

Smart Bus Tracking System

^[1]Surendranath.H, ^[2]Sai Ram.B, ^[3]Praveen Kumar.N, ^[4]S.Akshay, ^[5]Pavan
^[1]Assistant professor, ^{[2][3][4][5]}UG students
^{[1][2][3][4][5]}Dept of ECE, RYMEC,Ballari

Abstract: Smart Bus Tracking System uses an application that tracks a bus and gathers the distance to each station along its route. Tracking System involves the installation of an electronic device in a bus, with an installed Android App on smart phone to enable the Administrator/student to track the bus location. Based on IoT this project is implemented as an android application. GPS devices are located in the bus to track their positions. IR sensors are used to count the number of filled seats in the bus so that the student gets to know the seat availability. All these information is made to display on LCD in the bus and at the bus stop. The tracked positions will be periodically updated to the server. The android application displays location showing the position of bus. It shows where buses are located currently on the location and provide the updated information at different time interval. The server will monitor location and will store its data in the database. It is a real-time system as this method automatically sends the information on the GPS system to a system & smart phone. The entire software and hardware is controlled by the Arduino mega and uno. The data is received to the android app via cloud and also received through the Zigbee module and made to display on LCD at the bus stop. Simple mode of communication is the key feature of the Bus Tracking system. This application can be easily extended for central tracking system to track all the buses.

Keywords - GPS, IR sensor, LCD, Arduino, Zigbee, Internet Of Things

I. INTRODUCTION

In today's world, time is more important for students. Students have to wait for their bus at the bus stops for long time without even knowing the bus will arrive or departed. Thus, the arrival time of the bus cannot be guaranteed. Since college management didn't employ a system of providing current details of bus position time to time, though its cost effective. The proposed project proves a demo for the real time implementation of the system where students and management can be aware of bus status at their desired instant at low cost. We have planned to implement a smart bus tracking system in our college for easy transport facility. This provides a transparency between the students and a management such a student friendly system is being developed in turn an interest of management to encourage an advanced mechanism.

Mobile phones are widely used and are becoming more and more popular. The smart bus tracking system commonly uses an application for tracking buses. The proposed project is equipped with navigation systems such as GPS or Global Positioning Satellite. The location of the bus is tracked using GPS. The collected data is sent to a remotely located server using Wi-Fi module.

The android app is controlled by Arduino IDE programming. The application is using Google-APIs to show the location. The location coordinates will be sending to and retrieve from firebase. The collected data is retrieved and

processed by the server using an application that we installed on smart phone using IOT and displayed on LCD at the bus stop.

II. PROBLEM STATEMENT

This proposed system is designed with aimed to track the vehicles using Real Time Operating System (RTOS) programming. The location of the vehicle is indicated using GPS (global positioning system) technology. Exact location of the target vehicle is received with the help of a GPS receiver. GPS will give the information of parameters like longitude, latitude, by which we can easily identify the location of the vehicle and map it on Google map. First the communication takes place between GPS receiver and GPS satellite. GPS satellite continuously tracks the target vehicle and the position of the vehicle is send to the controller from GPS receiver. Vehicle is ready with the GPRS connectivity which sends the continuous information about the position of the vehicle to the server unit.

Here multiple tasks are

1. Send GPS location of vehicle to server
2. Collect all sensors data (Temperature sensor, alcohol sensor, eye blink sensor, accelerometer) which senses condition of the Car/vehicle and send it to server and if any action require then it will do that e.g. it detects the Alcohol then it should send the information to owner of the vehicle (by SMS on his phone), then if it detects the level of fuel

International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)
Vol 6, Issue 4, April 2019

(petrol or diesel) then it should send location of nearest petrol pump (with its distance from his current location, by sms and GPS location too) to the driver also, in case of accident it should send nearest hospital location (in distance) to driver (by sms) and GPS location too so if he is in condition then he can go there. also send the information of this accident to the owner (if applicable) of vehicle (by SMS).

III. METHODOLOGY

Arduino mega 2560 microcontroller works as an interface for all other components such as GPS,IR Sensors,WI-FI module,LCD and PB switches .This module updates the bus information to the database time to time so that the information can be retrieved by the students through the mobile application at the bus stops.

By this student can be able to track the respective bus at their corresponding stops and also management is aware of punctuality of handling the buses GPS module placed inside bus module communicates continuously with the satellites for getting co ordinates then those coordinates from GPS are sent to data base then arduino extract the require data from received data by GPS the extracted GPS data in the form of latitude and longitude is nade to be uploaded to the firebase and also display on the LCD The proposed project also detects the number of students entering and leaving the bus which is displayed on the standard LCD(2*16).The push button switches have been employed in this section in order to update the current position at remote location to firebase and also displayed through lcd.

