A smart system for public transportation using M2M architecture based on GSM technology

Srinivas [1]; Second Author*[2]& Third Author#[3]

#First-Third Department, First-Third University
Address Including Country Name
[1]first.author@first-third.edu
[3]third.author@first-third.edu

Abstract:

The paper proposes a method which is useful for the public who are facing problems with bus transportation system. This system focuses on enhancing the usability and productivity of existing bus transportation system in Indian cities. The technology which we are using had a role to play an important part for completion of the goal by providing an effective solution by establishing a wireless communication network in the city. By this system we can introduce a frame work to improve the existing system of city bus public transport in India .we can predict the Arrival Time of bus in real time and approximate number of seats available in the bus. ZigBee and GSM/GPRS Technologies can be utilized to establish a wireless network among Buses, Bus Stops and Central Bus Stand in order to create this interconnection and communication between bus and the stations. Zigbee modules are used for short range communication and GSM messaging is used for long range communication. The paper also suggests modifications in the design of currently used Digital Ticketing Machine to implement the feature of conveying the seat availability. The improvements 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.

INTRODUCTION

The paper proposes a system which focuses on enhancing the usability and productivity of existing bus transportation system in Indian cities.

The technology 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. The paper introduces a 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 GSM/GPRS Technologies can be utilized to establish a wireless network among Buses, Bus Stops and Central Bus Stand in order to create this 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 and Long-range communication is established using GSM messaging. The improvements 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

Intelligent Transport Systems for Indian Cities:

Road traffic congestion is a recurring problem worldwide. In India, a fast growing economy, the problem is acutely felt in almost all major cities. This is primarily because infrastructure growth is slow compared to growth in number of vehicles, due to space and cost constraints. Secondly, Indian traffic being non-lane based and chaotic, is largely different from the western traffic. The

International Journal of Research

Available at https://edupediapublications.org/journals

p-ISSN: 2348-6848
e-ISSN: 2348-795X
Volume 03 Issue 18
December2016

difference can be understood fully only through experience, but some example scenarios can be seen . Thus, Intelligent Transport Systems (ITS), 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. We next pose a set of interesting open research problems in the context of Indian ITS. 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. Though our paper focuses on the Indian traffic scenario because of our hands-on experience of working with it [2, 3, 4], many of the problems and solutions outlined in this paper, are relevant for other developing countries asell.

Intelligent Transport Systems In Indian cities

Road traffic congestion is a recurring problem worldwide. In India, a fast growing economy, the problem is acutely felt in almost all major cities. This is primarily because infrastructure growth is slow compared to growth in number of vehicles, due to space and cost constraints. Secondly, Indian traffic being non-lane based and chaotic, is largely different from the western traffic. The difference can be understood fully only through experience, but some example scenarios can be seen . Thus, Intelligent Transport Systems (ITS), 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. We next pose a set of interesting open research problems in the context of Indian ITS. 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. Though our paper focuses on the Indian traffic scenario because of our hands-on experience of working with it [2, 3, 4], many of the problems and solutions outlined in this paper, are relevant for other developing countries asell.

Climate change scenarioswith wireless sensor network & geo-ict: a preliminary observation

A preliminary study was carried out under shed-net condition to observe climate change scenarios on tomato crop. Wireless Sensor Network (WSN) technology was used in the studies to monitor climate parameters (temperature, humidity and CO_2 concentration) continuously under micro-climatic conditions. WSN Devices used for the studies were: FieldServer and Agrisens. DSSAT (Decision support for Agrotechnology Transfer) simulation software tool was used to determine scenarios of crop yield under different CO_2 and Temperature conditions. In addition, coping strategies were also studied to combat the change scenarios. OpenSource/Free Geographical Information and Communication Techniques (Geo-ICT) tool was used for sensor web enablement and for dissemination to the rural community. In existing systems there is no facility like location of bus and also availability of seats also not available. Only ticket automation is available. But in proposed system we got all these feature with single solution. In proposed system each bus having zigbee and GSM connectivity. Using these communications user can know bus position through SMS and in each station through zigbee communication user can also know bus position and availability seats.

