- Programming Language: Java, HTML, CSS, JavaScript, Bootstrap
- IDE: Eclipse IDE, Brackets
- Database Connectivity: JDBC
- Database Engine: MYSQL
- Web Server: Apache Tomcat
- Tools: LOMBOK

II. Hardware Specification:

- Processor: Intel Core I3 or Higher
- RAM: 4 GB or above
- Hard Drive: 100 GB (min)

2.3 Statistical Tools and econometric models

2.3.1 Regression analysis:

The link between several variables, such as the number of cab reservations and the canonical hour, civil days, or month of the year, is investigated using regression analysis.
This helps to identify patterns and trends in the data, as well as factors that contribute to changes in demand.

Linear Regression
Formula:

$$Y= b_0 + b_1*1 + b_2*2 +\ldots\ldots\ldots\ldots\ldots+ b_n* x_n + e$$

Were

- Y is the dependent variable, such as the number of cab bookings
- b_0 is the intercept term
- b_1, b_2,……., and b_n are the coefficients for the independent variables, such as canonical hour, civil days, or month of the year.
- x_1, x_2, ..., and x_n are the independent variables
- e is the error term.

2.3.2 The Distance Calculation Model

The Distance Between the two points on the earth
The Haversine formula can be used to resolve the issue: The great circle distance or orthodromic distance is the smallest distance between any two points on a sphere. We need to know the coordinates of points A and B in order to apply this strategy. The huge circle strategy is chosen over other strategies [10].

If we wish to determine the distance between two locations: -

- The radius of the Earth will be 3, 963 miles.
- The Earth's radius will be 6, 378.8 km.

The following formula is used to determine the distance between two points, A and B:

$$\text{Distance, } d = 3963.0 * \text{accros}[(\sin(lat1) * \sin(lat2)) + \cos(lat1) * \cos(lat2) * \cos(long2 - long1)]$$

2.3.3 The Fair Estimation Model

The System Cost Construct

- **Base Fare:** which changes according to the kind of vehicle auto, bike, SUV, minicar, etc. is the set price that the system assesses for each ride.
- **Cost per Mile:** This is the fee the system levies for each mile traveled.
- **Cost per Minute:** Starting with the first minute of the ride, this is what the system costs. It considers traffic and other factors that can make a ride take longer than anticipated.
- **Booking Fee:** This is an additional charge levied by the system to recoup its operating expenses [10]

The fare is calculated as:

Base Fare + ((Cost per minute x time of the ride) + (cost per mile x ride distance) + booking fee =Passengers Ride Fare

III. PROPOSED SYSTEM ARCHITECTURE

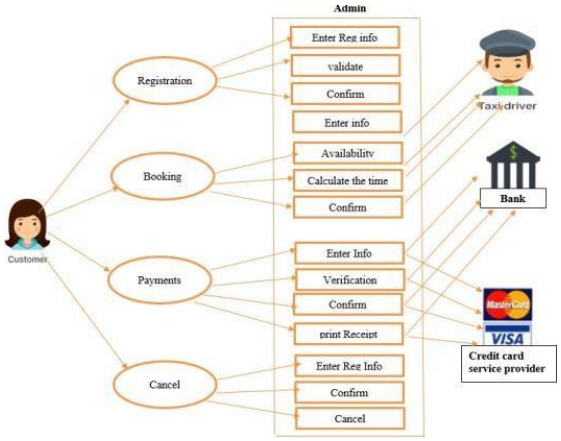

fig 1. proposed system architecture

As shown in Fig. The four components of the proposed system are a customer, a taxi driver, an administrator, and a payment gateway that is linked to the administrator. Each of the system's aforementioned components has its own significance. The following is an analysis of each of their distinct tasks and roles [10]:

1. **CUSTOMER**
   a. Register for a new account to log into the system.
   b. Provide the necessary booking information.
   c. After a ride, make your payment.
   d. Cancel the ride.
2. **TAXI DRIVER**
   a. Learns all the details of the trip.
3. **ADMIN**
   a. The system is completely under the admin's control.
   b. The admin has complete control over the system's operation.
4. **PAYMENT GATEWAY**
   a. To pay once the ride has been completed.

IV. MODELS

1. **Use Case Diagrams:** These diagrams show how the system and its actors interconnect with one another. Use-case diagrams tell what the system does and how the actors interconnect with it; they do not, however, show how the system functions overall.

