Real Time Passenger Information and Bus Monitoring System

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ABSTRACT

In today's world of digital technologies, people want things to be smart and work efficiently that are things that require fewer efforts and save time. One of them is public transport which is a basic need of every third person in the world from student to aged ones. In public transport, Bus Transportation is used by many citizens nowadays but they waste lots of time waiting for buses at the bus stop. The operation of a bus system is affected by many conditions as the day progresses, such as traffic or dispatching buses at an irregular time from the depot. If people traveling by bus get the exact location of bus and arrival time will increase the trustworthiness in public transport among peoples. This system tracks public bus using GPS, tell the current location of a bus and estimated arrival time to the user with the help of an Android application. The Android Application will also contain details of all buses like bus number, bus route, bus timing or frequency. Using App users can also make payment of tickets by using the Payment Wallet available in a mobile application. This system also includes a panic button alteration for the user in case of any emergency situation.

Keyword: - *Android Application, Global Positioning System (GPS), Payment Wallet, Public Transport.*

1. INTRODUCTION

On basis of the daily operation of the public transport system mainly which of buses, the movement of a vehicle is affected by different uncertain conditions as the day progresses. Many passengers are often late to work, students are late for classes because they decide to wait for the bus instead of just simply using alternate transportation.[1] The purpose of this system is to track an accurate bus arrival time, which is very useful for the passenger. In addition, the system also provides security to the passenger by providing alteration of panic situation notification message to the police station, parents number, and bus depot manager number at the time of any panic condition.

2. LITERATURE SURVEY

The ability to obtain accurate predictions of bus arrival time on a real time basis is a vital element to both bus operations control and passenger information systems. Several studies had been devoted to this arrival time prediction problem; however, few resulted in completely satisfactory algorithms. [2]

Bus headway in a rural area is usually much larger than that in an urban area. Providing real-time bus arrival information could make the public transit system more user-friendly and thus enhance its competitiveness among various transportation modes. [3]

3. PROBLEM STAMENT

To design and develop a system for passengers who want to travel by bus also want to know the exact arrival time of the bus and cashless payment of bus ticket, so that to provide detail bus location using a GPS system and also provide seat availability of the bus and wallet for online payment.

4. MOTIVATION

A passenger has to wait for the bus to arrive, hence to reduce the waiting time we are developing this system. The main focus is to reduce the waiting time as well as provide the location of the bus. Also, provide details to the passenger about seat availability on the bus. This was one of the main motivations behind developing this system. Such systems must be installed urgently in order to reduce the number of abduction taking place. The system provides security to passengers with the help of a panic button.

5. OBJECTIVE

1. To design a system that gives the exact bus location and tells predicted bus time to the passenger?
2. To design a simple bus ticket management system by introducing a new approach of valid OTP till destination.
3. To design and develop a smart bus location tracker and management system in which the conductor can give information to the next bus stand if any failure occurs.
4. To design secured applications that will send notification through panic button cases of any problem occur.

