

GSM Based Advance Security System by Using Pic Microcontroller

K. Sri Hari Rao¹ & B.Srinivas²
Professor¹, Associate Professor²
Department of ECE
Malla Reddy Engineering College

Abstract- In this Project PIC Microcontroller is used to interface with PIR Sensor, RFID Module, GSM Module, LCD display, and Keypad. If anybody enters from outside of the border, it will be first detected by the PIR Sensor and once the Person is detected by the PIR Sensor next level of security will be RFID card. It has to be get detected by RFID Reader. Once RFID Card gets detected, person has to enter the secret code by using the Keypad which will be displayed on LCD. If any of the authentications is not correct, the information of unauthorized entry will be sent to headquarter by GSM as SMS/Call.

Index Terms- GSM; Keypad; LCD; PIC18F4550; PIC Microcontroller; PIR; RFID.

INTRODUCTION

An embedded system is typically a design that uses the power of a small microcontroller, like the Microchip PIC® microcontroller (MCU) or dsPIC digital signal controller (DSC). These microcontrollers combine a microprocessor unit (like the CPU in a personal computer) with some additional circuits called peripherals, plus some additional circuits on the same chip to make a small control module requiring few other external devices. This single device can then be embedded into other electronic and mechanical devices for low-cost digital control [1]. In this Project PIC Microcontroller is used to interface with , Passive Infrared (PIR) Sensor, Radio Frequency Identification (RFID), Global System for Mobile communication (GSM), Liquid Crystal Display (LCD), and Keypad.

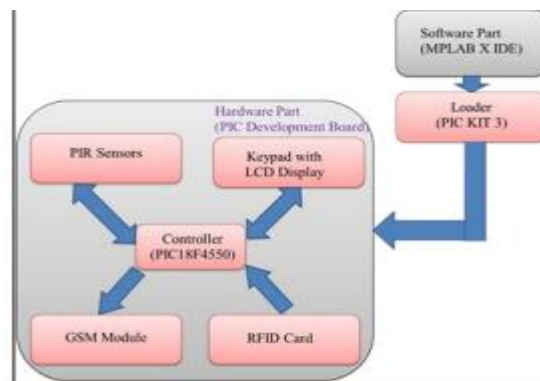


Fig. 1: Block Diagram of Complete Project

If anybody enters from outside of the border, it will be first detected by the PIR Sensor and once the Person is detected by the PIR Sensor next level of security will be RFID card. RFID Card has to be get detected by RFID Reader if entry is authorized. Once RFID Card gets detected, person has to enter the secret code by the Keypad which will be display on LCD display. If RFID Card is not valid it means authentication is not correct and the information of unauthorized entry will be sent to headquarter using GSM by SMS. If secret code is not correct it means authentication is not correct and the information of unauthorized entry will be sent to headquarter using GSM by Call. Complete Block diagram of the System is shown in the below figure.

I. EXISTING WORK OR LITERATURE SURVEY

Research considering Android interface-based GSM home safety system was done by Sharma, Rupam Kumar, where the researcher has researched a low-cost GSM based smart home based security method along with the face recognition and detection technique [1]. Another work was developed to stop the access of illegal persons into our home by using facial recognition. The project objective is to

monitor and track whether the person is authorized or not was done by Budijono, Santoso, Jeffri Andrianto, and Muhammad Axis Novradin Noor [2]. Another group of researchers has added a vibration sensor to the system. This method contains 89S52 microcontroller board, IR sensor module, Wireless camera to capture the image of a person which was done by Choudhury, Biplav [3]. Another work that developed the system more upgraded, systematic, and effective with electronic door lock arrangement was done by Azid, Sheikh Izzal, and Sushil Kumar [4]. Another group researched a low-cost, highly configurable, and mobile home security system that secures homes from illegal entities attempting to gain illegal entry into such homes which was done by Lee, Jer-Vui, Yea-Dat Chuah, and Chin-Tin Chai. So, in our paper Arduino and GSM based home based safety system was developed which has more sensitivity and we have generated a new proposed model to ensure home security by alarm and calling system together that will be very effective for our future work [5].

III WRITE DOWN YOUR STUDIES AND FINDINGS (PROPOSED WORK)

A. Power Supply

In this Project, 5 Volts 1 amp, power supply is needed for embedded development board.

B. PIC Microcontroller

An embedded system is typically a design that uses the power of a small microcontroller, like the Microchip PIC® microcontroller (MCU) or dsPIC digital signal controller (DSC). The pin diagram of PIC18F4550 IC is shown in the below figure 2.1.