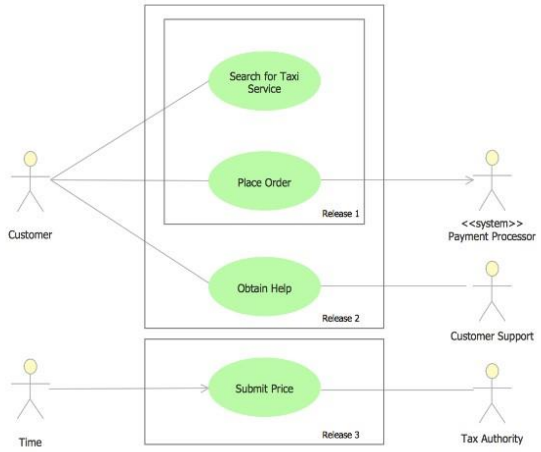

fig 2. use case diagram

2. **ER Diagram:** The ER Diagram of an information technology system is a graphic representation that illustrates the relationships between objects, people, places, concepts, or events. Relationships, attributes, and entities make up its three core components.

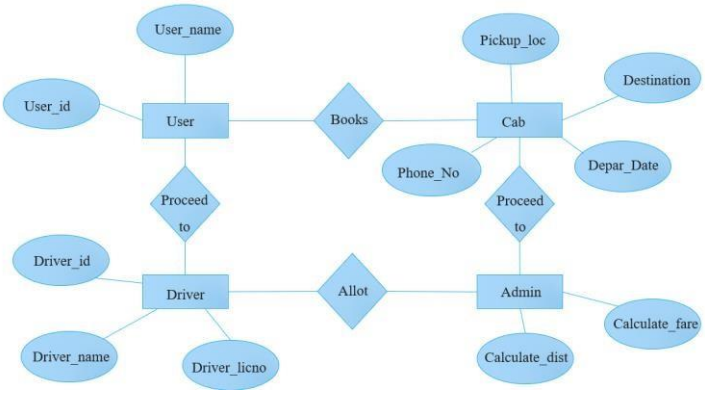

fig 3. er diagram

3. **Class Diagram:** Class diagrams are helpful for representing the individual components of the system, illustrating the connections between them, and outlining the tasks and services that each one provides.

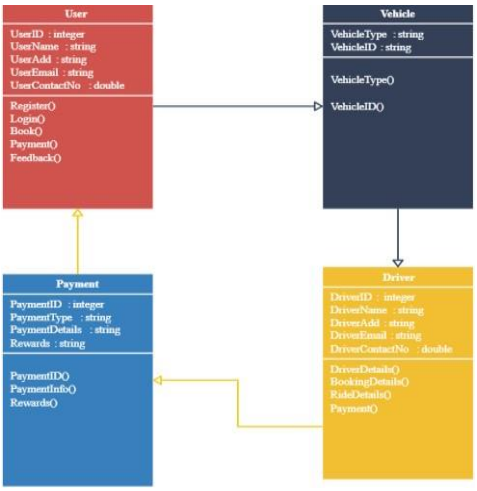

fig 4. class diagram

4. **Collaboration Diagram**: Collaboration diagrams can be used to depict the dynamic behavior of a certain use case and specify each object's function.

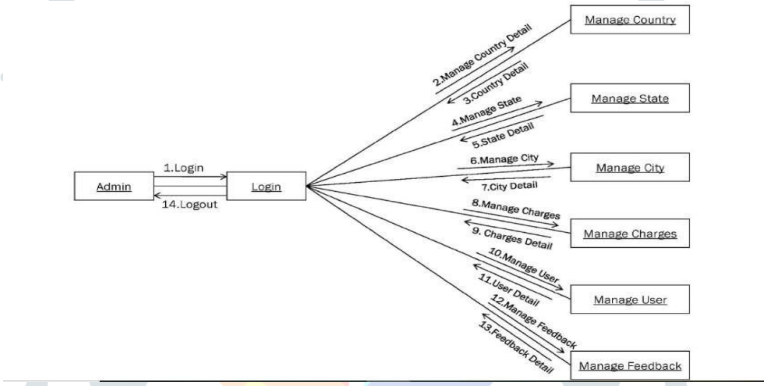

fig 5. collaboration diagram

5. **Activity Diagram:** The progression of one action into another is shown in a flowchart. The action could be referred to as a system operation. One action follows another in the control flow. Similar to a flowchart or data flow diagram, an activity diagram visualizes a system's control flow or sequence of processes.

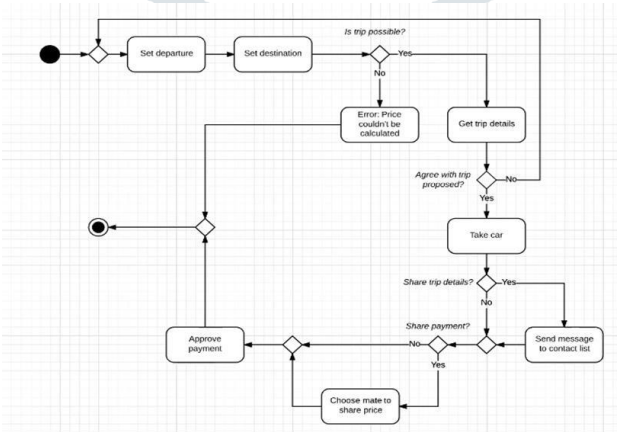

fig 5. activity diagram

6. **Sequence Diagram:** Sequence diagrams are used to represent high-level communications between a system and its user, other systems, or subsystems.

