



Secured and Control Home Automation System Using Cloud Server

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ABSTRACT: The main motivation of this paper came from to help physically challenged and elderly people, where uses of project works are being reduced human efforts and also improves energy conservation through mobile app. In this busy life while away from home we may tend to forget to switch off the AC appliances which cause wastage of energy and monitoring our physically challenged peoples. In Home automation household appliances and residential house features like gates, curtains etc are controlled automatically or semi - automatically. Some of the currently available systems provide a view of the house from a web application: but this can cause trouble to the user. Because user must access the web each time he/she wishes to view the status of the home appliances. In this paper a home automation and security system that uses Bluetooth ,RFID and cloud server to control AC appliances using android app is introduced that is easy to use over the traditional method of the switch. Therefore, the motivation behind the development of this system is to let people know about these technologies, and make the system as simple as possible for an ordinary person to understand. The result of this paper is the implementation of home automation system which involves control and automation of home appliances through mobile voice app application from remote locations and security system.

KEYWORDS: PIC-Microcontroller, Bluetooth, Mobile voice app, cloud server and RFID .

I. INTRODUCTION

Nowadays we are moving towards smart and secure ways to live. Automation and android phone plays a major role to live smartly and securely. Home automation is a remotely controllable network to which lights, appliances, electrical outlets, heating and cooling systems are connected. Today, automation system require to control the AC appliances and get the current status back of appliances i.e. ON/OFF wirelessly on an android application over long distance.

Home automation is also known as domotics. This involves the control and automation of lighting, heating, ventilation, air conditioning, security. It also includes control and automation of home appliances such as washers/dryers, ovens or refrigerators/ freezers. Home automation is a modern technology that transforms your home to an extent that it can perform different sets of tasks automatically. This technology is constantly upgrading its versatility by integrating modernized features to fulfill the increasing demands of people..Main purpose of home automation system is to save electricity. Smart home automation facilitates user comfortable living and energy management features as well as added benefits for disabled individuals.

Home automation systems have varying degree of intelligence and automation. It can range from simple voice control of lighting to Pic-Microcontroller based networks. The main characteristic of home automation system is voice controlling and access of home appliances and security systems. Use of home automation systems causes home appliances to communicate in an integrated manner. It helps to obtain several factors such as convenience, energy efficiency and safety benefits. Most of the present systems are not reasonable for many people due to their high costs and exhausting maintenance. Some systems provide solutions that are not very useful for household applications. In this paper RFID, Bluetooth and Cloud server are the methods used for home automation.



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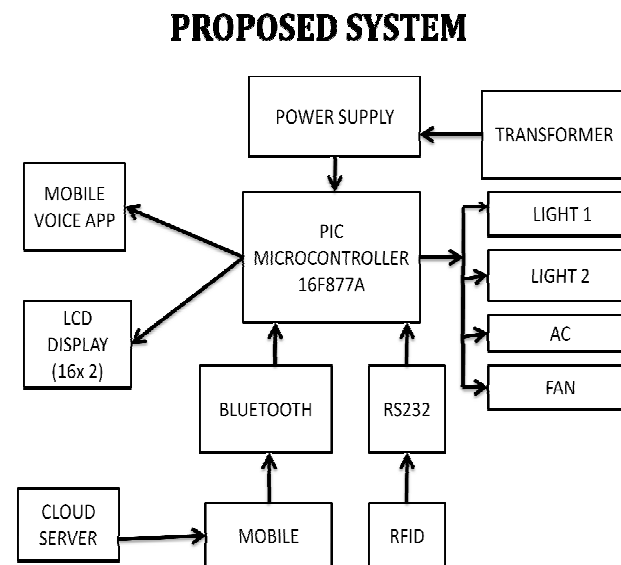
CONTROLLING PROCESS

By using an mobile voiceapp can controlling the home appliances. The Mobileapp connect to the Bluetooth device of the system and automatic controlling the different loads. It can access in at any location using an cloud server technology connecting one or more devices at same time.

