

VISITOR GUIDANCE AND TRACKING SYSTEM USING WIRELESS COMMUNICATION

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Abstract - This is the world of wireless technology. Number of systems and applications using wired data transfer are now replaced by wireless communication media. We are developing this system for big premises such as colleges, hospitals, industries etc. Our aim is to use this wireless technology for visitor guide and visitor tracking application. The system will consist of one handheld unit given to a visitor at the entrance of premises by security persons. The visitor will enter the destination where he wants to go or the person to whom he wants to meet. This handheld unit will guide him to reach the destination. He doesn't need to ask anyone. Another feature of this system is that it is wirelessly connected to security unit located in security cabin, where the security person will be able to track the visitor on premise map on Smartphone. There will be wireless link between handheld unit and security unit. For this we will use Zigbee module and RF media for data transfer.

Keywords: Keypad, LCD Display, Zigbee Module, RFID Tag and Reader, Buzzer, Speaker.

1. INTRODUCTION

The handheld unit will consist of micro controller, LCD to see the guidelines, voice IC and audio amplifier for audio playback of guidelines. The keypad will be used to enter the destination where he wants to go or the person to whom he wants to meet.

Zigbee module is used to send the location to the security unit. RFID reader is used to read the location code at various checkpoints. If the visitor enters in some restricted area by mistake the handheld unit will warn him as well as it will convey it to security. As soon as the destination address is entered by the visitor using keypad, the handheld unit guides the visitor to reach the destination by showing the directions by arrows such as GO RIGHT, GO LEFT, etc. until the visitor reach their destination.

The security unit will consist of Bluetooth module and Smartphone interface. On Smartphone there will be plotted map of premise using Block Description language. Data coming from handheld unit via Zigbee will be used to plot the location of the visitor on map. This is the world of wireless technology. Number of systems and applications using wired data transfer are now replaced by wireless communication media. We are developing this system for big premises such as colleges, hospitals, industries etc. Our aim is to use this wireless technology for visitor guide and visitor tracking application. The system will consist of one handheld

unit given to a visitor at the entrance of premises by security persons. The visitor will enter the destination where he wants to go or the person to whom he wants to meet. This handheld unit will guide him to reach the destination. He doesn't need to ask anyone. Another feature of this system is that it is wirelessly connected to security unit located in security cabin, where the security person will be able to track the visitor on premise map on Smartphone. There will be wireless link between handheld unit and security unit. For this we will use Zigbee module and RF media for data transfer.

A visitor guide and Tracking system is for visitors who are come to visit the any large organizational area like Company, Hospital etc. These visitors are unknown to their campus or area. And also they have to get entry pass first at entrance of the company; this process is time consumable because all details of the visitor need to be fill. And at working time no one will be available to help the visitors as a guide to reach the destination completely. Since the visitors guide helps us track our destination by giving us directions; this reduces the time wasted in asking and searching for a particular destination.

This idea also includes a feature of tracking visitors. So that there is no need to take a watch on visitors, the visitor is tracked at security cabin on the premise map on smart to hone. Also this system warns to the visitor, if they will moving towards the restricted area. The visitor guide and tracking system mainly consists of one handheld unit that works as a guide for visitor and tracking system at security cabin. This handheld unit is low weight unit gives facilities like provides keypad to set destination, sound indications, shows directions on lcd etc overall result is that, it is easy to handle and perfect guide for visitors.

