

Advance Wireless Security System Using GSM Module and PIC Microcontroller

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Abstract – This research work examines the ability of 'full home control', which is the purpose of Home Automation System in the near future. The analysis and implementation of the home automation technology using Global System for Mobile Communication (GSM) modem to control home appliances such as light, conditional system, and security system via Short Message Service (SMS) text messages is presented in this paper. The proposed research work is focused on functionality of the GSM protocol, which allows the user to control the target system away from residential using the frequency bandwidths. Home owners will be able to receive feedback status of any home appliances under control whether switched on or off remotely from their mobile phones. With the integration of GCM, the PIC16F877A microcontroller provides the desired baud rate of 9600 bps to Smart Automated House System. The proposed prototype of GSM based home automation system was implemented and tested with maximum of four loads and shows the accuracy of $\geq 98\%$.

- Covered parking area.
- Garage automation access.

1.1 FLOW CHART:-

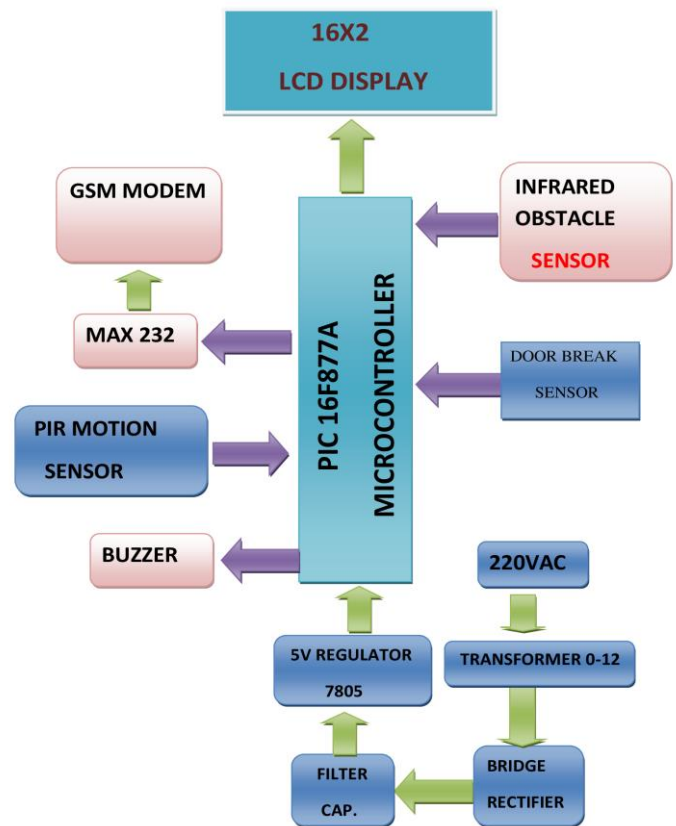


FIG.1: BLOCK DIAGRAM OF COMPLETE PROJECT

Key Words- Home automation; Global System for Mobile Communication (GSM); Short Message Service (SMS); PIC microcontroller; RS232 standard

1. INTRODUCTION

In recent years, there has been a growing interest among consumers in the smart home concept. Smart homes contain multiple, connected devices such as home entertainment consoles, security systems, lighting, access control systems and surveillance. Intelligent home automation system is incorporated into smart homes to provide comfort, convenience, and security to home owners. Home automation system represents and reports the status of the connected devices in an intuitive, user-friendly interface allowing the user to interact and control various devices with the touch of a few buttons. Some of the major communication technologies used by today's home automation system include Bluetooth, WiMAX and Wireless LAN (Wi-Fi), Zigbee, and Global System for Applications

The following are the applications of this module-

- The PIR sensors can be used in the shopping malls, Garden lights, etc.
- These sensors are used for the outdoor lights.
- It used in the multi apartments for security reasons.

1.2 COMPONENTS DETAILS OF THE PROJECT

A. Power Supply:- In this Project, 5 Volts 1 amp, power supply is needed for embedded development board.

B. PIC Microcontroller :- PIC 16F877A is one of the most advanced microcontroller from Microchip. PIC controller is widely used for experimental and modern applications because its low cost. It is ideal for applications such as machine control applications, measurement devices, study purpose, and so on. The PIC 16F877 features all the components which modern microcontrollers normally have. The figure of a PIC16F877 chip is shown below.

