

TOUCH SCREEN AND ZIGBEE BASED WIRELESS COMMUNICATION ASSISTANT

M Raghupathi Reddy
Krishnamurthy IET, Hyderabad
madaparaghu@gmail.com

A Praneeth Reddy
ASTRA, Hyderabad
pranith7.a.reddy@gmail.com

B Akhil
ASTRA, Hyderabad
akhilbarlas295@gmail.com

Abstract — The main aim of this project is to construct a user friendly multi-language communication system for illiterate/dumb people traveling by Airlines. As we have different languages in our world and its impossible for us to know all the languages. So, in this project we are building a device that helps them in expressing their needs with other language people (Airhostess) i.e. request them if we need anything in the flight like coffee, tea, drinks etc. In this project we use GLCD and Touch screen Technology to make it easy even to illiterates as it is also included with images, which indicates the needs. This even reduces the difficulty to airhostess in receiving the customers with different languages. Here for wireless communication purpose we use Zigbee technology.

Key words: Touch screen sensor, Zigbee and GLCD

1. INTRODUCTION

Zigbee is a wireless technology developed as an open global standard to address the unique needs of low-cost, low-power, wireless sensor networks. Zigbee is the set of specs built around the IEEE 802.15.4 wireless protocol. As Zigbee is the upcoming technology in wireless field, we had tried to demonstrate its way of functionality and various aspects like kinds, advantages and disadvantages using a small application of controlling the any kind of electronic devices and machines. The Zigbee Technology is broadly adopted for bulk and fast data transmission over a dedicated channel. This Project consists of Zigbee based system that transmits the wireless signals according to the input given by the user using touch screen. At the receiver (airhostess) end the information will be displayed on GLCD in English language. Here when user sends his need through touch screen, then micro controller transmits that information through Zigbee transmitter. The information received by the Zigbee receiver will be displayed on GLCD.

2. PROJECT OVERVIEW

An embedded system is a combination of software and hardware to perform a dedicated task. Some of the main devices used in embedded products are Microprocessors and

Microcontrollers. Microprocessors are commonly referred to as general purpose processors as they simply accept the inputs, process it and give the output. In contrast, a microcontroller not only accepts the data as inputs but also manipulates it, interfaces the data with various devices, controls the data and thus finally gives the result. The project Touch screen and Zigbee based wireless communication assistant for Dumb/Illiterates in Airlines and also by using 18F452 and 16F73 Microcontroller is an exclusive project that is used to construct a user friendly multi-language communication system for illiterate/dumb people traveling by Airlines.

3. ZIGBEE IEEE802.15.4

Zigbee is a wireless technology developed by Zigbee Alliance as an open global standard to address the unique needs of low-cost, low-power, wireless sensor networks [5]. The standard takes full advantage of the IEEE 802.15.4 physical radio specification and operates in unlicensed bands worldwide at the following frequencies: 2.400–2.484 GHz, 902-928 MHz and 868.0–868.6 MHz The Zigbee used in this paper is Xbee Zigbee Module from Digi International. It can send data up to 30m and it has low power consumption (1mW for transmitting data). Xbee works in 2.4 GHz frequency and offers three modes of operation; AT mode, Application Programming Interface (API) mode and API with Escape (ESC) character mode. API operation is chosen to be used in this project due to several reasons. Firstly, it can transmit data to multiple destinations without having to enter the command mode. Secondly, it can identify the source address of each packet and thirdly, it will receive update on the transmission status whether it is successful or fail. The data frame for API operation is shown in figure 2. The frame is being divided

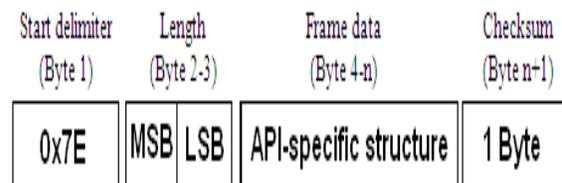


Figure 2: Xbee Zigbee Module API Data Frame

into four sections; start delimiter section, length section, frame data section and checksum section.