6. PROPOSED SYSTEM

6.1 Modules:

- Bus Unit
- Central Control Unit
- Client side Application

6.2 Architecture:

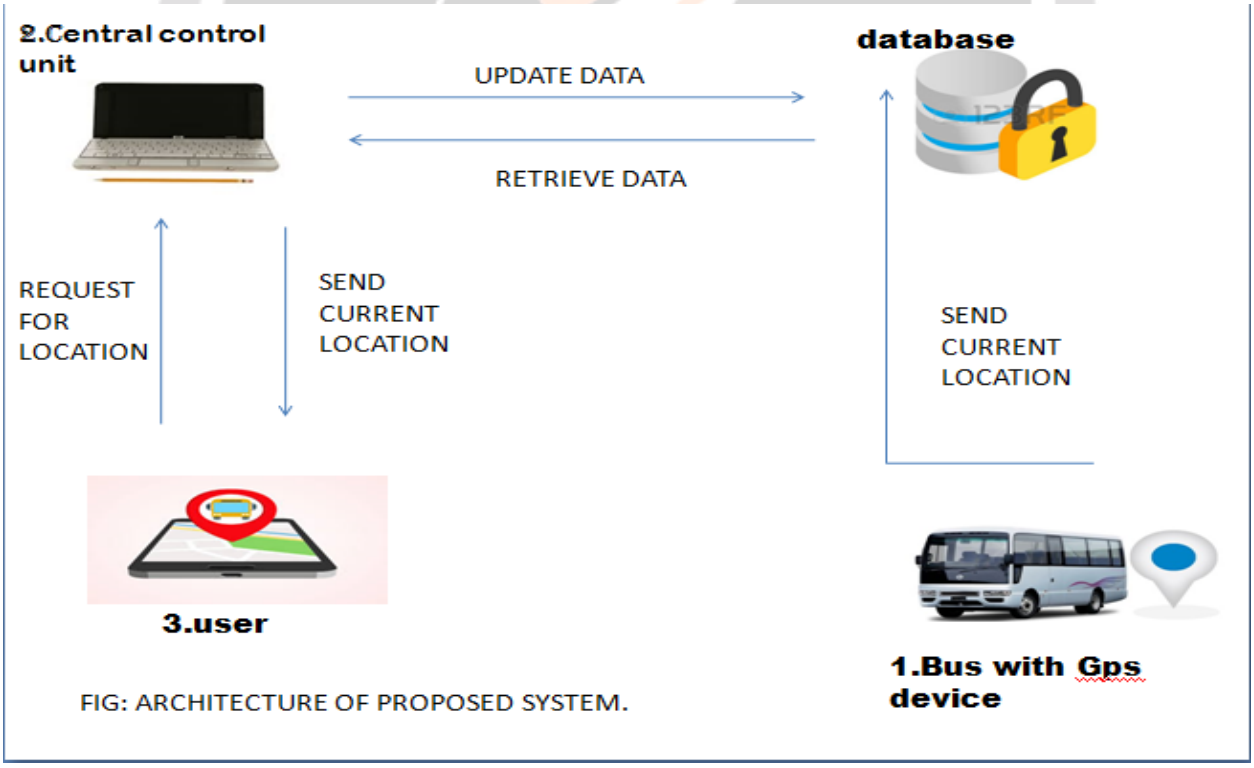

Fig -1: Architecture of proposed system

The internet is the medium that is used to transfer the user data and service request from the mobile to the server and then the requested information back to the user. The figure shows the main 3 elements that construct the system which are

1. Querying user:

User sends the request to the backend server a querying user queries the bus arrival time. the interest bus route and bus stop indicated by the querying user for receiving the predicted bus arrival time.

2. Conductor:

They contribute the information of mobile phone sensing by the sharing user to the system. After a sharing user gets on a bus the data collection module starts for collecting the sequence of nearby cell tower IDs. Via cellular networks, the collected data is transmitted to the server. Since with different means of transport the sharing user may travel is detect whether the current user is on a bus or not by mobile phones. It starts sampling the cell tower sequences and sends the sequences to the back end server once the mobile phone confirms it is on the bus. Ideally, they automatically perform the data collection and transmission by the mobile phone of the sharing user without the manual input from the sharing user.

3. Admin server:

To the backend server we shift most of the computation burden where querying users are addressed the uploaded information from sharing users is processed and their quests. There are involved two stages in this component. First to bootstrap the system, in the offline pre-processing, the stage we need to survey the corresponding bus routes. To cell tower sequences natures we construct a basic database that associates particular bus routes. We mainly war drive the bus routes and record the sequences of observed cell tower IDs since we do not require the absolute physical location reference, which reduces the initial construction overhead significantly

6.3K-Mean clustering Algorithm:

K-means algorithm is an iterative algorithm that tries to partition the dataset into K pre-defined distinct non-overlapping subgroups (clusters) where each data point belongs to only one group. It tries to make the inter-cluster data points as similar as possible while also keeping the clusters as different (far) as possible. It assigns data points to a cluster such that the sum of the squared distance between the data points and the cluster's centroid (arithmetic mean of all the data points that belong to that cluster) is at the minimum.[4]The less variation we have within clusters, the more homogeneous (similar) the data points are within the same cluster. The way k-means algorithm works is as follows:

1. Specify number of clusters K.
2. Initialize centroids by first shuffling the dataset and then randomly selecting K data points for the centroids without replacement.
3. Keep iterating until there is no change to the centroids. i.e assignment of data points to clusters isn't changing.
4. Compute the sum of the squared distance between data points and all centroids.
5. Assign each data point to the closest cluster (centroid).
6. Compute the centroids for the clusters by taking the average of the all data points that belong to each cluster.

Flow of algorithm:

Input: K- the number of clusters
D: a data set containing n objects
Output: A set of k clusters

Steps:

1) Randomly select k data objects from dataset D as initial cluster centers.
2) Repeat.
3) Calculate the distance between each data object di (1 ¡= i¡=n) and
all k cluster centers cj(1¡=j¡=k) and assign data object di to the nearest cluster.

4) For each cluster j (1¡=j¡=k), recalculate the cluster center.
5) Until no changing in the center of clusters.

The computational complexity of the algorithm is O(nkt)
n: the total number of objects
k: the number of clusters
t: the number of iterations

7. CONCLUSIONS

Here we come to the conclusion that the proposed system will not only facilitate the passengers to search or track the bus location but also helps avoid the paperwork. The proposed system also intimate to users or admin about the failure of bus. The proposed system also helps passengers to get seat availability. As of now, this application is developed for the bus only. In the future we will add another transport system to this application such as taxi services and trains. Also, we will add some hardware part to the project at the conductor end.

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