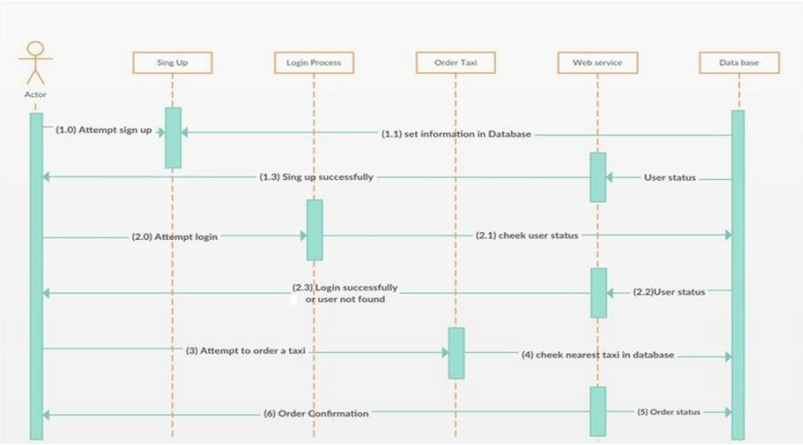

fig 6. sequence diagram

7. **Data flow diagrams:** A DFD graphically represents the "flow" of data through an information system to model its process features. A DFD offers a high-level picture of the system that can be further developed. Data processing can be visualized using DFDs.

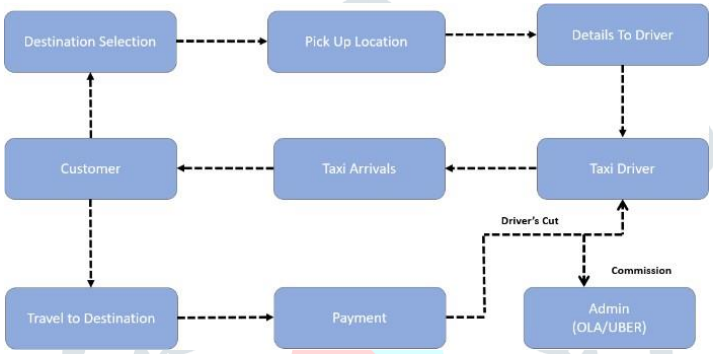

fig 7. data flow diagram

V. RESULTS AND DISCUSSION

5.1 Result

The smart taxi booking system project was successfully completed, and the web application was developed and deployed. Customers can utilize the application's user-friendly interface to make payments, see their booking progress, and book a cab. Additionally, the system enables drivers to access and control their reservations. All the functions of the application were thoroughly examined, and it was discovered that they all functioned as intended.

5.2 Discussion

The issue with conventional taxi booking systems has a creative answer in the form of the smart taxi booking system. It is simple to use and offers customers and drivers a seamless experience. Customers may easily find out the anticipated time of arrival of their taxi thanks to the application's real-time tracking of taxi locations. Customers can grade drivers through the system, which aids in maintaining the level of service.

The application is designed to be user-friendly for visually impaired people. It provides a voice-guided interface for visually impaired people, which makes it easy for them to use the application. The system also allows customers to select their preferred mode of communication, such as voice or text, which makes it easy for visually impaired people to communicate with drivers.

Because it decreases the number of empty taxi journeys, the smart taxi booking system is also good for the environment. As a result of the system's optimized taxi routing, fewer taxis are required to drive as far, lowering their carbon footprint.

VI. CONCLUSION

The application provides an easy-to-use interface for visually impaired people to book their taxis, view booking status, and make payments. This technology enables users to book cabs. Using this online system, customers may explore available taxis, check profiles, and book cabs. The system attempts to meet their needs and improve their participation in the modern business environment. By making it easier to schedule cab services so that visually impaired persons do not have to depend on other folks to do so for their commutes. In a given city, numerous different transportation companies typically offer taxi booking as a mode of transportation. Most people rely on taxi services for their daily transportation needs. The company must comply with all security and transportation department requirements and be registered with 255. To complete this project before the deadline, it was necessary to pass a number of courses in a wide range of disciplines, from business concepts to computer science.

The application has the potential to change the way visually impaired people book taxis and can serve as a model for other similar applications

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