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The Application of ZigBee Technology to the Intelligent Bus Query System

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ABSTRACT

In this modern generation, number of vehicle has been increased vigorously; this has become the main issue for traffic congestion and pollution in cities, mainly during the peak hours. Most of the people choose bus transportation for their safe journey. It is becoming difficult for the passengers to choose the right bus route at right time. The proposed system describes the implementation of real time and intelligent bus query system for the public transport using ZigBee as a communication medium. It gives the data such as bus locations, bus number, and number of persons in the bus. This system is more flexible and efficient when compared to the conventional methods. With this system we can easily choose the travel path and save our time. We discuss about the usage of wireless technologies in the real time bus query system and how it is more efficient than the conventional methods.

INTRODUCTION

The paper proposes a system which is showing interest on enhancing the usability and productivity of existing bus transportation system in Indian cities. The technology used has a role to play for

completion of the goal by means of providing an effective solution by establishing a wireless communication network in the city. This paper introduces a complete framework as an improvement to the existing city bus public transport system in India. Arrival Time Prediction of bus in real time and approximate Seat Availability in the bus. Zigbee and GPRS Technologies can be utilized to establish a wireless network among Buses, Bus Stops and Central Bus Stand in order to create the interconnection. The paper also suggests modifications in the design of currently used Digital Ticketing Machine to implement the feature of conveying the seat availability. Zigbee modules are used for short-range communication. The improvements that are performed in the system are expected to encourage more and more people to use public transport in order to overcome the problem of traffic and excessive fuel consumption.

LITERATURE SURVEY

Road traffic is a major problem worldwide. In India, a fast growing economy, the problem is acutely felt in almost all urban areas. This is happening because infrastructure growth is slow compared to

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growth in number of vehicles, due to space and cost constraints. Secondly, Indian traffic is being a non-lane based and completely different from the western traffic. The difference can be understood only through experience, but some examples can be seen. Thus, smart Transport Systems, used for efficient traffic management in developed countries, cannot be used as it is in India. ITS techniques have to undergo adaptation and innovation to suit the contrasting traffic characteristics of Indian roads. In this position paper, we present a comprehensive study of all available ITS systems, including both research prototypes and deployed systems. Finally, we list a set of public and private organizations, that play a role in Indian traffic management and research, as meaningful collaboration between field practitioners and researchers is needed for efficient transfer of relevant technology.

EXISTING SYSTEM

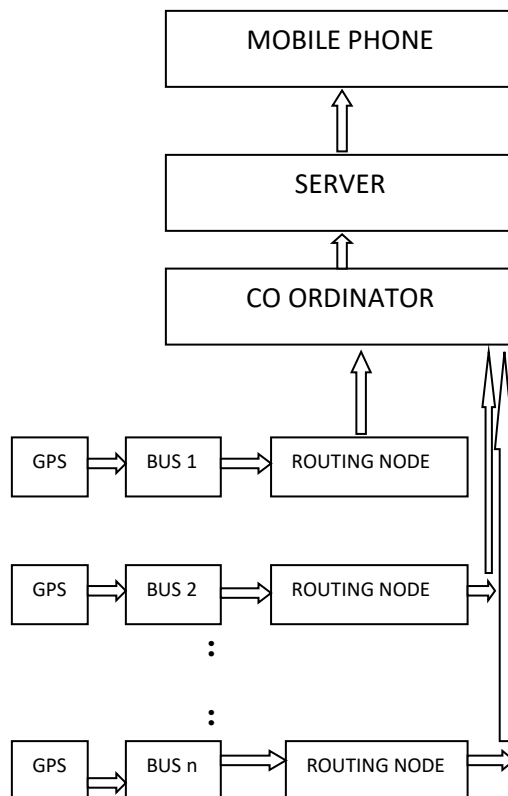
In existing systems there is no facility like location of bus. Only ticket collection automation is available. But in proposed system we got all these features with single solution.

PROPOSED SYSTEM

In proposed system each bus having ZigBee connectivity. Using this communication user can know bus position through GPS technology and in each station through zigbee communication user can know bus position. In this project LPC2148 is a microcontroller and it belongs to ARM architecture. GPS is connected to controller through serial communication. Also the

zigbee is connected to controller. Through GPS controller fetches location values such as latitude, longitude, speed, and time. The information collected by the GPS is collected by using zigbee communication. This zigbee wireless transmission network puts the data to the server data base, so that users can easily access the data base and query the position of the vehicle through their android phones.

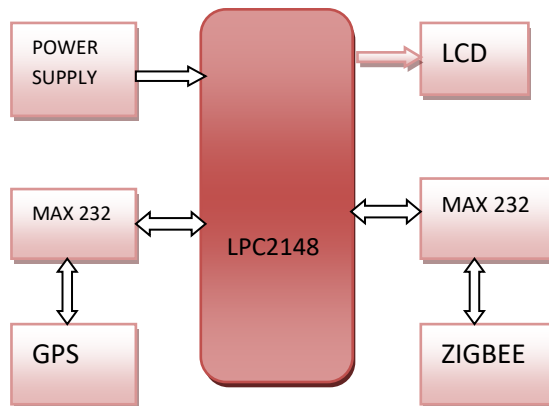
SYSTEM ARCHITECTURE



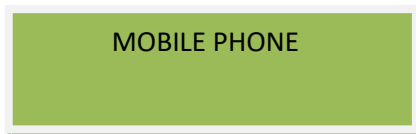
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BLOCK DIAGRAM

BASE STATION 1



BASE STATION 2



HARDWARE DESCRIPTION

ARM PROCESSOR LPC2148

ARM processor is called as RISC Machine. Many projects in embedded systems are designed by using ARM processor as the main component. ARM processor has many applications in our day to day portable consumer devices. ARM 1 is the first prototype that is developed in the year 1985; at which one billion and above ARM processors are launched in worldwide by the end of 2001. later APRM 7 was developed with high code efficiency and low power consumption.