SECURITY PROCESS

RFID cards are used for that security identification easily the unauthorized people. The RS232 serial communication device sense the authorized cards. It can send the alert for that particular mobile and display the information in LCD display. It also having data storage, We can cross check the data with time.

II. BLOCK DIAGRAM



fig(2)Home automation controlling and security system

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PIC MICROCONTROLLER (PIC 16F877A)

INTRODUCTION

PIC is a family of **Modified Harvard architecture microcontrollers** made by Microchip Technology, derived from the PIC1650 originally developed by **General Instrument's** Microelectronics Division. The name PIC initially referred to "Peripheral Interface Controller". PICs are popular with both industrial developers and hobbyists alike due to their low cost, wide availability, large user base, extensive collection of application notes, availability of low cost or free development tools, and serial programming (and re-programming with flash memory) capability.

FEATURES

HIGH PERFORMANCE RISC CPU

PIC has only 35 single word instructions. All are single cycle instructions except for program branches, which uses two-cycle. The Operating speed of PIC in DC is 20 MHz and clock input in DC is 200 ns instruction cycle. The PIC has 8K x 14 words of flash Program Memory, 368 x 8 bytes of Data Memory (RAM).

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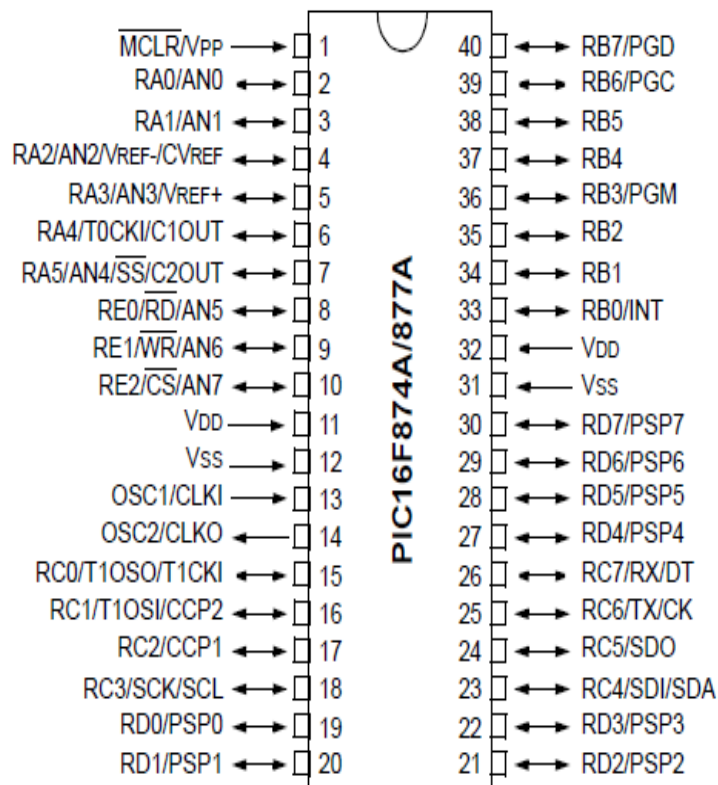
CMOS TECHNOLOGY

PIC has a Low power, high speed CMOS FLASH technology with a fully static design. It provides a wide operating voltage range of 2.0V to 5.5V. It has Low power consumption and used in commercial and industrial temperature ranges.

PERIPHERAL FEATURES

- Timer0: 8-bit timer/counter with 8-bit pre scaler.
- Timer1: 16-bit timer/counter with pre scaler.
- Timer2: 8-bit timer/counter with 8-bit period register, prescaler and postscaler.
- It has a Capture, Compare, PWM (CCP) module. Capture is of 16-bit and it has a maximum resolution of 12.5 ns. Compare is of 16-bit and it has a maximum resolution of 200ns. Pulse Width Modulation has a maximum resolution of 10-bit. 8-bit,
- 8 channel Analog-to-Digital converter with 10 bit each.
- It has a Synchronous Serial Port (SSP) with SPI (Master/Slave) and I2C, USART with 9 bit detection. It also has a Brown-out detection circuitry for Brown-out Reset (BOR).