4. METHODOLOGY

The methodology of this project design can be divided into two sections; hardware and software implementations. The hardware implementation consists of the development of the Touch screen sensor, Zigbee and GLCD while the software implementation focuses on the programming of the microcontroller using Proteus 7 (Embedded C).

A. Hardware Implementation

The block diagram of the project and design aspect of independent modules is considered. Block diagram is shown in figure: 1(a), 1(b). Microcontrollers are widely used in embedded systems products. Microcontroller is a programmable device. A microcontroller has a CPU in addition to a fixed amount of RAM, ROM, I/O ports and a timer embedded all on a single chip. The fixed amount of on-chip ROM, RAM and number of I/O ports in microcontrollers makes them ideal for many applications in which cost and space are critical. Here we use PIC18F452 and PIC18F452 for transmitting and receiving sections. Figure 2(a), 2(b) shows the operation of this Transmitter and receiver section system.



Figure 2(a) Transmitter section

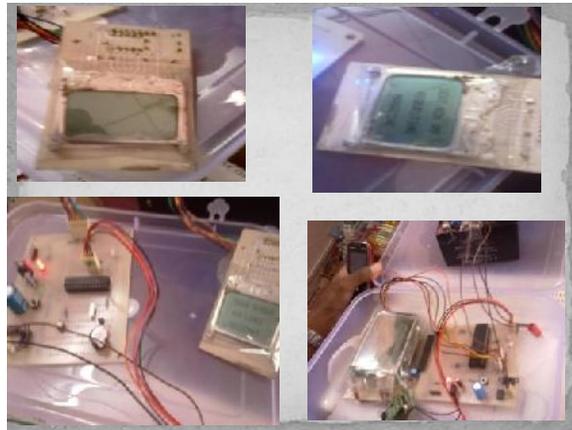


Figure 2(b) Receiver section

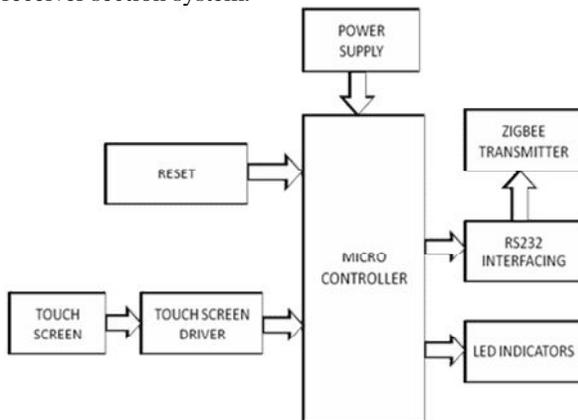


Figure 1(a): Block diagram for Transmitter section

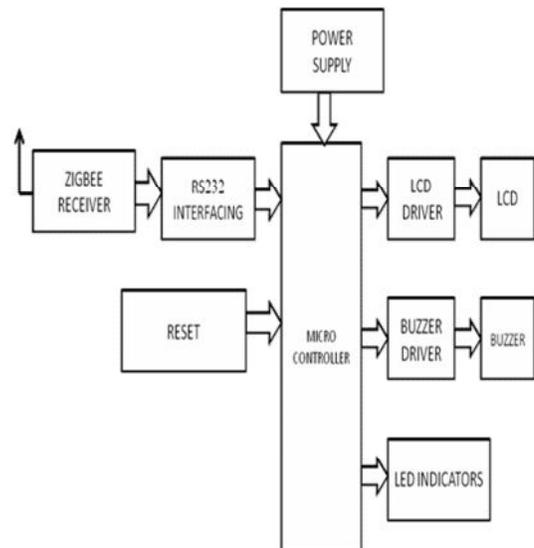
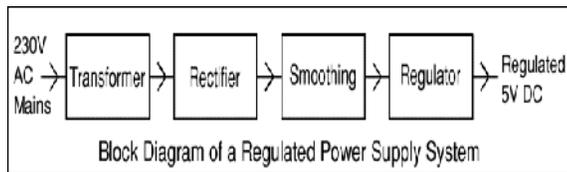


