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Development of an Efficient Public Transport System Using Zigbee and RFID

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Abstract—
This paper describes the Development of Efficient Public Transport System using Zigbee and RFID. The efficient public transport is very useful and immensely required in the public transport system as it communicates with the passenger and gives the exact location of the bus in real time. The real time location of the bus in the public transport system makes it information efficient and unmatched system. The efficient public transport system can replace the conventional bus system with its effective efficiency. This paper shows the use of short range communication medium Zigbee as a reliable and cost effective medium and moreover Radio Frequency Identification (RFID) is used for validation of the BUS at different Bus Stops.
Keywords— Arm LPC 2148, Zigbee, RFID, LCD.

I. INTRODUCTION

IN the past few years due to increase in the population, enhancement of standard of living of people, developing economy and rising level of vehicles public expectations have increased enormously. In the present condition of the public transport travelers don not have information to choose their bus for their respective destination. The travelers are unaware with the routes that the particular bus will follow. Travelers even don't know the time required by the bus to reach the bus stop. Travelers face many problems in choosing the right and appropriate bus that will lead them to desired destination.

Wireless communication plays a very important role in the streams' of Army, Navy and Medication. In the Previous some years the use of communicating from one point to other is done by Walkie Talkie. Then after the development in the field of technology the various devices such as GSM Modem, Internet, Wimax etc are deployed for the communication purposes.

"Public Transport System" for the passengers in the public transport system uses a wireless technology called "Zigbee". Zigbee is more efficient, accurate and less expensive. This research is not only to develop the efficient public transport system but to make available of good option when these system compared with the other traditional system and can be used where there is no internet connection, 3G ,

WIMAX or other wireless communication systems available .

This paper describes the efficiency and competency of Zigbee. Up till now the use of Zigbee was carried only in the internal operation of vehicle or indoor applications. This paper gives the idea of making use of Zigbee as inter vehicle i.e. vehicle to vehicle communication or vehicle to infrastructure communication. The Zigbee devices is used to communicate between the Bus module and the Bus stop module the use of Zigbee will minimize the total cost of the system as Zigbee is low cost than other wireless communication devices. The power consumption of Zigbee is also low as compared with other wireless communication devices such as wifi. By the ability of Zigbee to consume low power it can be employed in mountainous regions where power is major factor to be considered.

Generally GPS is employed to track the location of the vehicle and the information is updated in internet for accessing. As the information is stored in internet, it can be accessed by everyone, but there is no use in providing the information to everyone as the people who are using the specific location can only be profited. In this system, the same data such as bus route and bus location is obtained without using GPS and internet in a cost effective manner.

For a long time in urban areas there are several issues faced by the people due to traffic conditions.

However, recently, the urban transportation system has been developed because of the arrival of the wireless technology. The public transportation system will dispatch and command the people about the public traffic vehicles automatically along with the time of vehicles via the electronic bus stop boards thus reducing the travel time of passengers . The implementation of the Efficient Public Transport system must be under the assistance of innovative ideas and the support of sophisticated techniques. The Public transportation system has a big place in the entire urban areas. The intelligent public transportation based on ZigBee and RFID will become an active area of research in industrial applications.

II. SYSTEM ARCHITECTURE

The Efficient Public Transport System contains two modules.
1. Bus Stop Module.
2. Bus Module.

Both the modules have Zigbee interfaced to it as a need of transfer of data between two modules.

2.1 Bus Stop Module

The most important part of efficient public transport system is a Bus stop module. Bus stop module makes the use of microcontroller which is further interfaced with different devices assigned for particular tasks. One of device that is interfaced with microcontroller is Zigbee which has been employed to obtain the communication i.e. data exchange between Bus stop and Bus stop Module. Microcontroller used in the module is LPC2148 which is interfaced with the Display. Display used in the module is 16X2 alphanumeric displays. It displays the stop name the bus arrived at. Bus module will also display the latest bus that is going to arrive at the Bus stop.

Rfid reader is interfaced with LPC2148. The use of RFID reader is to validate the Bus arrived at the Bus stop. Different Buses are attached with distinct RFID Tag. As soon as the RFID Tag makes available in the range of the RFID Reader the respective Bus will be validated and the module will display the arrival of Bus and also the module will transmit the data. i.e. the arrival of the respective bus to the next stop. The next bus stop will also be information efficient regarding the latest bus that is to arrive.