PIN DIAGRAM



Fig(2) pin diagram of PIC 16F877A

MEMORY ORGANIZATION

There are three memory blocks in the PIC16F87XA device. The program memory and the data memory have separate buses so that concurrent access can occur. The PIC16F87XA devices have 13 bit program counter capable of

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addressing an 8K x 14 bit program memory space. The data memory is partitioned into multiple banks which contain the general purpose registers and the Special Function Registers (SFRs). Bits RP1 and RP0 are the bank select bits.

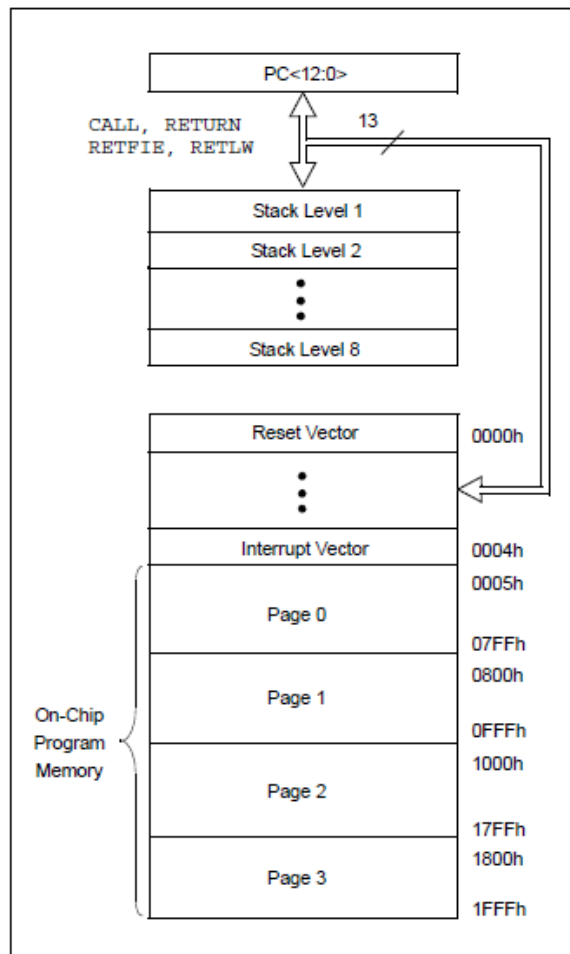


Fig.(3).Program Memory Organization And Stack

RP1:RP0	Bank
00	0
01	1
10	2
11	3

Fig.(4).Data memory-bank selection

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I/O PORTS

I/O ports are multiplexed with an alternate function for the peripheral features on the device. In general, when a peripheral is enabled, that pin may not be used as a general purpose I/O pin.

INTERRUPTS

The PIC16F877A has up to 15 sources of interrupt. The interrupt control register (INTCON) records individual interrupt requests in flag bits. It also has individual and global interrupt enable bits. A global interrupt enable bit, GIE (INTCON<7>) enables (if set) all unmasked interrupts, or disables (if cleared) all interrupts. When bit GIE is enabled, and an interrupt's flag bit and mask bit are set, the interrupt will vector immediately. Individual interrupts can be disabled through their corresponding enable bits in various registers. Individual interrupt bits are set, regardless of the status of the GIE bit. The GIE bit is cleared on RESET. The "return from interrupt" instruction, RETFIE, exits the interrupt routine, as well as sets the GIE bit, which re-enables interrupts. The RB0/INT pin interrupt, the RB port change interrupt and the TMR0 overflow interrupt flags are contained in the INTCON register.

The peripheral interrupt flags are contained in the Special Function Register, PIR1. The corresponding interrupt enable bits are contained in Special Function Register, PIE1, and the peripheral interrupt enable bit is contained in Special Function Register INTCON. When an interrupt is serviced, the GIE bit is cleared to disable any further interrupt, the return address is pushed onto the stack, and the PC is loaded with 0004h. Once in the Interrupt Service Routine, the source(s) of the interrupt can be determined by polling the interrupt flag bits. The interrupt flag bit(s) must be cleared in software before re-enabling interrupts to avoid recursive interrupts.

