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Bus Location and Passenger Alert System using Zigbee

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Abstract— Locating a public transport bus and to transfer it location to the knowledge of people using gps, rf id tags and gprs are all useful, but the main objective is not yielded with this where the people receives information with many delay and thus people get misguide with different bus in the crowed metro city, In this project a bus location monitoring using zigbee is used. The passengers in the bus stops is provided with a zigbee Trans receiver which gets the data from the zigbee Trans receiver of the incoming bus. The arduino controller makes the gprs (sim900) displays the data in the bus stops and also it takes the data from the zigbee and sends it to the control section of transportation and also to other target bus stops .thus the passengers in the bus stops can be aware of the buses coming so they can board their respective buses. The bus stops details are displayed inside the bus along with audio using programming. The controllers used here is an arduino controller (ATMEGA238) and (ATMEGA2560). This idea also reduces traffic and overloading of public in buses.

Keywords: Bus Location and Monitoring, Zigbee Trans receiver, Gprs (sim900), Arduino controller

I. INTRODUCTION

The greatest challenge in today's life is bus travelling in a metro city. Rush in bus and bus unavailability makes people tired of it. The passenger inside the bus are also unaware of the bus stop due to rush inside the bus. The passenger waiting for the bus at the bus stop are aware of the incoming buses and their location thus they get stressed and may take a costlier mode of transport to reach destination in time. Thus they waste their money in other mode of transportation.

Also people sitting inside the bus misses their bus stop to step down due to over crowd inside the bus.

In order to overcome this problem local government may use GPS system to locate the bus and thus they can inform the people in the bus stop about the bus location and the people inside the bus also get information about the bus location inside the bus using GPS system. The GPS location can also be sent to the control section of transportation using gprs thus they can monitor the bus location. But the problem is not reduced in this system it has been increased. The GPS usage may get delay in locating the moving bus and also the usage of internet may cost local government high thus this system may create a major trouble of giving wrong information to the people and may also mislead them to different bus stop.

To overcome the drawbacks in currently applicable ideas we have proposed a Bus monitoring and location alert system using zigbee. In this method many ideas have been implied to overcome the drawbacks, zigbee is connected with gprs module to provide an enhanced level in data communication [1]. Zigbee is used in the bus stop to receive the information from the bus and gprs is also connected with zigbee to send the data received as a message to other bus stops. Zigbee is used in the bus to transfer the data of the bus to the zigbee at the bus stops [2]. The bus stop information is provided to the people inside the bus through programming. Zigbee is a low cost component to transfer a data [3], thus zigbee is combined with gprs system to locate the bus coming towards a bus stop. Alerting the people inside the bus about the bus stop information is also done. Thus an Automatic bus location and passenger alert system is made to provide a luxurious ride to the passengers [4]. Thus a flexible and automatic location alert to public is done with low cost.

II. METHODOLOGY

The overall block diagram of the proposed system is shown in the figure 1. The overall system consist of bus module, bus stop module and control section module. The main objective the of the overall system is that the bus stop module will get information of the bus module using Zigbee and displays the bus information through lcd display the GPRS is used to transfer the data to other bus stops and control center. The bus module consists of an arduino controller board connected with a Zigbee Trans receiver and with an LCD display. The bus module sends the data of the bus through Zigbee to other Zigbee at different bus stops thus the information of the bus is sent to bus stops through this module. The bus stop module consists of Zigbee Trans receiver and GPRS (sim900) and an LCD.

Display connected with an arduino controller. The bus stop module receives the information from the bus module and displays the information of the bus at the bus stop, then through GPRS it sends the data of the bus to other bus stops and control center. The control center module consists of an arduino controller with a GPRS module and LCD display. The control center module receive the information sent from every bus stop and displays it in the display.