2. METHODOLOGY

The block diagram and circuit diagram for that project is as follow

2.1 BLOCK-DIAGRAM

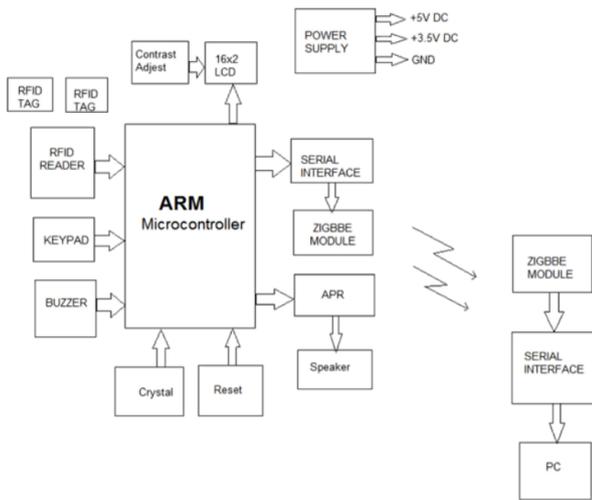


Fig.1: Block Diagram of Handheld Unit

RF ID is Radio Frequency Identification which is used to make track of every physical object. The frequency of operation widely used at present are LF –Low Frequency 125 KHz & UHF (Mifare) 13.5MHz. In this post our focus is on 125KHz RF ID. The main components of the RF ID system are: The RF ID Reader – EM-18 type of RFID reader is used for demo in this post. RF ID tag – The Tag contains an Integrated circuit for memory & an Antenna coil. There are 2 types of Tags: Passive & Active. We make use of Passive tags here. As the name implies these tags do not have a power source .When the passive Tag is near a RF ID reader, the energy is induced by electromagnetic waves. The tag “wakes up” & responds by sending the data stored in its memory. The range of passive tag access is below 10 cm. Keypad is used to set destination where visitor wants to go. A keypad is a set of buttons arranged in a block or "pad" which bear digits, symbols or alphabetical letters. Pads mostly containing numbers are called a numeric keypad. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles. The ARM architecture is most widely used in mobile devices, and most popular 32 bit one in embedded system. 500kb of flash memory is available for user code and 32kb of static RAM used for code and data storage. LPC2144/46/48 contains two analog to digital converters. These converters are single 10-bit successive approximation analog to digital converters. While ADC0 has six channels, ADC1 has eight channels. Therefore, total number of available ADC inputs for LPC2144/46/48 is 14. LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in

5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD. Serial Interface is used for TX and RX data serially from zigbee and processor. For serial communication between processor and zigbee we used MAX 232 device. A serial interface is a communication interface between two digital systems that transmits data as a *series* of voltage pulses down a wire. A "1" is represented by a high logical voltage and a "0" is represented by a low logical voltage. Zigbee Module is a short range, low- power, low data rate wireless interface specially designed for small devices that have limited power, CPU and memory resources. The module we used in this project is CC2500 and the range of this module is 150 meter. It works in Half Duplex mode i.e. it provides communication in both directions, but only one direction at same time (not simultaneously). This switching from receiver to transmitter mode is done automatically. Board plays wav files from memory card giving high quality sound output. The board is controlled from an external microcontroller or PC which sends simple ASCII string telling board what to play. You can also give it external triggers if you want standalone operation. The board is a tiny Audio-Sound module that can play back pre-stored audio files such as voice and music from a micro-SD memory card. The module supports various 8/16 bit stereo/mono uncompress audio files having sampling rate from 8Khz to 48Khz. By using the free available software tool, any audio file (WAV, MP3, PCM, etc) can be easily converted to supported format. The compact board takes minimal board space and is ideal for any application that required embedded audio. The board is controlled through simple serial commands. Board is a very flexible, compact and low cost embedded audio solution for any applications. Accepts any micro SD card from 128MB to 32GB. These memory cards are available at very low cost due to wide use in mobile phones. It is used in Automobile, Parking radar, GPS navigation systems, MP3 player like simple devices etc. Board plays wav files from memory card giving high quality sound output. The board is controlled from an external microcontroller or PC which sends simple ASCII string telling board what to play. You can also give it external triggers if you want standalone operation. The board is a tiny Audio-Sound module that can play back pre-stored audio files such as voice and music from a micro-SD memory card. The module supports various 8/16 bit stereo/mono uncompress audio files having sampling rate from 8Khz to 48Khz. By using the free available software tool, any audio file (WAV, MP3, PCM, etc) can be easily converted to supported format. The compact board takes minimal board space and is ideal for any application that required embedded audio. The board is controlled through simple serial commands. Board is a very flexible, compact and low cost embedded audio solution for any applications. Accepts any micro SD card from 128MB to

32GB. These memory cards are available at very low cost due to wide use in mobile phones. It is used in Automobile, Parking radar, GPS navigation systems, MP3 player like simple devices etc.

