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Smart Bus for Smart Public Transport using IOT Technology

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ABSTRACT: Public transportation is very important today as it provides people with mobility and access to employment, community resources and medical care etc. People who use public buses waste a lot of time waiting for the bus at the stop.The operation of the buses may be affected by unknown circumstances, such as traffic conditions or irregular dispatch of buses from stations. If people taking a bus gets the exact location and approximate arrival time of the bus based on normal traffic conditions and the number of passengers on the bus, there will increase in the credibility of public transport. This article proposes a system that uses PIC controller,GPS to track buses, GSM to send and receive information between the user and the bus module. It also gives information about number of passengers in the bus with the help of infrared sensors and the estimated arrival time to reach the user.

KEYWORDS : GPS,GSM,Infrared sensors, PIC controller

I.INTRODUCTION

 The common form of transportation is use of public transportation. In today's transportation system, the public has encountered many problems, including frustrated waiting time for bus arrivals [1]. The timetable poster at the bus station has information such as the bus number and the arrival of the bus at the bus station. These signs are fixed and may not be changed regularly. Passengers will follow the same rules and will wait a long time until they take the bus. Sometimes, it must happen that the bus breaks down during the journey. If it happens so, the driver calls the station and informs them about the failure of the bus. Therefore, the driver waits for the new bus to come and then deports the passengers and the ticket is been checked. This type of system needs to be updated with the latest technology to bring convenience to citizens who choose public transportation. At present,current location of buses in cities cannot be tracked by the public, but only by the public transportation authority. To overcome this issue, we have used IOT to develop an intelligent bus. Generally, a smart city is a city that integrates six dimensions: economy, transportation, governance, people, life, and environment. These six dimensions are integrated to solve smart solutions that enable modern cities to improve the quality of services provided to citizens [2,3]. By introducing the concept of smart bus, we have developed one of the dimensions, namely mobile convenience. Urban transportation is one of the global smart city projects that can provide real-time traffic management, passenger transportation management, logistics and tracking applications, and smarter transportation Service [4]. The purpose of this document is to design and develop an intelligent bus system that uses IOT to track buses, know number of passengers in the bus and the estimated arrival time of the bus to the bus stop.

The project aims to develop a smart bus for smart cities, which provides information about the bus by sending simple text messages to the system. In this project, the GSM module is used to send and receive messages, and the infrared sensor is used to count incoming and outgoing passengers. The main control device of the project is the PIC 16f877A microcontroller. Passengers waiting at the bus station must know the exact location of the bus and the time of arrival at the bus station, as well as the number of passengers on the bus. User must send a request message to system.The system

receives it and sends information about the bus via GSM. The status of the project will be displayed on the LCD screen. The microcontroller uses embedded C language programming to provide an efficient environment for performing tasks.

II.LITERATURE REVEIW

Majd Ghareeb, Athar Ghamlous, Hawraa Hamdan, Ali Bazzi,Samih Abdul-Nabi[6] proposed "Smart bus: a tracking system for school buses".Parents are most concerned about the safety of their children on the way home from school and the time of their arrival. Waiting for the school bus in the morning and waiting for the children to come back in the afternoon is a waste of time for parents every day, especially when traffic jams are getting worse at this time. The purpose of the project is to make it easier for parents to complete this task and to save their time by automatically notifying them a few minutes before their children arrive so that they can get off the car. This also applies to taking the bus in the morning to inform parents that the bus is approaching and their children will take the bus to school. Any school in Lebanon can use this system to enhance the safety measures of its students and reduce the responsibility of parents waiting on the school bus every day.

R.C.Jisha, Aiswarya Jyothindranath, L Sajitha Kumary[7] proposed "IoT based school bus tracking and arrival time prediction". In order to reduce the time and complexity of people waiting at the bus station. When choosing public transportation, time and patience are more concerned. The system provides real-time vehicle tracking through Global Positioning System (GPS) technology to detect the location of the bus, and uses the Internet to display real-time images on Google Maps or website applications through General Packet Radio Service (GPRS) technology to track the bus s position. We are using GPS and GPRS modules, the GPS module will locate the bus via satellite, and the GPRS module will collect all the data and send it to the website. The coordinates of this system will be used to monitor buses in real time. We are developing an Android application that will provide bus schedules in real time. With the increase in the population of India, the number of vehicles skyrocketed rapidly, causing an overload in traffic management. To reduce fuel consumption, reduce car use and comfortable traffic congestion, we can use bus services. Passengers need exact bus schedules.