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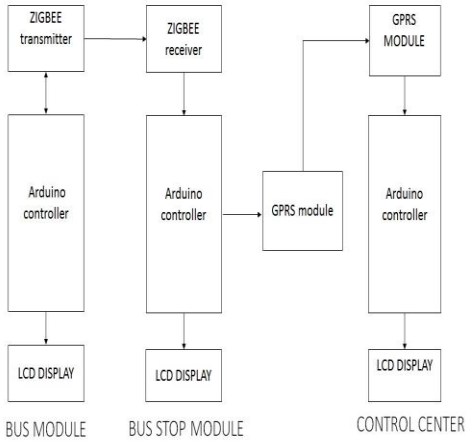

Fig.1.Functional Block diagram

A. *Bus Module:*

The bus module consists of an arduino controller connected with a zigbee transmitter and an LCD display. The arduino controller powered by a power supply of 5v by a battery. The Zigbee is connected to the arduino, the arduino is programmed in such a way that the zigbee sends a data of the bus to the Zigbee receiver of nearest bus stop module. The arduino is also programmed such that it displays the route and information of the bus inside the bus. The fig 1 displays the block diagram of the bus module. The zigbee Rx pin and arduino Tx pin is connected and arduino Rx pin and zigbee Tx pin is connected for serial communication through which data is to zigbee. Zigbee is powered from the battery. The LCD display is connected to the arduino digital output pins. The working of bus module can be seen in Fig 8

B. *Bus Stop Module:*

The bus stop module consists of an arduino controller with a zigbee end device and a GPRS module also an LCD display. A 5v battery is used to power all the components. Here the arduino controller is different from bus module due to the use of two communication devices we used an arduino mega controller. In arduino mega controller it contains separate pins for communication thus it will be useful for bus stop module. The zigbee and gprs is connected to arduino mega and arduino is programed that the zigbee waits for any data and when connected to any coordinator it gets the signals from the coordinator zigbee and displays the message in the lcd displays then gprs module is programmed in a way that it sents a message about the bus to the other bus stops and control center. The working method of bus stop module is shown in Fig 9.

C. *Control Center:*

The control center has an arduino controller with a gprs receiver end also an LCD display. The gprs receiver receive the data from various gprs transmitter and displays the information in the display. With the use computer they can be stored for future analysis. The gprs is connected to the Rx and Tx pin of the arduino controller and LCD display is connected to the digital output pin of the controller. The control center regularly monitors the bus location and thus it makes a record of bus speeds which will be useful for future purpose.

III. COMPONENTS INVOLVED

A. *.Arduino Controllers:*

The ARDUINO Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller [5], simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. This arduino board is used for bus module and control section module.

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. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. This controller is used for bus stop module where two communication device are involved. The arduino controllers are shown in the figure 2 and 3.