OVER ALL SYSTEM DESIGN

In this designed system, ARM7 LPC2148 microcontroller is used to control all the hardware components connected to it.In this Proposed System, different types of sensors like temperature sensor,rain level sensor, humidity sensor, and sensor were used. If any fire accident occurs immediately the fire sensor gets activated,

with the help of signal conditioning unit information is sent to Micro controller(LPC 2148) ,it activates the alarm and message is sent to base station 2 using zigbee Modem and the information is displayed in LCD at base station2 and base station2 send the data to remote location places servers . Similarly the sensor gets activated and information is sent using GSM modem.

Base station 1

Base station

MOBILE PHONE
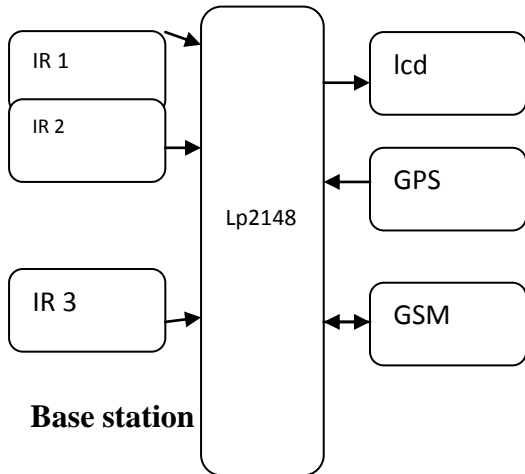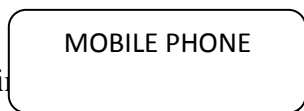
The increase in climate change lead to global average temperature rise, salinity intrusion, flood increasing, lack of water can affect negatively to crop yields. In order to research all effects of climate change on human activities, and to find a solution for human to adapt with climate change, an automatic and continuous monitoring of climatic parameters is an important requirement. In recent years, wireless sensor network (WSN) improve the agricultural decision making and apply coping strategies to combat the threats from climate change by using sensor nodes which one node can obtain many climatic parameters from a specific field in real time. For years, researches have proposed automatic environmental monitoring systems based on WSN .However, the network formed by WSN is only a local area network because it used one wireless transceiver that support just one communication interface and could not inter-connect with other networks. Hence, it could make difficult for monitoring areas where are very far from data center with

require an inter-networking with different communication technologies. Climate change monitoring application requires other types of networks to connect all monitoring areas to one data server center. For recent years, by combining General Packet Radio Service (GPRS) network with the WSN infrastructure, the problem of network management is solved so that climate change monitoring can be done anywhere at any time. Consequently, the best solution to climate change monitoring would be achieved by integrating WSN with GPRS/3G network by using a gateway, which offers a more complete set of measurements as well as telecommunication for remote access.

HARDWARE DESIGN OF THE SYSTEM

LPC 2148 MICROCONTROLLER: LPC2148 microcontroller board based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine microcontrollers with embedded high-speed flash memory ranging from 32kB to 512kB. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate. The meaning of LPC is Low Power Low Cost microcontroller. This is 32 bit microcontroller manufactured by Philips semiconductors (NXP). Due to their tiny size and low power consumption, LPC2148 is ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers (CISC). This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core. The key idea behind Thumb is that of a super-reduced instruction set The Thumb set's 16-bit instruction length allows it to approach twice the density of standard ARM code

International Journal of Research

Available at https://edupediapublications.org/journals

p-ISSN: 2348-6848
e-ISSN: 2348-795X
Volume 03 Issue 18
December2016

while retaining most of the ARM's performance advantage over a traditional 16-bit processor using 16-bit registers. The particular flash implementation in the LPC2141/42/44/46/48 allows for full speed execution also in ARM mode. It is recommended to program performance critical and short code sections (such as interrupt service routines and DSP algorithms) in ARM mode.