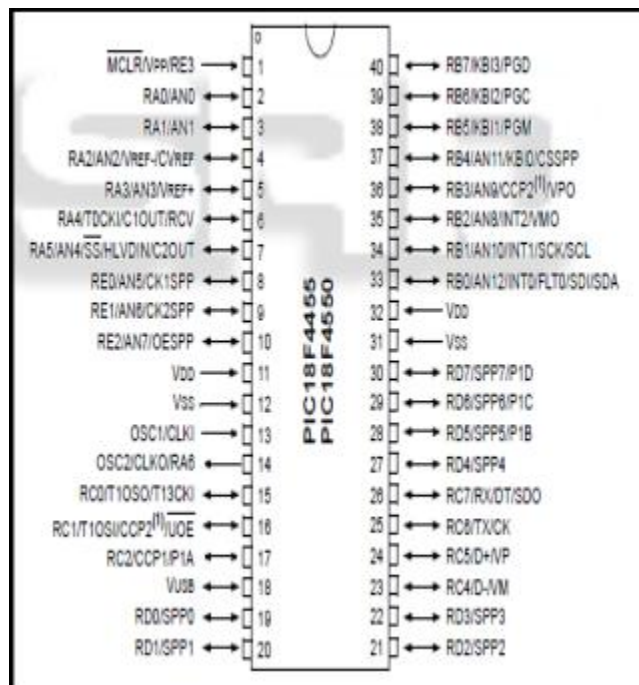


Fig. 2: PIC18F4550 Controller IC

PIC families have included 18F4550 Controller [2] which is used in our project for interfacing with other devices. In 1989, Microchip technology Corporation introduced an 8-bit microcontroller called PIC, which stands for peripheral Interface Controller. This microcontroller had small amounts of data RAM, a few hundred bytes of on-chip ROM for the program, one timer, and a few pins for I/O ports, all on a single chip with 8 pins. The PIC18 has a RISC architecture that comes with some standard features such as on-chip program (Code) ROM, data RAM, and data EEPROM, Timers, ADC, USART and I/O ports The main features of PIC18F4550 Controller are below.

1K byte Dual Port RAM + 1K byte GP RAM – Full Speed Transceiver – Streaming Port – Internal Pull Up resistors (D+/D-) – 48 MHz performance (12 MIPS) – Pin-to-pin compatible with PIC16C7X5

C. PIR Sensor

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIRbased motion detectors. This sensor helps to sense the motion, almost always

used to detect whether a human has moved in or out of the sensor's range. The advantages of PIR sensors are small in size, inexpensive, low-power, easy to use [3].

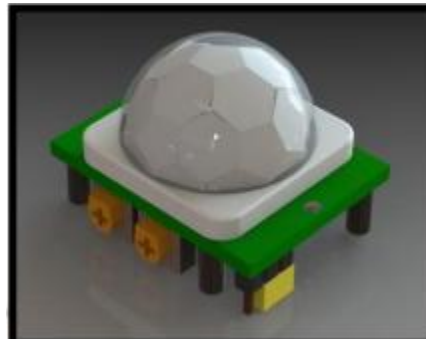


Fig. 3: Actual View of PIR Sensor

In this Project, PIR Sensor is first level of security. It is used to detect human at Border. If PIR sensor is not detected means System will not go for further security steps. D. RFID Module Radio-frequency identification (RFID) is the wireless use of electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tags contain electronically stored information. This RFID module consists of three components: an antenna and transceiver (often combined into one reader) and a transponder (the RFID card). The antenna uses radio frequency waves to transmit a signal that activates the transponder. When activated, the RFID Card transmits data back to the antenna [4].



Fig. 4: RFID Reader & RFID tag

In this Project, RFID Module is Second level of security. RFID reader is used to detect RFID card of the human at Border. If RFID reader, detects the RFID card then further security steps will occur by embedded development board but if RFID reader, not detects the RFIDcard then System will not go for further security steps and information will reach to headquarter using GSM module as SMS.

D.GSM Module

A GSM (Global System for Mobile Communications) modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone which is helpful to send information of unknown person to the headquarter[5].



Fig. 5: SIM800 GSM Module

F. LCD Display

The LCD Display is used to display the data on the screen. The Connection of LCD display is given in below figure 5.

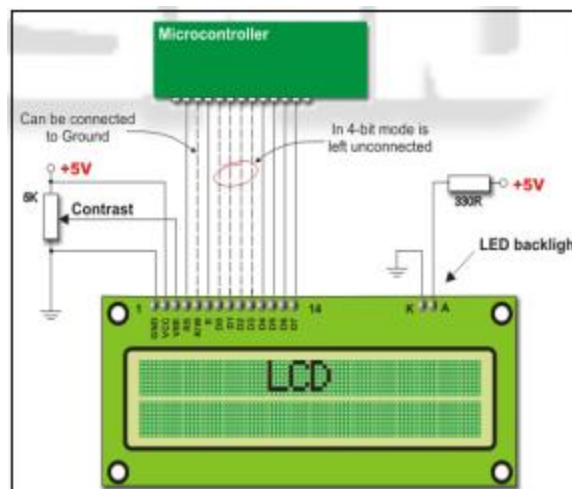


Fig. 6: Connections of LCD Display with PIC18F4550 Controller

G. Keypad

Once the RFID card is detected as 3rd level of security, the Keypad is used to enter secret code. If the secret code is not valid, the information is going to send to headquarter using GSM by Call. 4*4 Keypad Module has 8 Input pins, which has to be connected with development board. That is, 4 columns and 4 rows. These rows & columns have to be connecting to RB port of PIC18F4550 Controller. As B port is having pulled up register. RB0 to RB3 ports will connect as row1 to row4 respectively and RB4 to RB7 column 1 to column 4 respectively