Figure 1(b): Block diagram for receiver section

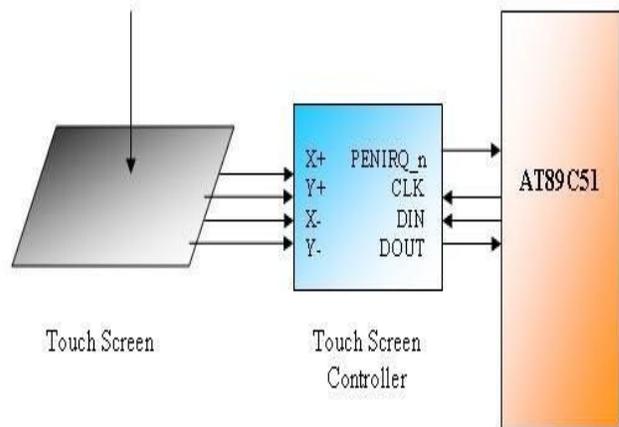
4.1. REGULATED POWER SUPPLY

Power supply is a supply of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others. A power supply may include a power distribution system as well as primary or secondary sources of energy such as Conversion of one form of electrical power to another desired form and voltage, typically involving converting AC line voltage to a well-regulated lower-voltage DC for electronic devices. Low voltage, low power DC power supply units are commonly integrated with the devices they supply, such as computers and household electronics.



4.2. TOUCH SCREEN SENSOR

Touch screen panel is composed of several layers, the most important of which are two thin, metallic, electrically conductive layers separated by a narrow gap. When an object, such as a finger, presses down on a point on the panel's outer surface the two metallic layers become connected at that point: the panel then behaves as a pair of voltage dividers with connected outputs. This causes a change in the electrical current which is registered as a touch event and sent to the controller for processing. A four-wire resistive touch screen panel consists of two flexible layers uniformly coated with a transparent resistive material and separated by an air gap. Electrodes placed along the edges of the layers provide a means for exciting and monitoring the touch screen.



Interfacing between touch screen & micro controller

When a position is measured on a 4-wire touch screen, voltage is applied across the screen in the Y direction; and a touch presses the layers together, where a voltage can be read from one of the X electrodes. The contact made as a result of the touch creates a voltage divider at that point, so the Y coordinate can be determined; the process then repeats with the X direction being driven, and a reading is taken from one of the Y electrodes. A touch-screen controller is simply an ADC that has built-in switches to control which electrodes are driven and which electrodes are used as the input to the ADC.

An Analog Devices AD7843 scans the X and Y axes and determines the unique voltage drop for each axis. The four electrodes for scanning are labeled X+, X-, Y+, and Y-. These electrodes are connected to the AD7843 touch screen controller and the touch sensor is scanned and the analog voltages read.

The four touch electrodes are connected to the inputs X+, X-, Y+, and Y- of the AD7843. A selected axis (X or Y) pair of electrodes is energized with a static voltage and the voltage of the positive electrode of the other pair in the 4 wire touch panel is measured. The sensed voltage is measured and converted to either an 8 bit or 12 bit resolution. A digital word representing the voltage at the contacting point on the touch panel is created and sent out via a high speed SPI serial interface.