DISPLAY UNIT (LCD): LCD's (Liquid Crystal Displays) have substances which merges the characteristics of both crystals and liquids. Instead of having melting point, they comprises a temperature range inside which the molecules and they are having more mobility when they would be in liquid; however they are grouped mutually in an ordered type similar to a crystal. The following figure shows a wide-ranging alphanumeric LCD, with '2' lines of sixteen characters:The Liquid Crystal Displays are light-weight with just a few mille meters thickness. The given Liquid Crystal Displays require less power and they are appropriate with low power electronic circuits and it should be power-driven for lengthy intervals. The LCD's are used extensively in watches, calculators and measuring instruments is the typical 7-segment displays, contains a partial quantity of data.

Global Positioning System: The **GPS** is a space-based satellite navigation system that provides location and time information in all weather, anywhere on or near the Earth, where there is an unobstructed line of sight to four or more GPS satellites. It is maintained by the United States government and is freely accessible by anyone with a GPS receiver.The GPS program provides critical capabilities to military, civil and commercial users around the world. In addition, GPS is the backbone for modernizing the global air traffic system. 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.

GSM MODULE: Global System for Mobile Communication (GSM) is a set of ETSI requirements specifying the infrastructure for a digital cellular provider. The general is used in approx.85 international locations on the planet including such locations as Europe, Japan and Australia. A GSM modem is a Wi-Fi modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The predominant change between them is that a dial-up modem sends and receives information through a constant mobile phone line even as a wireless modem sends and receives data by way of radio waves.A GSM modem will also be an external gadget or a laptop Card / PCMCIA Card. In general, an outside GSM modem is attached to a laptop via a serial cable or a USB cable.

SOFTWARE DESIGN OF THE SYSTEM
TYPES OF EQUIPMENTS

- KEIL C
- Flash Magic

The software used in designing this project is" KEIL MICRO VISION". The µVision development platform is easy-to-use and helping you quickly create embedded programs that work**.** Keil development tools for the 8051 Microcontroller Architecture support every level of software developer from the professional applications engineer to the student just learning about embedded software development.Keil Software development tools for the 8051 microcontroller family support every level of developer from the professional applications engineer to the student just learning about embedded software development. Keil offers an evaluation package that will allow the assembly, c- language and debugging of files 2K or less. Keil is a cross compiler. So first we have to understand the concept of compilers and cross compilers. After then we shall learn how to work with Keil.

International Journal of Research

Available at https://edupediapublications.org/journals

p-ISSN: 2348-6848
e-ISSN: 2348-795X
Volume 03 Issue 18
December2016

Keil C Cross Compiler

Keil is a German based Software development company. It provides several development tools like

IDE (Integrated Development environment)

Project Manager

Simulator

Debugger

C Cross Compiler

Cross Assembler

Locator/Linker

Keil Software provides you with software development tools for the 8051 family of microcontrollers. With these tools, you can generate embedded applications for the multitude of 8051 derivatives. The Keil 8051 tool kit includes three main tools, assembler, compiler and linker. An assembler is used to assemble the 8051 assembly program. A compiler is used to compile the C source code into an object file. A linker is used to create an absolute object module suitable for your in-circuit emulator. Keil μVision4 are used in this project for compelling technique.

Proposed algorithm

Algorithm for the proposed system is divided in two parts as

1. Initialize SPI (Serial Peripheral Interface).
2. Initialize LCD.
3. Initialize GSM, GPS.
4. Initialize all IR sensors .
5. Display status of the vehicle i.e in terms of time of arraival.
6. If the seat with IR sensor is filled then message is displayed on lcd.
7. Then the message is passed to near by station using zigbee technology.
8. If the station is far from the bus, then message is sent via GSM to the central station.

RESULTS AND CONCLUSION

In this project LPC2148 is a microcontroller and it belongs to ARM architecture. GPS and GSM are connected to controller through serial communication. Also zigbee connected to controller. Through GPS controller fetches location values .when user send SMS to vehicle it send current location values to mobile along with seats availability. Some IR sensors are attaching to each seat to know seats availability. Also From zigbee (connected to PC) user can know position and availability of seats. Zigbees are place in each station.In this project uses regulated 5V, 500mA power supply. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer.

More reliable the public transit, more will be its usability. The key areas of project development were:

1. Occupancy Indication: Ticketing machine with primitive features was made to ensure accurate vacancy information.

2. Creation of a Central Server: The critical operations for the autonomous monitoring require GUI and centrally managed system. We were successfully able to meet this requirement by developing the backend using algorithms and MATLAB programming.