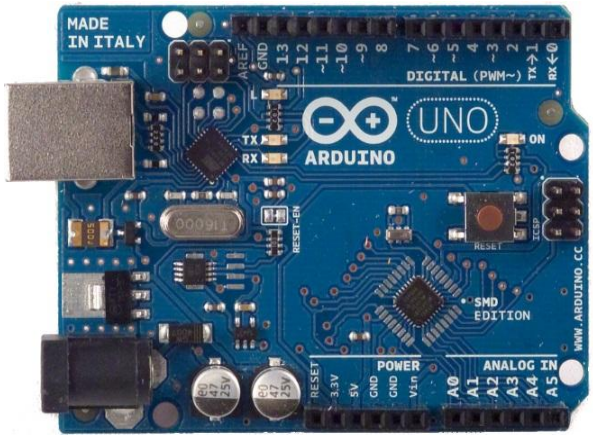

Fig 2 Arduino uno controller board

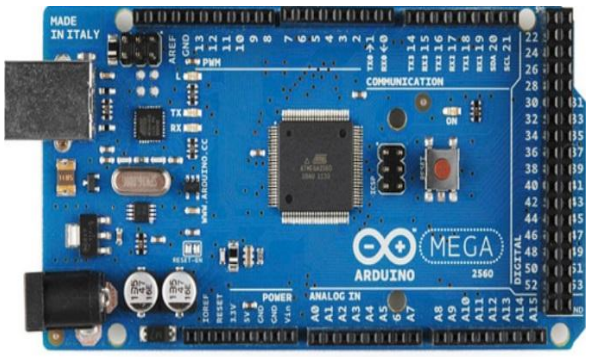

Fig 3.ARDUINO MEGA controller board

B. Zigbee

ZigBee is a low-cost, low-power, wireless mesh network standard targeted at wide development of long battery life devices in wireless control and monitoring applications. Zigbee devices have low latency, which further reduces average current. ZigBee chips are typically integrated with radios and with microcontrollers that have between 60-256 KB flash memory as shown in fig 4. ZigBee operates in the industrial, scientific and medical (ISM) radio bands: 2.4 GHz in most jurisdictions worldwide; 784 MHz in China, 868 MHz in Europe and 915 MHz in the USA and Australia. Data rates vary from 20 kbit/s (868 MHz band) to 250 kbit/s (2.4 GHz band).zigbee has a coordinator and end device to send and receives the data. Zigbee pin configuration is shown in Fig 5.

Fig 4 zigbee board

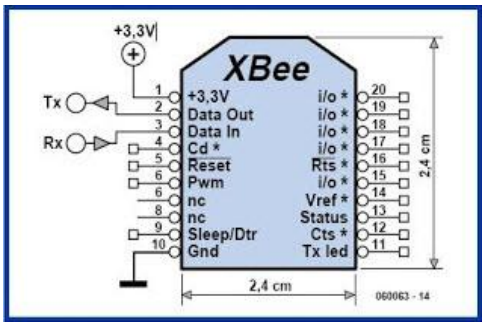

Fig 5 zigbee pin diagram

C. GPRS

GPRS module is a breakout board and minimum system of SIM900 Quad-band/SIM900A Dual-band GSM/GPRS module. It can communicate with controllers via AT commands.

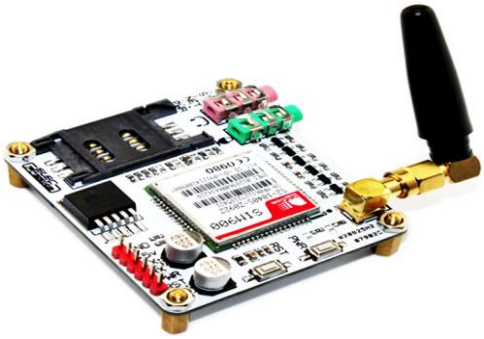

Fig 6 GPRS MODULE (SIM 900)

It has tx pin and rx pin trough which communication can take place. Here 5v power supply is provided to the gprs module. Gprs can be explained from Fig 6 .

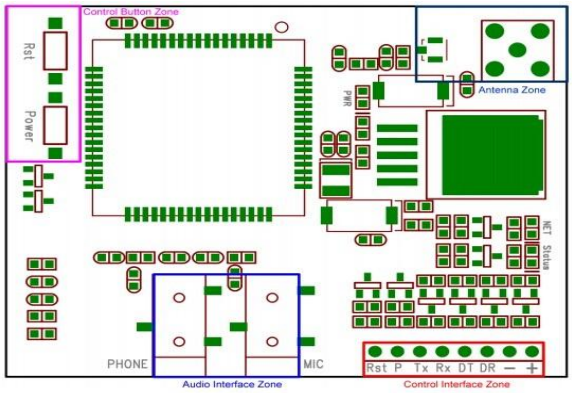

Fig 7 GPRS board pin connection

GPRS pin diagram is well explained from the Fig 7.