I.G.Susrama Mas Diyasa,Itan Yuniar Purbasari[8] have proposed a system "Smart Passenger Information based on IOT".This system consists of an RFID which serves as the entry of passengers who get on and off the bus and IOT Microcontroller (Wemos d1 Mini) which used to process the data of the number of passengers read by the RFID sensor.The microcontroller then conneccts WiFi to the access point installed at bus stops.Then the data is sent to the cloud and gets displayed on the website.In this way counting of passengers is done and displayed on the website.

III.PROPOSED SYSTEM

Bus Module:

The bus module consists of GPS, GSM, PIC16F877A microcontroller, LCD controller, LCD screen, etc. The GPS receiver in BUS will continuously obtain longitude and lattitude values to track the current location of the bus. It is used to find the position, speed, and time of any object on earth. The GSM module is used to send and receive information, and the infrared sensor is used to the count number of passengers. The main controlling device of the project is PIC 16f877A microcontroller .
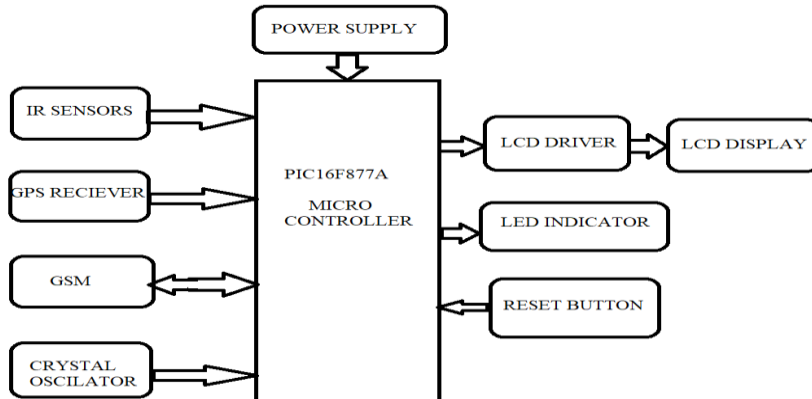
Figure 1.Bus Module

Count of Passengers:

The infrared sensor is responsible for counting the passengers on the bus. This is done by detecting the movement of objects on and off the bus. The arrangement of the two sensors increases the number of seats and the movement from IR1 to IR2 as shown in Figure 1 (b), the number of seats is reduced from IR 2 to IR 1.
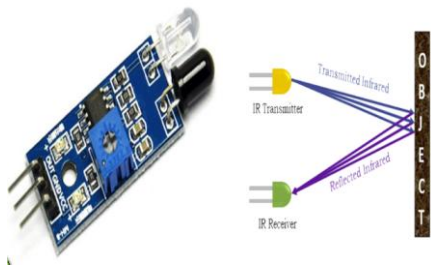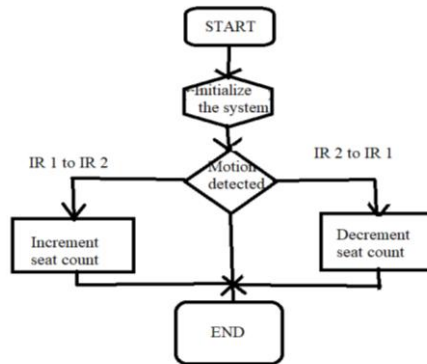
Fig1:.IR sensor   Fig2:.Flowchart for passenger count

Tracking the Location of the bus:

GPS satellites revolve rounnd the earth twice a day in a particular orbit and transmit signal information to earth. GPS receivers take this information and use triangulation technique to calculate the user's exact location. Essentially, the GPS receiver compares the time a signal was transmitted by a satellite with the time it was received. The time difference tells the GPS receiver how far away the satellite is. Now, with distance measurements from a few more satellites, the receiver can determine the user's position and display it on the unit's electronic map.