The mobile application used to track the information about bus from the IN Bus Module through GPS in the form of the latitude and longitude at the student end through their mobile application and analyse the data which depicts the bus information at their respective stops for desired instant.

The Bus stop module retrives the bus information from the database through nodem cu and displays the current status of the bus like arrival,departure.Thus student will be able to kmnow about the bus without wasting any time through the proposed project .

IV. SYSTEM ARCHITECTURE

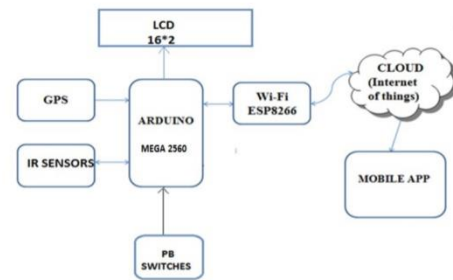


Fig 3.1: Block Diagram of IN-BUS MODULE

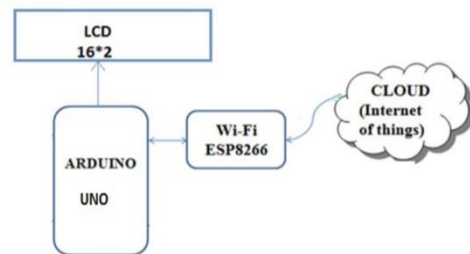


Fig 3.2: block diagram of Bus-stop module

The major component of Aquaculture circuit is Arduino Uno. Every Arduino board needs a way to be connected to a power source. The Arduino UNO can be powered from a USB cable coming from your computer or a wall power supply that is terminated in a barrel jack Pins (5V, 3.3V, GND, Analog, Digital, PWM, AREF). The pins on the Arduino are the places where you connect wires to construct a circuit.

Arduino Mega: The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. The MEGA 2560 is designed for more complex projects. With 54 digital I/O pins, 16 analog inputs and a larger space for your sketch

LCD MODULE: LCDs can add a lot to any application in terms of providing an useful interface for the user, debugging an application or just giving it a "professional" look. The most common type of LCD controller is the Hitachi 44780. Here we use 16*2 LCD display

A WI-FI module is basically, a complete WI-FI solution, which have self contained operating system and integrated TCP/IP protocol stack that can be easily connected to microcontroller for gaining the access to any WI-FI network.

**International Journal of Engineering Research in Electronics and Communication
Engineering (IJERECE)
Vol 6, Issue 4, April 2019**

This module has the capability of either to give or gain the applications and functions from other module or processor. means that this also have the facility of hosting or uploading the functions and applications.

GPS: GPS stands for Global Positioning System by which anyone can always obtain the position information anywhere in the world.

IR SENSOR: Infrared technology addresses a wide variety of wireless applications. The main areas are sensing and remote controls. In the electromagnetic spectrum, the infrared portion is divided into three regions: near infrared region, mid infrared region and far infrared region

V. SOFTWARE IMPLEMENTATION

IN-Bus module:

- Module should be initialised first
- IR sensors counts the number of students/stops entering and leaving the bus
- GPS updates the current location of the bus continuously
- The count of students/staffs and the bus location is displayed through the LCD screen
- The count of students/staffs and the bus location is uploaded to the firebase continuously with precision

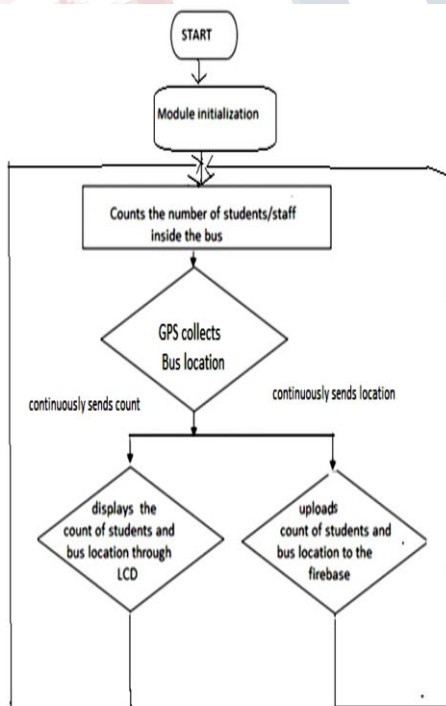


Fig:Flow Diagram of In Bus Module

Bus stop module

- Module should be initialised first
- The bus information containing bus location and number of students/staffs is retrieved from the firebase that was uploaded by the IN-Bus Module
- The information is then displayed through the LCD screen