For external interrupt events, such as the INT pin or PORTB change interrupts, the interrupt latency will be three or four instruction cycles. The exact latency depends when the interrupt event occurs, relative to the current Q cycle. The latency is the same for one or two cycle instructions. Individual interrupt flag bits are set, regardless of the status of their corresponding mask bit, PEIE bit, or the GIE bit.

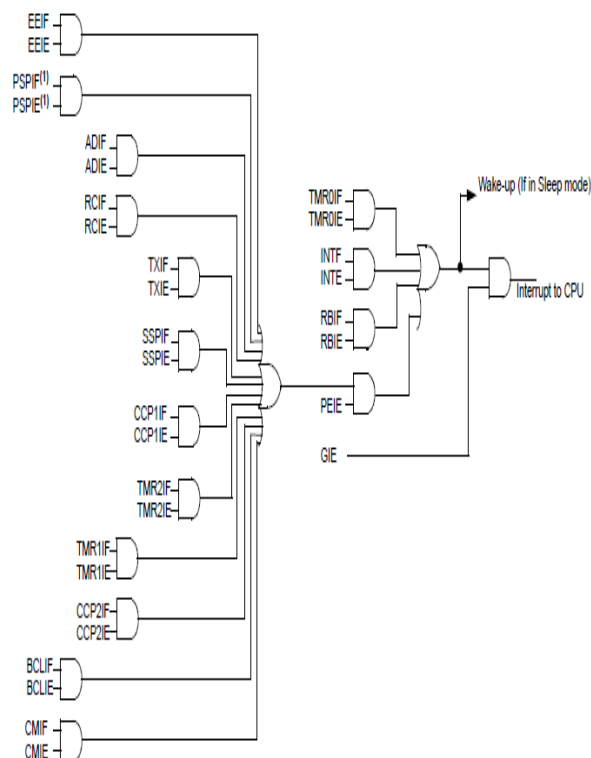


Fig.(5)Interrupts InPIC16F877A



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ADVANTAGES OF PIC MICROCONTROLLER

- PIC microcontrollers are consistent and faulty of PIC percentage is very less. The performance of the PIC microcontroller is very fast because of using RISC architecture.
- When comparing to other microcontrollers, power consumption is very less and programming is also very easy.
- Interfacing of an analog device is easy without any extra circuitry

DISADVANTAGES - PIC MICROCONTROLLER

- The length of the program is high due to using RISC architecture (35 instructions)
- One single accumulator is present and program memory is not accessible

POWER SUPPLY

Definition:

A power supply (sometimes known as a power supply unit or PSU) is a device or system that supplies electrical or other types of energy to an output load or group of loads. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.

POWER SUPPLY UNIT BLOCK

All digital circuits work only with low DC voltage. A power supply unit is required to provide the appropriate voltage supply. This unit consists of transformer, rectifier, filter and a regulator. AC voltage typically of 230Vrms is connected to a transformer which steps that AC voltage down to the desired AC voltage level. A diode rectifier then provides a full wave rectified voltage that is initially filtered by a simple capacitor filter to produce a DC voltage. This resulting DC voltage usually has some ripple or AC voltage variations. Regulator circuit can use this DC input to provide DC voltage that not only has much less ripple voltage but also remains in the same DC value, even when the DC voltage varies, or the load connected to the output DC voltage changes. The required DC supply is obtained from the available AC supply after rectification, filtration and regulation.

The main components used in the power supply unit are Transformer, Rectifier, Filter and Regulator. The 230V AC supply is converted into 9V AC supply through the transformer. The output of the transformer has the same frequency as in the input AC power. This AC power is converted into DC power through diodes. Here the bridge diode is used to convert AC supply to the DC power supply. This converted DC power supply has the ripple content and for normal operation of the circuit, the ripple content of the DC power supply should be as low as possible. Because the ripple content of the power supply will reduce the life of the circuit. So to reduce the ripple content of the DC power supply, the large value of capacitance filter is used.

TRANSFORMER

Transformer is a device used either for stepping-up or stepping-down the AC supply voltage with a corresponding decreases or increases in the current. Here, a transformer is used for stepping-down the voltage so as to get a voltage that can be regulated to get a constant 5V.