The Bus stop module also contain EEPROM. The use of EEPROM to store the database regarding the Bus ID and Destination . The EEPROM is also used to store the response that need to be transmitted for the arrival of the particular Bus.
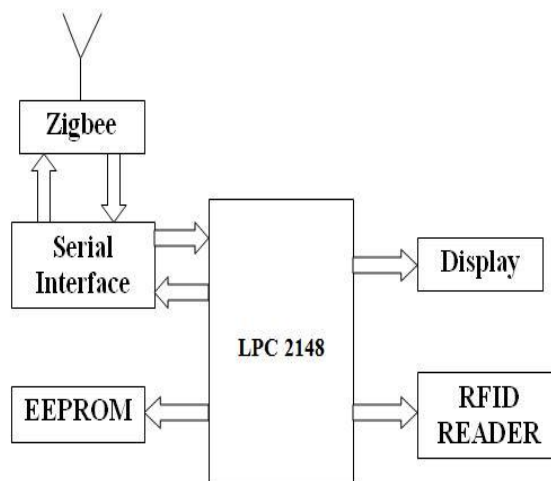

Figure 1: Block Diagram of Bus Stop Module

2.2 Bus Module

The second module that is present in the efficient public transport system is the Bus module. Bus module also makes the use of NXP Microcontroller LPC2148 which is responsible for manipulating all the devices that are interfaced to it. Zigbee tranciever is used to make the communication between stop module and Bus module. Zigbee is connected to the microcontroller using serial interface.

Each Bus module has unique identification Id number. These Id number is referred to the RFID tag. Reader validate tag and the unique tag number is stored in the EEPROM and respective Bus is identified. Display is used to notify the passenger the current Bus Stop and which is the next bus stop.
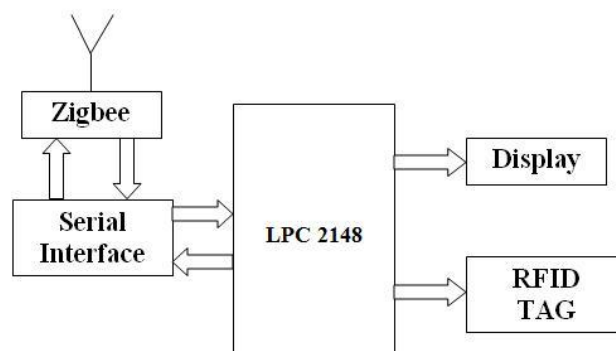

Figure 2: Block Diagram of Bus Module

2.2 Routing Module

Router is used when the distance between the two bus stops is larger than the range of Zigbee to communicate. Hence the routing module can be employed for the communication over the larger distance.
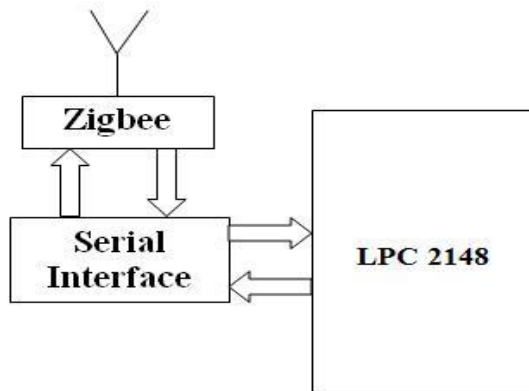

Figure 3: Block Diagram of Router Module

III. OPERATION OF MODULE

There are basically two important modules in the efficient public transport system.

1. Bus Stop Module
2. Bus Module

Bus stop module contains RFID reader and bus module contains the RFID tag. Whenever any bus reaches to the bus stop the RFID reader validates the RFID tag that is been attached to the bus module. This validation is matched with ID number that is stored in EEPROM that is interfaced with ARM LPC2148. After the validation the bus stop module displays the name of the bus that is arrived at the station in displays attached to the module.

At the same time bus stop module transmits the information regarding the arrival of the bus to the next bus stop using Zigbee as a communication medium. The next bus stop passenger now posses the exact location of the bus. In the transmission of the data regarding the position of the bus at the bus stop makes the passenger to know the location of the bus and the upcoming that is to be followed.