2.2 CIRCUIT DIAGRAM

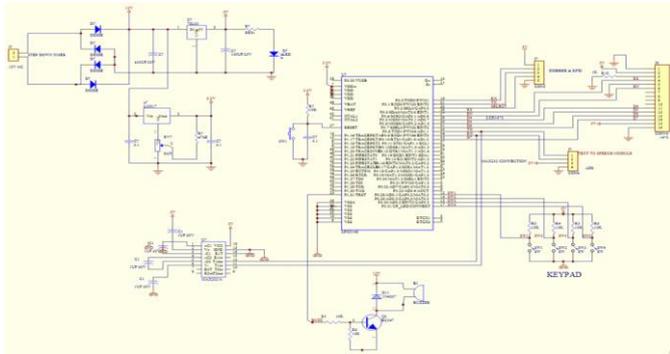


Fig. 2: Circuit diagram for handheld unit

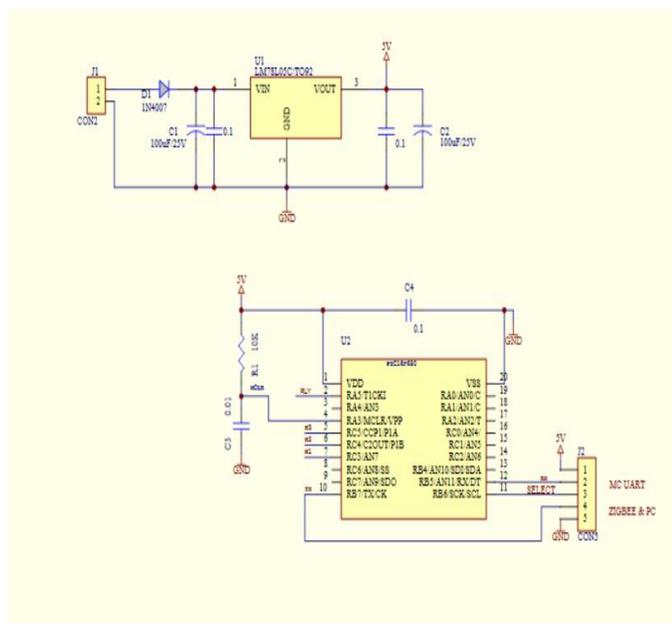


Fig 3: Circuit diagram for security unit

In this project we require 5v and 3.3v power supply to generate 5v power supply. We have 12v battery supply, 12v input gives to first terminal of 7805 regulator IC, middle terminal is common to ground so negative terminal of battery connected to middle terminal of regulator. After giving that connection third terminal make 5v power supply. To generate 3.3v voltage we use LM317 voltage regulator circuit. LM317 has three terminals are input pin, output pin and adjustment pin. This LM317 circuit is capable to provide variable DC power supply with output of 1A and can be adjusted up to 30v. The circuit consist of a low side resistor and high side resistor connected in series forming a resistive voltage divider which is passive linear circuit us to produce an output voltage which is a fraction of its input voltage. In this project we use LPC2148 (ARM controller) has total 64 pin out of them 6 pin connected to LCD display, 4 pin

connected to switches, 1 pin connected to buzzer. TX0 and RX0 pic connected to transmitter and receiver pin of MAX232 for programming purpose. TX1 and RX1 pin connected to voice speak modules of transmitter and receiver. MCU –UART switch: It has 5 pins are VCC, GND, TX, RX, SEL. TX and RX pin are directly connected to TX! And RX1 pin of controller. SEL pin connected any general input, output pin of controller. Across MCU-UART switch we can connect RFID and Zigbee module.

Text to speech module: This module has 4 pins are TX, RX, GND and VCC. TX and RX pin directly connected to TX0 and RX0 pin of controller. 5.3.4 Switches: Using 10K pull up resistor one terminal of switch connect to that resistor and second terminal of switch connected to ground. First terminal where pull up resistor connected goes to controller as a switch input one noise removing capacitor connected between output and ground. 5.3.5 Buzzer: Using transistor switching circuit buzzer will be connected to controller. The output pin of controller goes to cathode of diode which is 1N4007 anode of this diode goes to voltage divider. Output of voltage divider connected to base of transistor BC547. Emitter connected to ground and collector connected to negative terminal of buzzer. Positive terminal of buzzer connected to 5v. 5.3.6 Receiver section: 12V battery connected to LM7805 regulator IC. So output terminal generates 5v regulated voltage to remove noise in output voltage and 1UF capacitor connected between output and ground. Here we using PIC16F690 microcontroller which has 20 pins, out of them first pin is VCC, 20ns pin is ground, fourth number pin is MCLR. In MCLR circuit 10k pull up resistor connected to 0.01microFarad pull down capacitor. Here we require 2 TX and RX pair, but controller has only one so we will use MCU-UART serial divider switch, which has 5 pins that is TX, RX, GND, VCC and select. TX and RX pin directly connected to TX and RX pin of controller and select pin connected to any other general input output pin of controller.

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