Implementation of Vehicle Tracker

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Abstract—Internet of Things gives a general concept in which the network devices will have the ability to analyze and collect data from the places in the world and the data can be shared in the Internet where it is analyzed so that it can be used for various purposes. Most of the general crowd today relies on public transit for their travel and they expect to reach their travel destination on time. However, waiting for the public transport is not reliable; the major concern is to know the arrival time and the real time location of the vehicle. This information helps the travellers to have a better perspective on their travelling as significant details are given beforehand. In this proposed simulation system, the movement of the vehicle can be tracked using Ultrasonic sensor, the sensor placed in the bus stop which senses the movement of the vehicle and the current location co-ordinates will be stored in a third party cloud. This cloud access has the options to read and write details in graphical formats irrespective of the data type. These details can be retrieved to any user defined application like a mobile or a desktop app. The application GUI shows the current location of the bus and the duration to reach the user bus stop. The real time location and the user location will be displayed using the android application.

Index Terms—detection, vehicle tracking, Android application, Distance estimation.

I. INTRODUCTION

To implement the tracking of the vehicle and to intimate the user the details about the vehicle some requirements are mandatory. The first being the location of the user has to be tracked without compromising it to others. The second being the detection of the movement of the vehicle and its location. Once these information are been found then the Distance is calculated by using calculation methods so that the details related to the vehicle arrival time and other details can be uploaded to the cloud server using the Wi-Fi module which is present in the vehicle. The user can get the details related to the vehicle in the android application for the application to be installed in the user mobile it has to have the latest android OS.

II. OBJECTIVE

The whole system works on the concept of Detecting, Tracking and Distance Calculation of the vehicle. Detection of the vehicle is done with the help of Ultrasonic sensor, unlike other sensors ultrasonic is a low cost sensor and it has a range of 4.5m where in it can identify the objects present inside the range. Once the location of the vehicle has been identified its movement is tracked by the sensors which are kept in the path of the vehicle. With the use of the sensor the exact co-ordinates of the vehicle can be found which will be stored in the cloud provider. Using the Android application the user can find the details related to location, time of the arrival of the vehicle. For the application to show the correct distance and time of arrival to the user place the location of the user must be tracked in the application. The distance calculation is done using the simple calculation method, once the user location and the vehicle location has been updated. Based on the difference between the location of the user and the vehicle position the estimated distance for the vehicle to reach the destination and the time for its arrival can be found which will be displayed in the application and every-time the vehicle cross the Next station stop where the sensor are placed a toast message will be displayed in the application which will show the current location, estimated time and the distance to reach the destination will be displayed.

III. STEPS

1. The application gets the location of the user.
2. Tracking with sensor.
   2.1. The sensor is used to find and track the location of the vehicle.
3. The location of the vehicle and the user is used to find the estimation distance and the remaining
time to reach the user location which will be uploaded in the cloud server.

4. The android application displays the vehicle details to the user.

5. The user is alerted through the android application, every time the vehicle crosses a station.

**Figure 1: Architecture of Vehicle Tracker**

IV. USER INTERFACE

The only way users can obtain the details is through the interface of an Android application. The application can be developed using freeware and third party applications like ‘Virtuino’. The android where in it displays the details such as Total Distance, Current Location, Total Time, Next Time and the Time to reach the Next Station. As the vehicle cross the every station the information will be displayed in the application. A toast message is been made to alert the user every time the vehicle crosses a new station so that the user will be alerted with the recent location of the vehicle. The details are retrieved from the cloud providers which are shown in the GUI, so there may be some time delay in retrieving data respective to location of the vehicle. Internet connection is required for the normal functioning of the application so that it can live track the location of the vehicles and their details.

V. CALCULATION OF DISTANCE AND TIME

Real time values are used to calculate four particulars namely

1. Current location of the user.
2. Current location of the vehicle
3. Distance to destination
4. Estimated time of Arrival

Firstly, the current location of the user is obtained through the android application from the user mobile. This detail helps in determining all the remaining details. The current location of the vehicle is obtained from the law of speed which is

\[
\text{Speed} = \text{Distance} / \text{Time}
\]

The ultrasonic sensor with an inbuilt transmitter and receiver emits sound waves at 40 KHz which is approximately equal to 1.54 MS$^{-1}$. The time factor is obtained from the delay between transmission and reception, which varies depending upon the location of the vehicle. Using the time delay and the distance factor, the current location can be calculated modifying the formula to

\[
\text{Distance} = \text{Speed} \times \text{Time}
\]

This distance value is subtracted from the total distance to find the ‘current location of the vehicle’. The previously determined distance value is the ‘distance to destination’. The ETA is calculated is using the prior three values and the current speed of the moving vehicle. The formula is re-modified to

\[
\text{Time} = \text{Distance} / \text{Speed}.
\]
VI. TRACKING AND DETECTION

The tracking and detection is the one of the important step which is done in this project. In order to give the location information of the vehicle to the user, the movement of the vehicle is tracked using Ultrasonic sensor which is a cost effective sensor. Ultrasonic is an echo sensor which has two ends in it which are present in the same direction. It uses sender side of the end for sending the echo waves and once it hits an object it travels back which is received by the receiver end present in the sensor. Based on the time and speed of the returned echo pulse the sensor calculates the location of the vehicle. As the vehicle moves forward with a constant speed the sensor does his work by sending and receiving the echo pulse so that the current location of the vehicle can be tracked continuously. The time delay for the finding the location of the vehicle is based on the time in which the sensor will send the next echo pulse. The main problem with the use of the ultrasonic sensor is that if the echo pulse of the sensor is been interrupted by any obstacle it considers the obstacle location as the location of the vehicle which may provide wrong information related to the location of the vehicle.

VII. CONCLUSION

Users will be able to track upcoming vehicles accurately and in real-time to improve their day to day time allocations. When implemented en mass, there will be absolutely no buses gone astray or under the radar as they will tracked real-time.

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