RECTIFIER

A rectifier is a device like semiconductor, capable of converting sinusoidal input waveform units into a unidirectional waveform, with a nonzero average component.

FILTERS

Capacitors are used as filters in the power supply unit. The action of the system depends upon the fact, that the capacitors stores energy during the conduction period and delivers this energy to the load during the inverse or non-conducting period. In this way, time during which the current passes through the load is prolonged and ripple is considerably reduced.

VOLTAGE REGULATOR

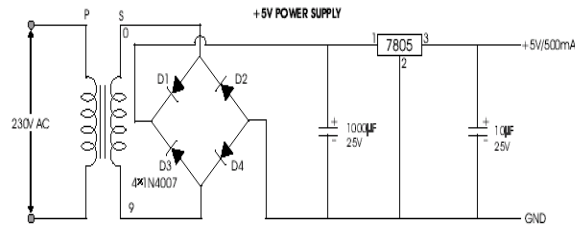
The LM78XX is three terminal regulator available with several fixed output voltages making them useful in a wide range of applications. IC7805 is a fixed voltage regulators used in this circuit

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Fig(6) voltage regulator circuit

CLOUD SERVER:

A cloud server is a hosted and typically virtual, compute server that is accessed by users over a network. Cloud servers are intended to provide the same functions, support the same operating systems (OS) and applications and offer performance characteristics similar to traditional physical servers that run in a local data center. Cloud servers are often referred to as virtual servers, virtual private servers (or) virtual platforms.

RADIO FREQUENCY IDENTIFICATION (RFID):

There are several automatic identification technologies including barcode, magnetic stripe and Radio Frequency Identification (RFID) applied in security system. Radio-Frequency Identification (RFID) is an emerging technology and one of the most rapidly growing segments of today's automatic identification data collection industry. RFID technology, offers superior performance over other automatic identification systems. Because it is not an optical technology like bar coding, no inherent line of sight is required between the reader and the tagged RFID object.

ANDROID VOICEAPP

The app on the Smartphone sends data and SMS when you click on buttons via Bluetooth and cloud server respectively from the mobile to Bluetooth module. Pic microcontroller board processes the received data and controls the relay board accordingly.



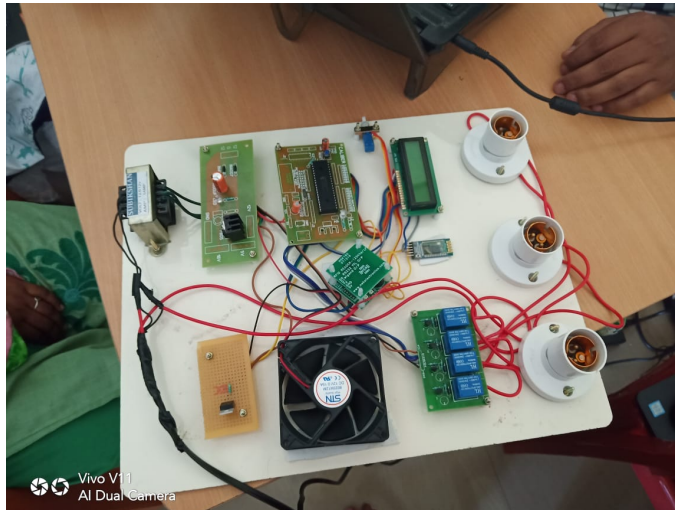
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HARDWARE MODULE



Fig(7) Hardware setup

III. CONCLUSION

Home automation market is very auspicious sector which is developing rapidly. It requires extensive range of developments that can be made in the idea of smart homes. Modelling and execution of home automation system using IR remote, Bluetooth and GSM through android application has been discussed in this paper. The proposed system is practical, economical and simple. Using IR remote commands are transmitted that are decoded by TSOP. While using Bluetooth the motive of the system is to use mobile phones integral feature for automating the home. As the range of GSM is worldwide people can use the home automation system from any part of the world. The key advantage of system is if control circuit fails then manual switching option of traditional method is available.

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