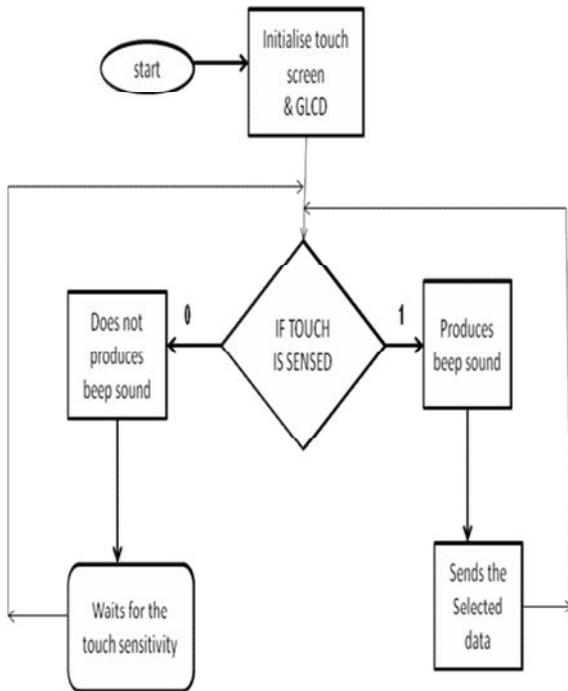


figure 5: Flow chart of the transmitter section

4.3. Graphic LCD with Touch Screen

These GLCD have common display drivers like KS0108 and T6963C and 4 wire resistive touch screen. Figure 4.3.1 shows the Graphic LCD with Touch Screen and figure 4.3.2 shows the GLCD (it displays the output). There is no need for touch screen digitizer/controller for micro controllers having on chip ADC with four analog channels. Just connect the four wire of touch screen to analog inputs and read the respective digital data for X and Y direction of touched point.

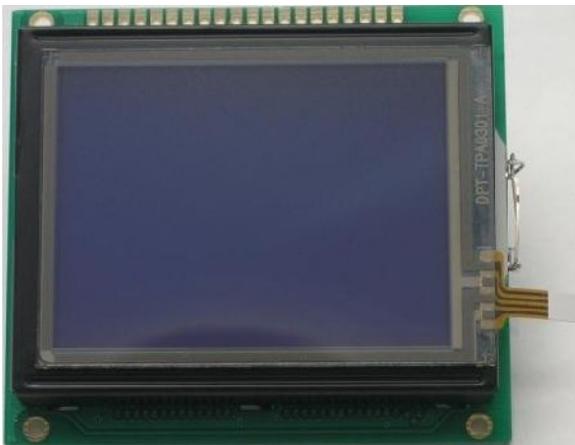


Figure 4.3.1: Graphic LCD with Touch Screen

B. Software Implementation

The software part consists of programming PIC16LF452 microcontroller using PIC C compiler. The scope of programming includes USART communication programming, LCD character module programming and analog to digital converter programming. All of this programming is done using C language.

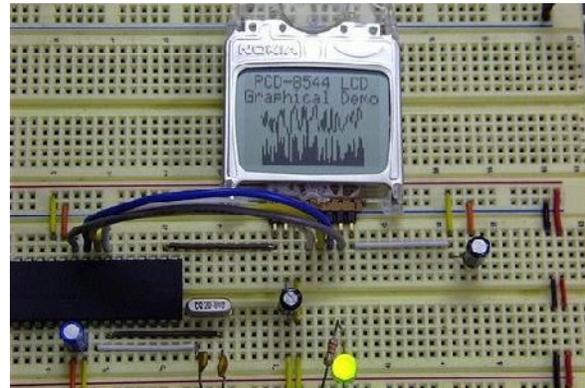


Figure 4.3.2: Nokia GLCD

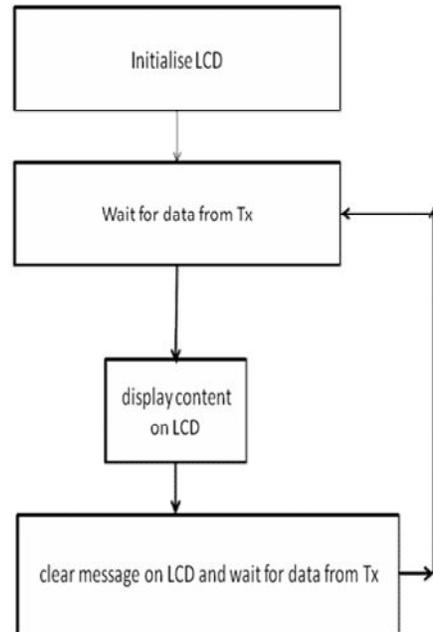


Figure 6: flow chart of the receiver section

5 RESULTS

This paper “Touch screen and Zigbee based wireless communication assistant for dumb /illiterates in airlines” was designed a user friendly multi-language communication system for illiterate/dumb people traveling by Airlines.

