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4G Enabled Intelligent Bus Monitoring System Using Combination of GPS And IR Sensors

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Abstract:- This paper summarizes work on the designing and application of GPS (Global positioning system) based technology clubbed with 4G for Bus monitoring for transportation[1].. The 4G clubbed IR Sensors and GPS technology can also be used to get the current location of vehicles and the available seats in it. Arduino Uno microcontroller is the main controlling device which controls and synchronizes all the operations by receiving the data 4G Module as well as GPS and IR Sensors. Such kind of monitoring systems[2] can be used for various public vehicles ranging from auto rickshaws to Buses. Such types of system will assist the travelers, drivers and the Bus stand controller at the control terminals for real time monitoring of the vehicles. . Not only would the GPS and 4G based Real Time Bus Monitoring system be a new product for Best Transportation, it would also be an improvement to the transportation service already addressing the dissatisfaction with current wait times of the buses. The user having a mobile that can be provided by bus arrival information with bus tracking based on the user's current location, and suggest alternative bus route to the same destination, it will definitely help the user to manage their time properly.

Keywords: Global Position System, , 4G, Arduino Uno, IR Sensors.

INTRODUCTION

The most important asset of man today is 'time'. It happens many a times that people wait in queues for a long time and ultimately miss out on their desired bus and the next choice bus arrives at a few streets away from their current location. If passengers

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had an easy way to see which bus is near to their location and approximate time it would take to reach the stop, in real-time, they could make a more accurate, informed decision of whether or not to wait at the stop. The GPS [3] and 4G based Real Time Bus Monitoring system will provide Convenience. it would also be an improvement to the transportation service already addressing the dissatisfaction with current wait times of the buses. If we have a mobile device that can provide bus arrival information with bus tracking based on the user's current location, and suggest alternative bus route to the same destination, it will definitely help the user to manage their time properly. Users can decide if they have to keep waiting at their bus stop or go across a few streets to wait for another bus instead. In case there is only one bus going from user's current location to their desired destination, then this application will show the approximate time the bus will take to reach the user's place. In this way the user does not have to unnecessarily stand at the bus stop. In addition, user can determine whether they have to run or walk to the bus stops when they are near to the potential bus stops.

WORKING PRINCIPLE

Recent advances in automatic BUS location (AVL) systems based on the global positioning system[4] (GPS) have provided the transit industry and public transport enterprises with tools to monitor and control the operation of their BUS s and manage their fleets in an efficient and cost-effective way .Instead of using expensive GPS device exclusively used for tracking purposes, this system aims at providing a GPS tracking solution providing all the existing and even more features than current tracking systems using the mobile technology. Following are the steps to achieve the process for Develop a user-friendly travel time prediction application to predict the bus arrival time on the basis of global positioning system (GPS) data , and gives information about availability of seats. we aim to provide a robust and efficient software implementation of this application which will allow a user to simply enter either the bus number or their desired source and destination. Subsequently the user is provided with various options to check the approximate arrival time , distance from current place and seat availability even track a bus on their phone.

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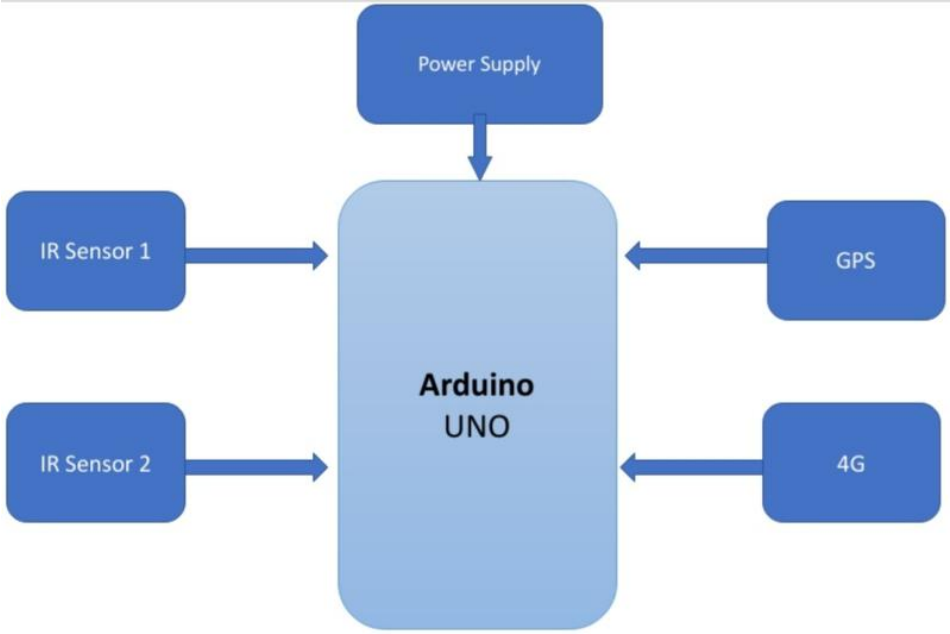
BLOCK DIAGRAM



