

Smart Bus Stop System

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Abstract— In this project we try develop a system through which user can access real time bus and passenger information such as, available seats in bus, bus route, bus number and user can also get information about arriving and departure time of bus. This system also counts number of passengers in bus through which we can do comfortable seating. For designing this system we use GSM module, Arduino mega, IR sensor and object sensor, LCD and speakers etc. This system is mainly divided into two parts bus module which transmitter part and bus station module which is receiver part. Main goal of over project is make people independent for traveling, comfortable traveling and save time of people. This project is blessing for handicap and visitors. In case of any emergency like an accident, any problem in bus this system useful to pass automatic message to the bus station.

Key words: Smart Bus Stop System

I. INTRODUCTION

In this system user can access real time bus and passenger information such as, available seats in bus, bus route, bus number and user can also get information about arriving and departure time of bus. This system also counts number of passengers in bus. For designing this system we use GSM module, Arduino mega 2560, IR sensor and RFID module.

A. Problem specification

Current system displays the route, time and Bus number. But this system may helpful to passenger to Connect directly with bus and bus station through GSM. In this system we also use IR sensor which counts the number of passengers in bus by this function we intend to do comfortable setting arrangement, that means if the number of passenger is more than available seats this system generate the message like, bus cannot be able to handle the load. The other thing is that in this system we display the status of each bus on every bus stop which is in rout of the bus through this chart passenger able to know next Bus's current status. Entry of bus at the station is done manually in current system. Instead of this in our system every bus has their particular identity card which is scan the bar code number of bus and entry will be automatically done. Form this the time accuracy is maintained as well.

B. Materials/Tool required

In this project we required Arduino mega software for the programming. We also used Proteus circuit designing tool for the designing of the circuit diagram. We required and LCD for display the rout and stops .IR sensor for counting the passengers and RFID module .we also require wooden material for making working module. [3]

II. IMPLEMENTATION

A. Block diagram

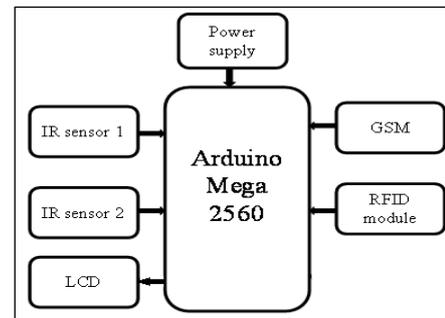


Fig. 1: Block diagram

The implementation of proposed system mainly involves GSM, IR SENSORS, using ARDUINO MEGA 2560 microcontroller based. The block diagram of the system is shown as in the Figure. It also contains the RFID module that connect bus stop with the buses and provides data to the announcement system. [5]

The smart bus stop system mainly consists of the following features.

- 1) Passengers counting using IR sensors.
- 2) Location tracking using GSM
- 3) Bus tag identification by RFID module
- 4) Data and status update display on smart phone app.
- 5) Route display on LCD

1) Passengers counting using IR sensors:

We have done the Passengers counting with the help of IR sensors. Here IR sensor 1 detects the entering person and if IR 2 senses the person after IR 1 it means the person is entering and it increases by 1. If IR 2 cuts the first and IR 1 then the person takes exit and it decreases by 1.

2) Location tracking using GSM:

GSM 900 module tracks the longitude and latitude of the location and provides that information on LCD display.

3) Bus tag identification by RFID module:

This is a low frequency (125 KHz) RFID reader with serial output with at range of 8-12cm. It senses the RFID tag and display on the bus stop arrived bus information.

4) Data and status update display on smart phone app:

The tracked location, bus route, passenger's information with arrival departure is displayed on the smart phone app on the passengers mobile.

5) Route display on LCD:

Each information that is related to bus, passengers, and status update is displayed on the LCD display.

III. COMPONENTS DETAIL.

A. Arduino mega board (2560)

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 Digital input/output pins (of

which 14 can be used as PWM outputs), 16 analog inputs, 4UARTs, 16 MHz crystal oscillator, USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get Started. The Mega is compatible with most shields designed for the Arduino Due milanove or Decimal.