IV. OVERVIEW OF EFFICIENT PUBLIC TRANSPORT SYSTEM
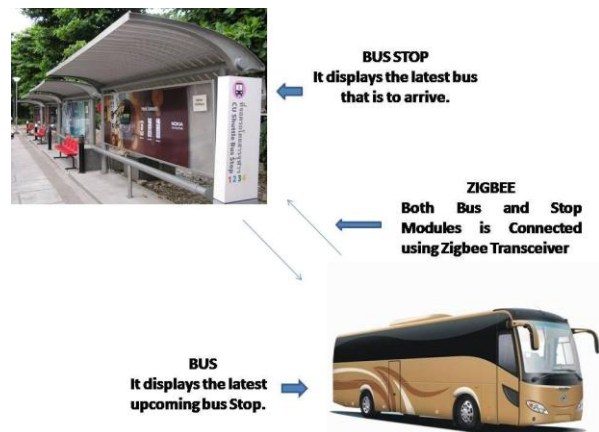

Figure 4: Overview of Efficient Public Transport System

The diagram gives overall idea of working of Efficient Public Transport System. Every Bus have a Bus Module and Bus Stop contains a Bus Stop Module. Unique Id is attached with Bus so whenever any bus reaches stop it get validated and the next stop is informed.
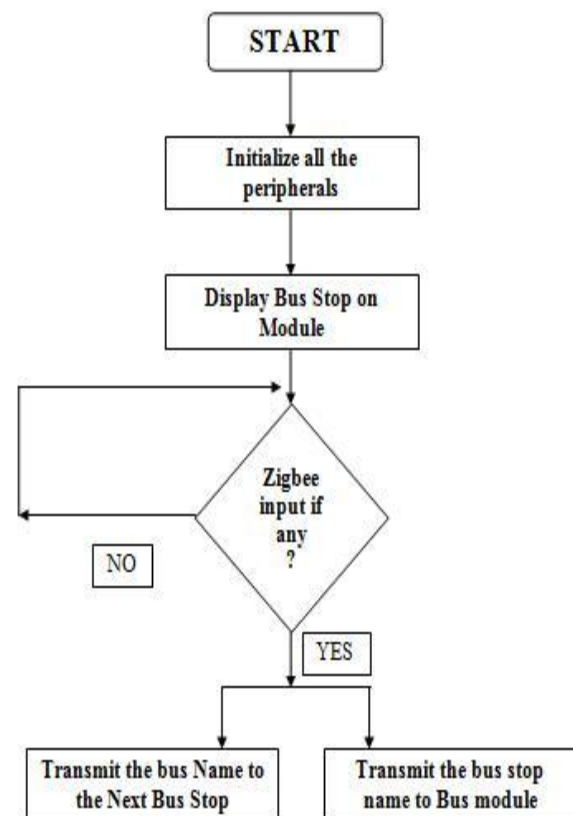
V. FLOW DIAGRAM

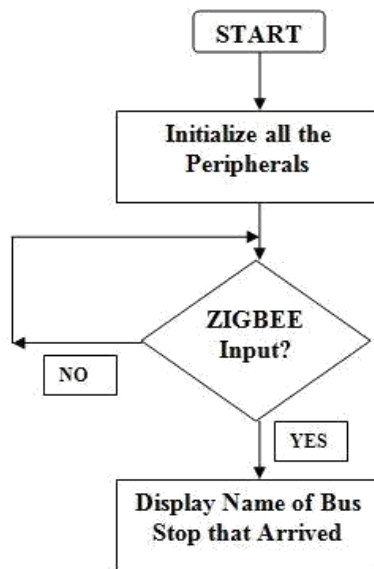Figure 5: Flow Chart of Bus Stop Module

Figure 6: Flow Chart of Bus Module

VI. RESULT

Fig. 7 shows the output of the Bus module. Displays shows the module is waiting for the update. As soon as any update arrives after validation displays shows the name of the bus stop.

Figure 7: Output

VII. CONCLUSION

The Efficient Public Transport System is a reliable and cost effective system. By the use of Zigbee for the communication purpose the cost of the system reduces greatly. Power consumption also reduces due to Zigbee. Urban areas have a lot of requirement of this system as the traffic density is high in cities. The system is able fulfill thee demand of passenger by providing them the real time information of the bus and its location. The system is cost effective. All these make the Efficient Public Transport System Rich and Reliable

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