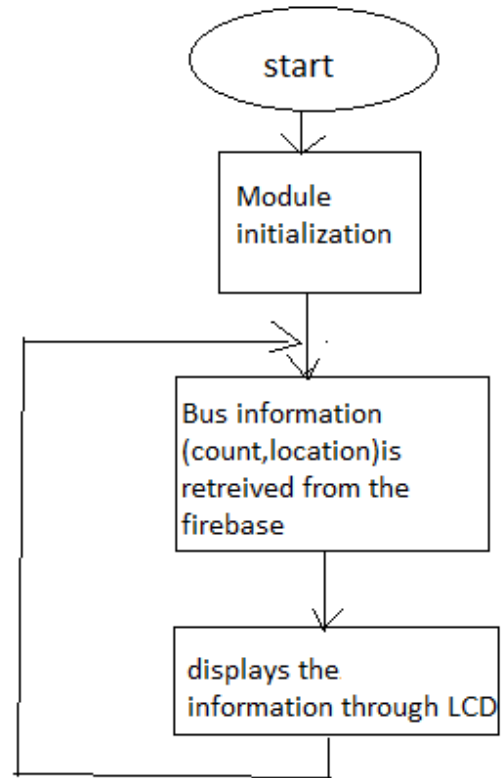


Fig: flow diagram of Bus Stop Module

VI. WORKING MODEL

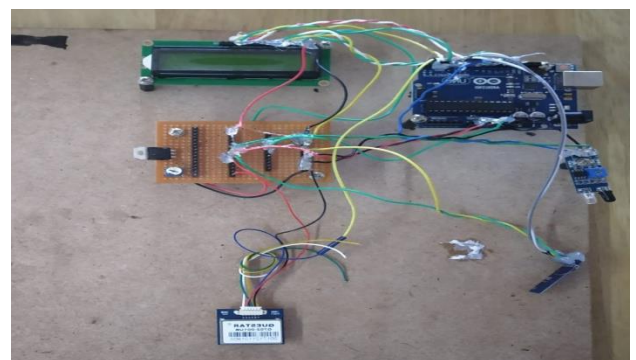


Fig:IN Bus module

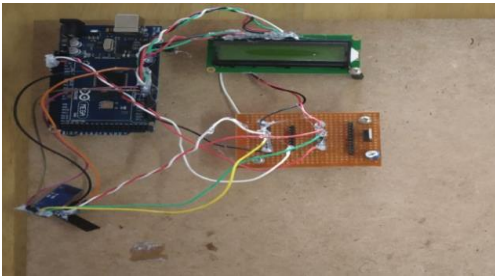


Fig:Bus Stop module

The working model of Smart Bus Tracking System is shown above. All the components are embedded on PCB. The system provides the latitude and longitude value of a current location of a bus that is displayed through the LCD. The system provides the information about the bus position at remote locations which is updated through the mobile application and also displayed through LCD. The system also provides count of the number of filled seats inside the bus as displayed and obtained through mobile application.

VII. RESULTS

The proposed model was implemented in the bus and the snapshots of the results obtained are shown below



Fig:GPS Tracked current location of a bus.

LCD displaying count of students/staff in the bus:

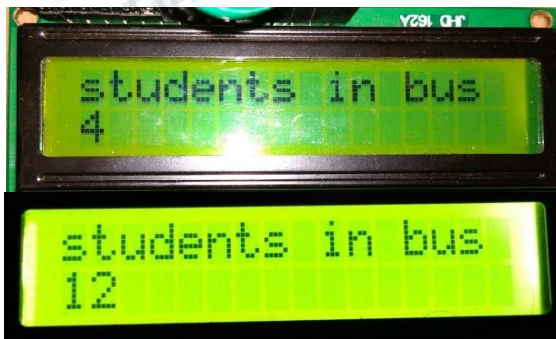


Fig: count of number of students/staff in the bus

CONCLUSION

The conclusion of this study suggests that knowledge of specific domain improves the results. This project has been implemented on the Android platform. Also, different attributes have been added to this project, which proves advantageous to the system. We have reviewed various existing techniques of college bus tracking. By implementing this idea, we can improve the transportation safety and the quality of services to the college buses. The system will have the latest technology and optimized algorithms with moderate cost. The Android application gives the information about the college bus for students and staff. The proposed system is more user-friendly than the existing system. And it also gives greater performance. The system may focus on accurate arrival time prediction and real-time position of the bus. The system can be installed in Android phones.

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