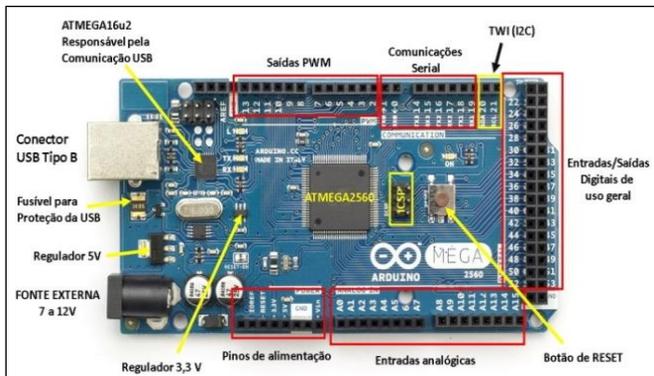


Fig. 2: Arduino Atmega 2560

B. Infrared sensor (IR sensor)

An Infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. This type of sensor measures only infrared radiation, rather than emitting it, that is called as a passive IR sensor

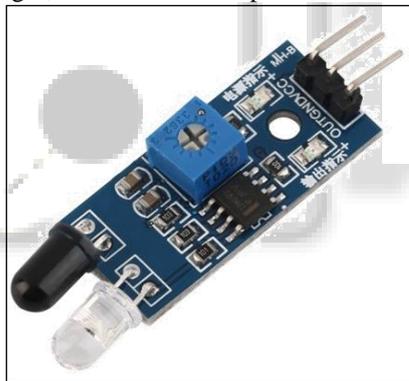


Fig. 3: IR sensor

C. RFID Reader Module

This is a low frequency (125 KHz) RFID reader with serial output with at range of 8-12cm. It is a compact unit with built in antenna and can be directly connected to the PC using RS232 protocol and with the FID abbreviation of RS232protocol of Radio Frequency Identification.

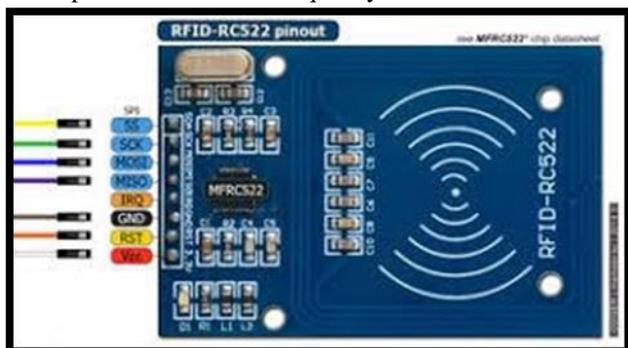


Fig. 4: RFID module

D. GSM module

GSM (Global System for Mobile) / GPRS (General Packet Radio Service) TTL-Modem is SIM900 Quad-band GSM / GPRS device, works on frequencies 850 MHZ, 900 MHZ, 1800 MHZ and 1900 MHZ. It is very compact in size and easy to use as plug in GSM Modem. The Modem is designed with 3V3 and 5VDC TTLinterfacing circuitry, which allows User to directly interface with 5V Microcontrollers (PIC, AVR, Arduino, 8051, etc.) as well as 3V3 Microcontrollers (ARM, ARM Cortex XX, etc.). The baud rate can be configurable from 9600- 115200 bps through AT (Attention) commands. [8]

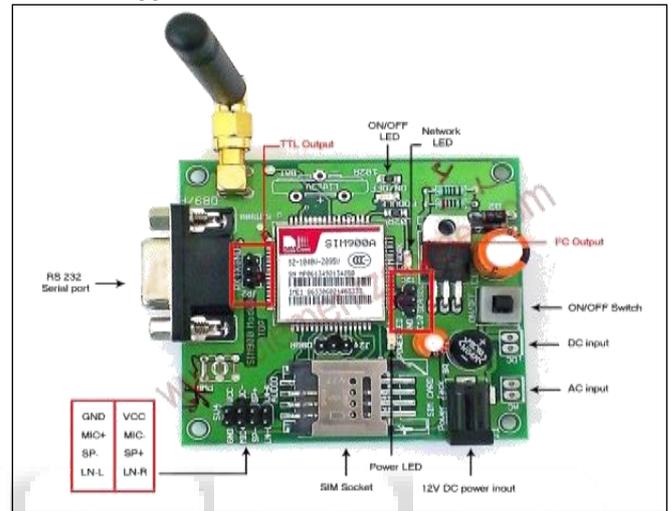


Fig. 5: GSM module

E. Smart phone application.

The smart application is installed in the mobile for the check of status update and numbers of the passengers. it locates the longitude and the latitude of the Bus and informs the passenger about it via message for the reserved passengers. The working of the smart phone application is based on JAVA, the algorithm is shown in the figure. It displays the location on the google map.