3. Setting up a coordinated small-distance and long distance wireless communication network: The team worked on different types of communication networks and established interchange of information. The specially developed data formats were used for it.
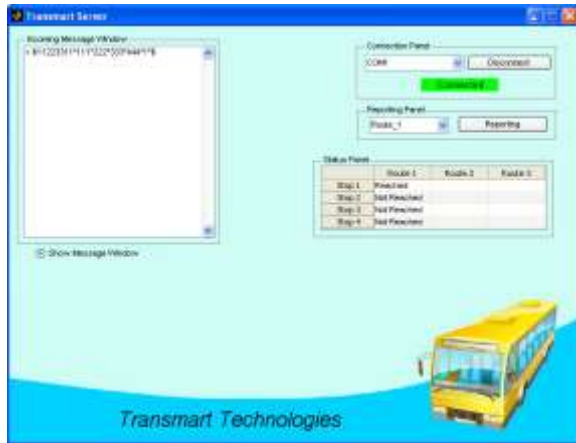
SCHYMATIC DIAGRAM OF CIRCUIT
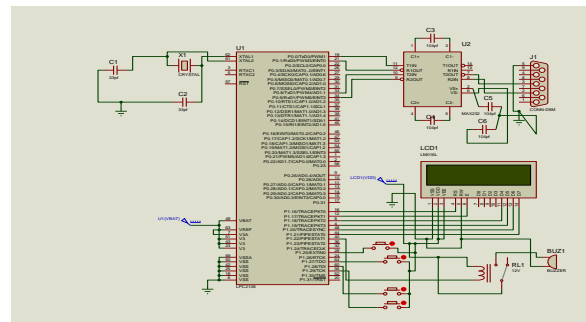
HARDWARE KIT

AFTER INSTALLING SOFTWARE

REFERENCES

[1] Z. Rasin and M. R. Abdullah, "Water quality monitoring system using zigbee based wireless sensor network," *International Journal of Engineering & Technology IJET*, vol. 9, no. 10, pp. 24–27, 2009.

[2] J. Arun, J. Adinarayana, U. Desai *et al.*, "Climate change scenarios with wireless sensor network & geo-ict: a preliminary observation," in *Proceedings of the Impact of Climatic Change in Agriculture, Joint International Workshop*, 2009, pp. 194–199.

[3] A. Bagula, M. Zennaro, G. Inggs, S. Scott, and D. Gascon, "Ubiquitous sensor networking for development (usn4d): An application to pollution monitoring," *Sensors*, vol. 12, no. 1, pp. 391–414, 2012.

[4] N. Jin, R. Ma, Y. Lv, X. Lou, and Q. Wei, "A novel design of water environment monitoring system based on wsn," in *Computer Design and Applications (ICCDA), in 2010 International Conference*, vol. 2. IEEE, 2010, pp. V2–593.

[5] A. Al-Ali, I. Zualkernan, and F. Aloul, "A mobile gprs-sensors array for air pollution monitoring," *IEEE Sensors Journal*, vol. 10, no. 10, pp. 1666–1671, 2010.

[6] A. Ghobakhlou, S. Zandi, and P. Sallis, "Development of environmental monitoring system with wireless sensor networks," 2011.

[7] R. Nallusamy and K. Duraiswamy, "Solar powered wireless sensor networks for environmental applications with energy efficient routing concepts: A review," *Information technology journal*, vol. 10, no. 1, pp. 1–10, 2011.

[8] T. instrument. Cc1120 development kit. [Online].Available:http://www.ti.com/product/cc 112

[9] T. C. C. of New York and S. A. I. of Technology. Zigbeesoftwaremodules.[Online].Available:http://ees2cy.engr.ccny.cuny.edu/zheng/pub/

First Author personal profile which contains their education details, their publications, research work, membership, achievements, with photo that will be maximum 200-400 words.
Second Author personal profile which contains their education details, their publications, research work, membership, achievements, with photo that will be maximum 200-400 words.