D. Flow Charts

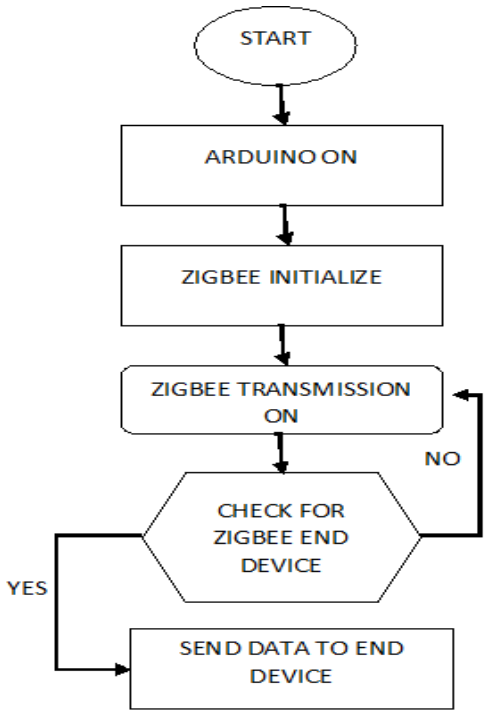

Fig 8 Bus module flow chart

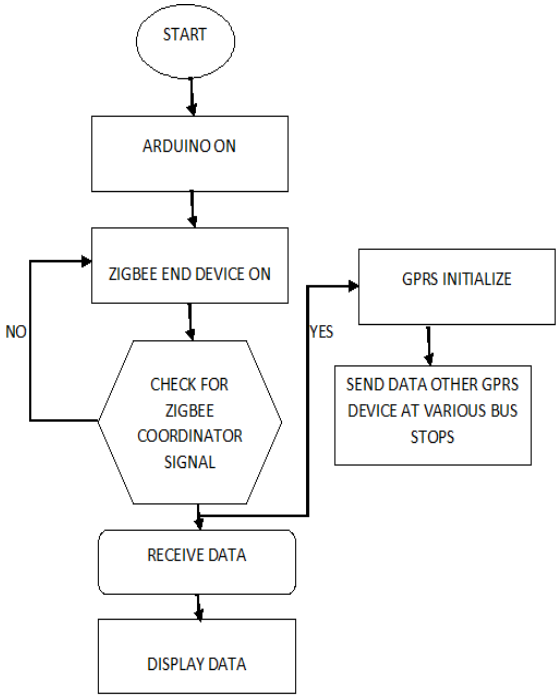

Fig 9 Bus stop module flowchart

IV. CONCLUSION AND FUTURE WORK

The bus stop zigbee checks for other zigbee coordinators continuously when a coordinator enter the region the data is send to the end device zigbee in the bus stop thus information of the bus is displayed in the bus stop. The gprs module carry the message to other bus stops .the people sitting inside the bus are also informed about the bus stops through programming.

Thus the people in the bus stops and people in the bus will have a luxurious drive by knowing the bus stops and the bus coming towards the bus stops. This system will be an efficient and low cost one due to the use of zigbee. Thus this paper gives a complete passenger friendly system, this idea can be improved with further work like improvising the bus details to control center ,adding voice information to the passengers, timing of the can also be added to the information, multiple bus issue may be solved using various methods.

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REFERENCES

[1] Aswin sayeeraman, P.S.Ramesh,. Zigbee and Gsm Based Secure Vehicle Parking Management and Reservation System Journal of Theoretical and Applied Information Technology 31st march 2012. vol. 37 no.2

[2] He feng , li lulu yin , Heng Huang Xia Bus Monitoring System Based on Zigbee and Gprs 2012 International Conference on Computer Distributed Control and Intelligent Environmental Monitoring

[3] Zigbee alliance. Zigbee specification [eb/ol], 2008. http://www.zigbee.org.

[4] G.Lavanya, Preethy. W, Shameem.A, Sushmitha.R Passenger Bus Alert System for Easy Navigation of Blind. 2013 International Conference on Circuits, Power and Computing Technologies [iccpct-2013]

[5] Arduino mega controller and Arduino uno controller. Arduino controller specifications. http://www.arduino.cc