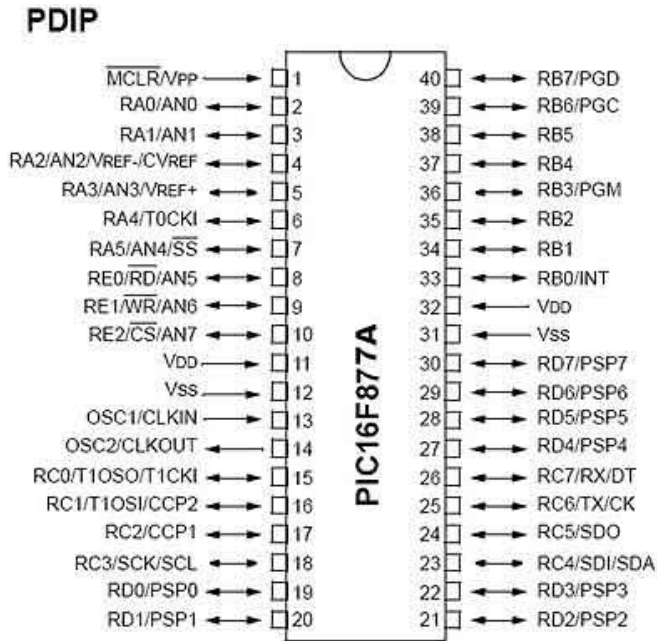


FIG.2:PIC16F877A CONTROLLER IC

General features-

- ONLY 35 simple word instructions.
- All single cycle instructions except for program branches which are two cycles.
- Operating speed: clock input (200MHz), instruction cycle (200nS).
- Up to 368×8bit of RAM (data memory), 256×8 of EEPROM (data memory), 8k×14 of flash memory.
- Eight level deep hardware stack.
- Interrupt capability (up to 14 sources).
- High performance RISC CPU

C. PIR Sensor :- An inactive infrared sensor (PIR sensor) is an electronic sensor that radiates the infrared (IR) light with objects in its area of measurement .They are most often used in PIR-based motion detectors. This sensor helps in understanding motion, almost always detects whether a person has gone in or out of the sensor range. The advantages of PIR sensors are small in size, inexpensive, low-power, easy to use.



FIG.3.PIR SENSOR

D. RFID Module:-Radio frequency identification automatically recognizes the use of this electromagnetic field and tracks the tags attached to the surrounding 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).



FIG.4:RFID READER

E. 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.



FIG.5:GSM900A MODULE

Features

- ☑ Dual band GSM/GPRS 900/1800MHz.
- ☑ Configurable baud rate.
- ☑ SIM card holder.
- ☑ Built in network status LED.
- ☑ Inbuilt powerful TCP/IP protocol stack for internet data transfer over GPRS.

F. LCD Display:- The LCD Display is used to display the data on the screen.

[4] MPLAB® ICD 3 In-Circuit Debugger User's Guide For MPLAB X IDE from Microchip Technology Inc, DS52081A, 2012

The Connection of LCD display is given in below figure

[5] PICkit™ 3 Programmer/Debugger User's Guide from Microchip Technology Inc, DS51795A, 2009.

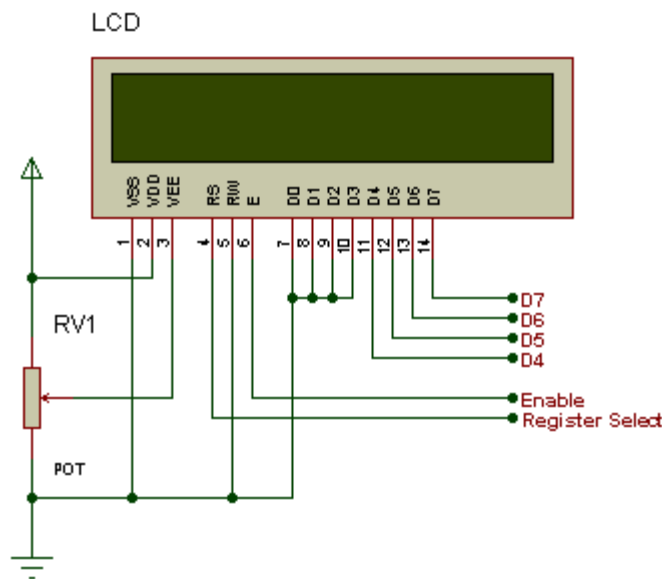


Fig. 6: Connections of LCD Display with PIC16F877A Controller

2. CONCLUSION

Recently, the home automation market is a very good field which is growing very fast and requires a broad range of development that can be done in the concept of smart home. PIC 16F877A Microcontroller Smart Automated House System with the support of GIS provides the desired baud rate of 9600 bps. In this project design and implementation of smart GSM house was considered. The proposed prototype was implemented and tested with maximum of four loads and shows the accuracy of $\geq 98\%$.

3. ACKNOWLEDGEMENT

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