CONCLUSION AND FUTURE SCOPPE

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

This project provides an efficient device that helps dumb/illiterate to communicate with airhostess in airlines. Zigbee used in this project provides a typical range of 50m. By using high power Zigbee module we can extend this range up to 1.3 km. using Zigbee we can send text only. By using IR/RF transmitter and receiver we can send audio and video signals also. But Zigbee provides better data security and range is also more compared to IR. And another thing to be noted is Zigbee works in license free bands. Zigbee is most preferable where data security is important. Further enhancements yet to be made in field of Zigbee

REFERENCES

- [1] T. Birtley, (2010) Japan debates care for elderly. [Cited 21/09/2010]. Available: <http://www.youtube.com/watch?v=COUTqfigSec>
- [2] Guangming Song, Fei Ding, Weijuan Zhang and Aiguo Song, “A Wireless Power Outlet System for Smart Homes,” IEEE Transactions on Consumer Electronics, Vol. 54, No. 4, NOVEMBER 2008
- [3](2010) uControl Home security system website. [Cited 201014thOct]. Available: <http://www.itechnews.net/2008/05/20/ucontrol-home-security-system/>
- [4] R. Gadalla, “Voice Recognition System for Massey University Smart house,” M. Eng thesis, Massey University, Auckland, New Zealand, 2006.
- [5] (2010) Home Automated Living website. [Cited 2010 14thOct]. Available: <http://www.homeautomatedliving.com/default.htm>
- [6] L. R. Rabiner and R. W. Schafer, Digital Processing of Speech Signals, New Jersey, US: Prentice Hall Inc, 2001

[7] B. Yukesekkaya, A. A. Kayalar, M. B. Tosun, M. K. Ozcan, and A. Z. Alkar, “A GSM, Internet and Speech Controlled Wireless Interactive Home Automation System,” IEEE Transactions on Consumer Electronics, vol. 52, pp. 837-843, August 2006.

[8] Jinn-Kwei Guo, Chun-Lin Lu, Ju-Yun Chang, Yi-Jing Li, Ya-Chi Huang, Fu-Jiun Lu and Ching-Wen Hsu, “Interactive Voice-Controller Applied to Home Automation,” 2009 Fifth International Conference on Intelligent Information Hiding and Multimedia Signal Processing

[9] Voice Recoder Reference Design (AN 278), Silicon Laboratories, 2006. [10] Guangming Song, Fei Ding, Weijuan Zhang and Aiguo Song, “A Wireless Power Outlet System for Smart Homes,” IEEE Transactions on Consumer Electronics, Vol. 54, No. 4, NOVEMBER 2008

[11] Il-Kyu Hwang Dae-Sung Lee Jin-Wook Baek “Home Network Configuring Scheme for All Electric Appliances Using ZigBee-based Integrated Remote Controller,” IEEE Transactions on Consumer Electronics, Vol.55, No.3, AUGUST 2009

[12] Rozeha A. Rashid, Hong Ling Zhen. “Wireless Monitoring System Using ZigBee IEEE 802.15.4 Standard”, *Int'l Wireless Telecommunication Symposium (IWTS06), Grand Bluewave Hotel, Shah Alam, 15-17th May 2006.*

[13] *Product Manual v1.xAx - 802.15.4 Protocol For OEM RF Module Part Numbers: XB24-...-001, XBP24-...-001.*

[14] *Tunheim, Svein Anders. “Implementing an IEEE 802.15.4 and ZigBee Compliant RF Solution”, Chipcon Paper IIC-China ESC-China 2005.*

BIOGRAPHIES

Mr. Raghupathi Reddy obtained his B.Tech Degree in Electronics and Communication from Krishnamurthy Institute of Technology and Engineering, Hyderabad in 2011. Pursuing M.Tech Degree in Electronics and Instrumentation at VNR Vignana Jyothi Institute of Engineering and Technology, Hyderabad.