Software used:

The microcontroller uses embedded C language for programming, which provides an efficient environment for performing tasks.
   PIC-C compiler for embedded C programming
   PIC kit 2 programmer for downloading code to
   Express SCH microcontroller for circuit diagram

Communication between bus and user:

In this project, the user must send a short message to the SIM card number of the GSM inserted in the bus module. Passengers waiting at the bus stop will be able to know the exact location and arrival of the bus. By sending an SMS request to the system, you will get to the bus. The time of the stop and the number of passengers on the bus. The system receives and sends information about buses via GSM so that users can have a pleasant journey.
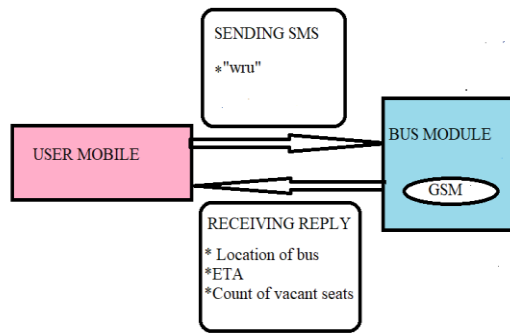

Figure 2.Communication between bus module and user.

IV.EXPERIMENT AND RESULTS

The project, Smart bus for smart city can be experimented by the following this procedure.

The code for the operating the system must be dumped into the PIC16F677A microcontroller, and the user must send a text message "wru" to the respected SIM card inserted into the GSM module. The user can know the SIM card number inserted in a specific bus through a fixed posture at the bus stop. The LCD screen displays welcome information, number of passengers, latitude and longitude values... The GSM module collects GPS and IR sensor data, and sends the response to the corresponding user's mobile phone via SMS. The response message includes the number of passengers on the bus and the link to track the bus using GPS. The link contains data on the location and estimated time of arrival of the bus at the bus stop.
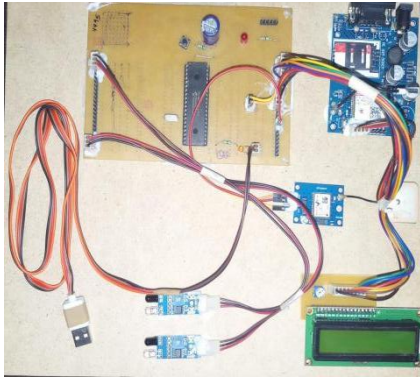
Fig 3:Hardware Kit

Fig 4:Receiving message from user

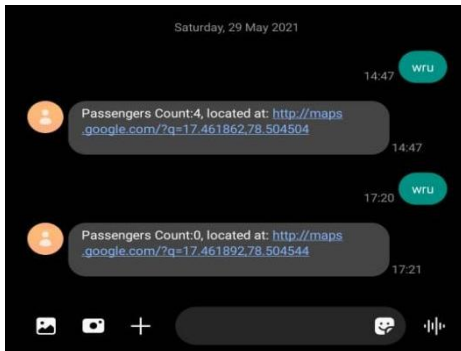
Fig 5:Locating Position

Fig 6:Count of passengers
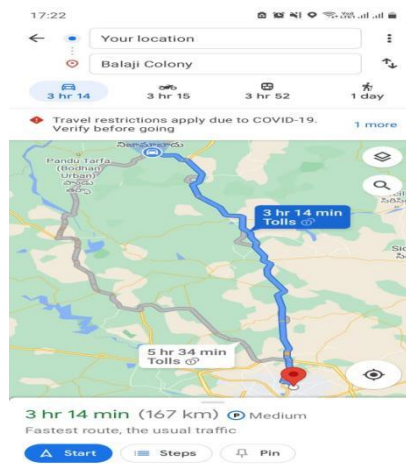

Fig 7:User Request & Reply

Fig 8:Location and Tracking of Bus arrival time

V.CONCLUSION

The paper proposes a smart bus concept, which will help users make a systematic journey while using public transportation. The project uses a simple process to obtain information about the current location, number of passengers, and estimated bus arrival time by simply sending a text message called "wru" request to the corresponding bus. All citizens can access the system, because it is different from the usage of RFID tags, network use, etc., it is a simple, cheap and easy process. User must just have knowledge about sending and receiving messages.Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit.Thus the project "Smart bus for smart public transportation" have be successfully designed and tested.

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