IV RESULTS AND DISCUSSION (IF ANY)

In this Project PIC Controller is used to interface with PIR Sensor, RFID, GSM, LCD, and Keypad. The Circuit diagram of the complete embedded system is shown in below figure 3.1.

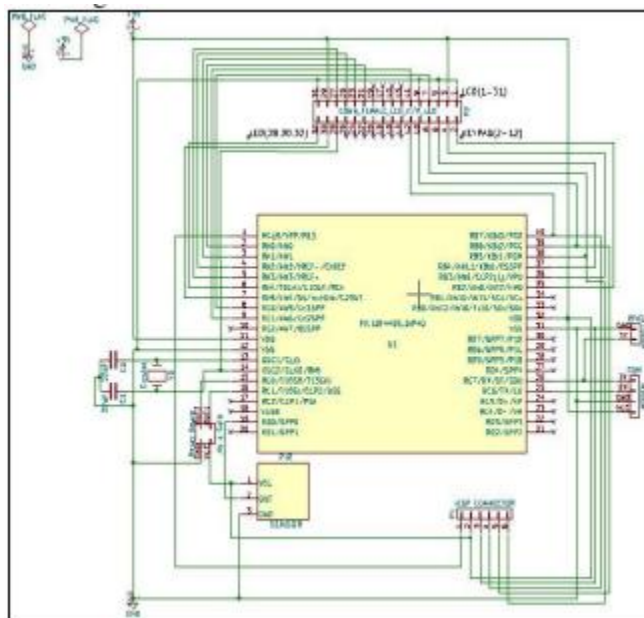


Fig. 7: Circuit Diagram of complete system

Once the 5V supply is given to the system, the Development board will be initialised. Once the board is ON, it will wait for human detection by PIR Sensor. Once human detected by PIR Sensor, LCD will display as “SWIPE RFID CARD”. RFID reader will read RFID Card data and if it’s not matches with pre-entered data then GSM module will be activated and SMS will send to headquarter. If RFID card data is matches with pre-entered data then LCD will display as “ENTER SECRET CODE”. Once the secret code is correct, the Gate will be open. But if the Secret code is not correct then GSM module will be activated and call will go to headquarter. The Experimental Set up of complete system is shown in below figure 3.2.



Fig. 8: Experimental Set up of the Project

V CONCLUSION

FROM ABOVE EXPERIMENTAL SETUP AND DETAILS OF PIC18F4550 MICROCONTROLLER WITH PIR, RFID, GSM, LCD AND KEYPAD, WE CAN CONCLUDE THE ADVANTAGES OF PIC MICROCONTROLLER AS FLEXIBILITY, LOW COST. PIC18F4550 MICROCONTROLLER IS ABLE TO INTERFACE WITH PIR, RFID, LCD, GSM AND KEYPAD, BY WHICH SECURITY AT THE BORDER CAN BE INCREASED. IF ANY UNAUTHORIZED ENTRY ENTERED AT BORDER, IT WILL BE UPDATED AT HEADQUARTER

REFERENCES

- [1] M.A. Mazidi, R. McKinley and D. Causey, PIC Microcontroller and Embedded Systems: Using Assemble and C for PIC, ISBN: 0-13-600902-6, 2008
- [2] PIC18F2455/2550/4455/4550 Data Sheet from Microchip Technology Inc, DS39632C, 2006
- [3] Pema Chodon, Devi Maya Adhikari et al, “Passive Infrared (PIR) Sensor Based Security System”, IJEECS, Vol: 14 Issue: 2, June 2013

- [4] Piyush Chandra, Prakhar Soni, Rakesh Kumar Keshari, "RFID-based Ticketing for Public Transport System: Perspective Megacity", ISSN: 2321-7782 (Online) Volume 2, Issue 5, May 2014
- [5] V.Ramya, B. Palaniappan, V.Sumathi, "GSM based embedded system for remote laboratory safety monitoring and alerting", IJDPS, Vol.3, No.6, November 2012
- [6] MPLAB® ICD 3 In-Circuit Debugger User's Guide For MPLAB X IDE from Microchip Technology Inc, DS52081A, 2012 [7] PICkit™ 3 Programmer/Debugger User's Guide from Microchip Technology Inc, DS51795A, 2009.