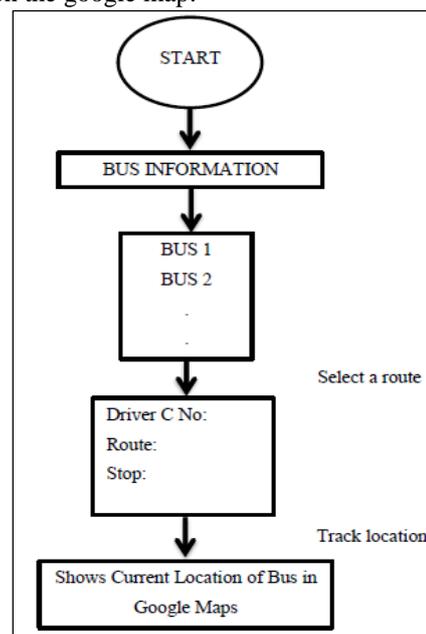


Fig. 6: Flow Graph of tracking application

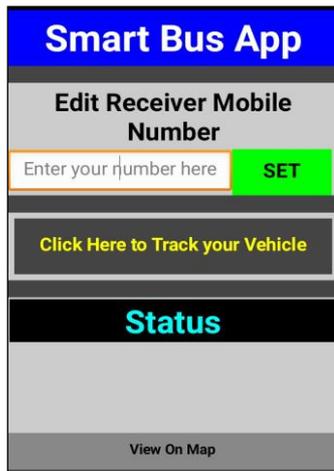


Fig. 7: Smart phone application

IV. SOFTWARE PROGRAMMING



Fig. 8: Software program

V. CIRCUIT DIAGRAM

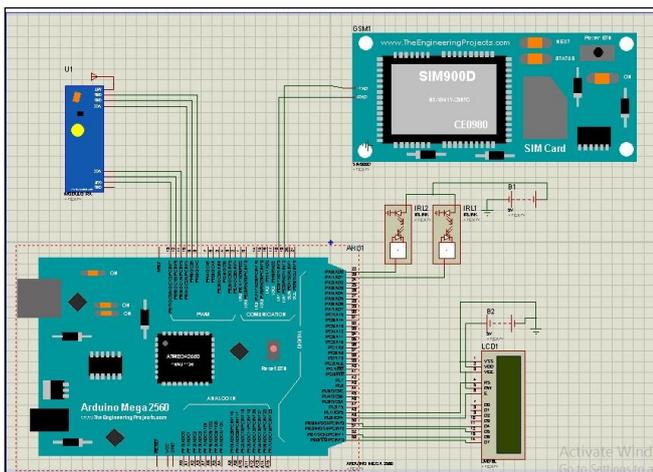


Fig. 9: Circuit diagram

The circuit diagram of the smart bus stop system is shown figure. The sim 900 and RFID module interfacing with the arduino mega 2560. IR sensors are us3d to count the number of passengers and arduino mega decodes the information and display it on the LCD.

VI. CONCLUSION

The objectives of this project has been achieved which was developing the hardware and software for smart bus stop system. From observation that has been made, it clearly shows that its movement is precise, accurate, and is easy to control and user friendly to use. In this project we use wireless technology to connect Buses, Bus stops and users. We try to develop user friendly interfaces for accessing real time transits data. The people with special needs in traveling they become independent by public transit system.

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VII. FUTURE SCOPE

In this system if we add an automatic announcement so, we can announce bus route, number and arriving and departure time at each stop. We can also use seeedunio mega in place of the Arduino board. We can also increase the range of communication and if we modify the programming and component then reduce the complexity of system.

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