The processor used in ARM was developed with RISC architecture. RISC architecture is

simple but provides powerful instructions, these are executed within a single cycle along with high clock speed. This ARM processor provides flexibility for both hardware and software. More flexibility is provided for software rather than hardware. RISC architecture consists of instructions, pipelines, registers, load store architecture. But the ARM design includes extend battery operation, high code density, price sensitivity, high volume applications with low cost memory devices. The programme is written in keil c and this program is dumped in to the ARM processor using flash magic software.

LCD

LCD stands for liquid crystal display. LCD is finding wide uses by replacing the seven segment LEDS. LCD is a flat panel display or electronic visual display or video display that uses light modulating properties of liquid crystal. Main reason for using LCD is due to its declining prices and efficient display. Liquid crystal does not emit light directly. They display alpha numeric digits, characters.

POWER SUPPLY

Power supply is the source of electricity. This power supply unit provides power to the systems in the required amounts to the required stages. This section is required to convert the AC signals to DC signals. It also reduces the amplitude of the signals. It converts the 230V AC signals to DC voltage with different amplitudes of +5V to +12V for different applications. This power supply section consists of step down transformer,

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bridge rectifier, capacitors, voltage regulator.

GPS

A GPS receiver is used to calculate its position by timings of the signals sent by GPS satellites high above the Earth. The receiver uses the messages it receives to determine the transit time of each message and computes the distance to each satellite. These distances along with the satellites' locations are used with the possible aid of tri-lateration principle depending on which algorithm is used, to compute the position of the receiver. This position is then displayed, perhaps with a moving map display or latitude and longitude; elevation information may be included. Many GPS units show derived information such as direction and speed, calculated from position changes.

The navigational signals transmitted by GPS satellites encode a variety of information including satellite positions, the state of the internal clocks, and the health of the network. These signals are transmitted on two separate carrier frequencies that are common to all satellites in the network. Two different encodings are used: a public encoding that enables lower resolution navigation, and an encrypted encoding used by the U.S. military.

ZIGBEE COMMUNICATION

ZigBee protocols are intended for use in embedded applications requiring low data rates and low power consumption. ZigBee current focus is to define a general-purpose, inexpensive, self-organizing mesh network

that can be used for industrial control, embedded sensing, medical data collection, smoke and intruder warning, building automation, home automation, etc. The resulting network will use very small amounts of power.

This system uses CC2530 zigbee module to make the complete network. It consists of collecting node, routing node and coordinate node. We place a collecting node in the buses, routing nodes in the station and coordinator node is in the regional center. Mesh networks by using coordinate nodes, routing nodes and collecting nodes to send and receive the data within the networks.

PROPOSED SYSTEM

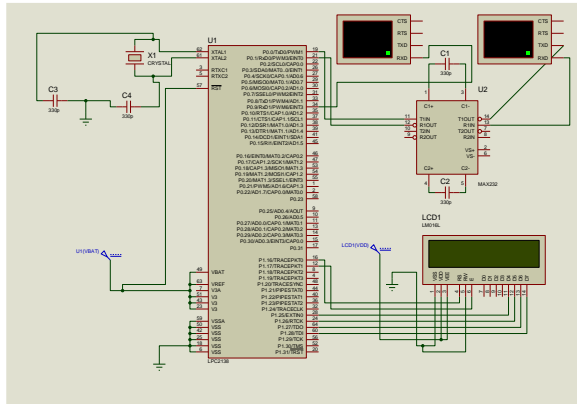
Algorithm for the proposed system is divided in two parts as

1. Initialize SPI (Serial Peripheral Interface).
2. Initialize LCD.
3. Initialize GPS.
4. Initialize zigbee module.
5. Display status of the vehicle that is in terms of time of arrival, distance from the bus to the station, and location of the bus.
6. Then this message is tracked by the users using zigbee technology.

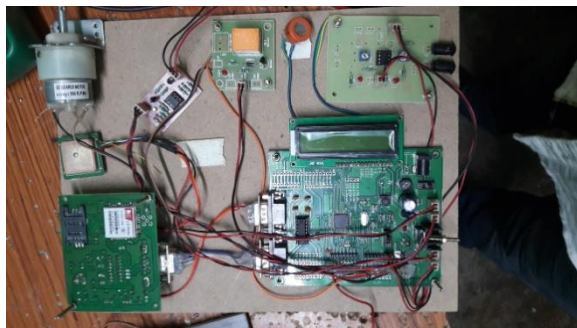
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RESULTS

SCHEMATIC DIAGRAM



HARDWARE KIT



CONCLUSION

In this Project LPC2148 connected to Zigbee/CC2500 and GPS module through two serial ports. This three combination act as a transmitter which is fixed in bus/vehicle. Microcontroller always getting GPS latitude and longitude coordinates from GPS and send these coordinates to receiver when every it send query. Other end microcontroller connected to Zigbee/CC2500 and some request switches. If any switch gets triggered it sends query to transmitter and it sends corresponding coordinated to receiver and it displays on LCD. Using this system we can see

particular bus position with respective to coordinates.

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