Arduino is a computer hardware and software company, project, and user community that designs and manufactures microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. The project's products are distributed as open-source hardware and software, which are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL). permitting the manufacture of Arduino boards and software distribution by anyone.

GPS is a space-based satellite navigation system. It provides location and time information in all weather conditions, anywhere on or near the Earth. GPS receivers

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are popularly used for navigation, positioning, time dissemination and other research purposes.

The 4G wireless cellular standard was defined by the International Telecommunication Union (ITU) and specifies the key characteristics of the standard, including transmission technology and data speeds.

Each generation of wireless cellular technology has introduced increased bandwidth speeds and network capacity. 4G users get speeds of up to 100 Mbps, while 3G only promised a peak speed of 14 Mbps. The transmission and receiving capabilities of 4G are powered by MIMO (Multiple Input Multiple Output) and Orthogonal Frequency Division Multiplexing (OFDM) technologies. Both MIMO and OFDM enable more capacity and bandwidth in comparison to 3G. OFDM provides more speed than the primary technologies that powered 3G, which include TDMA (Time Division Multiple Access) and CDMA (Code Division Multiple Access) technology. With MIMO, 4G reduces network congestion in comparison to 3G, because more users can be supported.

In this system IR sensor is used to detect the seat is vacant or not. If the sensors detect an object then that implies that , that particular seat is fill. Similarly if the IR sensors did not receive any thing then that implies that the seat is vacant. According to this information we can program it such that the sensors receives a physical signal and transmit a digital signal to a 4G module. The message will be send to the user with the help of 4G.

IMPLEMENTATION

This system is basically used for performing two operations, i.e., BUS Tracking and seat availability. On fueling up the framework and establishment in the BUS to be followed, a SMS is to be sent: "Track the BUS " to the framework set in the BUS. For appropriate ID of the string the prefix (#) or the postfix (*) can be utilized. ("#Track the BUS *"). The SMS that is sent is gotten by the 4G module and it sends the information to the Arduino and henceforth the SMS is perused and removed by the Arduino on examination with the pre-characterized message.

On coordinating with the pre-characterized message Arduino peruses the co-ordinates utilizing the GPS module. When the coordinates are gotten, they are sent

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to the client utilizing the 4G module. Henceforth the BUS is followed. These coordinates can be utilized to find the location which will be helpful to calculate the time. IR sensors are placed at each and every seat so that we can identify which seat is empty and which is not.

CONCLUSION

In this paper, the details of GPS and 4G based Real Time Bus Monitoring system are stated. The GPS and 4G based Real Time Bus Monitoring system tracks the current location of all the buses and estimates their arrival time at different stops. Estimates are updated every time the bus sends an update. It gives the information to the passenger through the message. GPS and 4G based Real Time Bus Monitoring system will be of great help not only to the passengers but also to the BUS drivers and administrators of the transport system. With the advent of GPS and the ubiquitous cellular network, real time BUS tracking for better transport management has become possible. Thus, the passenger will not only save a lot of time by receiving exact information about current position of the bus but will also receive information about the time it will take to reach a particular destination and occupancy of the bus.

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