

HOME AUTOMATION WITH SPY ROBOT AND SECURITY SYSTEM

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Abstract: Traditionally electrical appliances in a home are controlled via switches that regulate the electricity to these devices. As the world gets more and more technologically advanced, we find new technology coming in deeper and deeper into our personal lives even at home. Home automation is becoming more and more popular around the world and is becoming a common practice. The process of home automation works by making everything in the house automatically controlled using technology to control and do the jobs that we would normally do manually. Home automation takes care of a lot of different activities in the house. this project we propose a unique System for Home automation utilizing Dual Tone Multi Frequency (DTMF) that is paired with a wireless module to provide seamless wireless control over many devices in a house. This user console has many keys, each corresponding to the device that needs to be activated. The encoder encodes the user choice and sends via a FM transmitter. The FM receiver receives the modulated signal and demodulates it and the user choice is determined by the DTMF decoder. Based upon this the required appliance is triggered. Dtmf access the control unit, the user should send an authentication code (DTMF) along with their quire/desired function/action to his/her home control system via Global System for Mobile communication (GSM). Upon being properly authenticated, the cell phone-based interface at home (control unit) would relay the commands to a microcontroller that would perform the required function/action, and return a function completion code that would be sent to the source of the original command (user's cell phone)

Keyword: Home Automation System, Smart Home, DTMF, PIC Microcontroller, Spy Robot

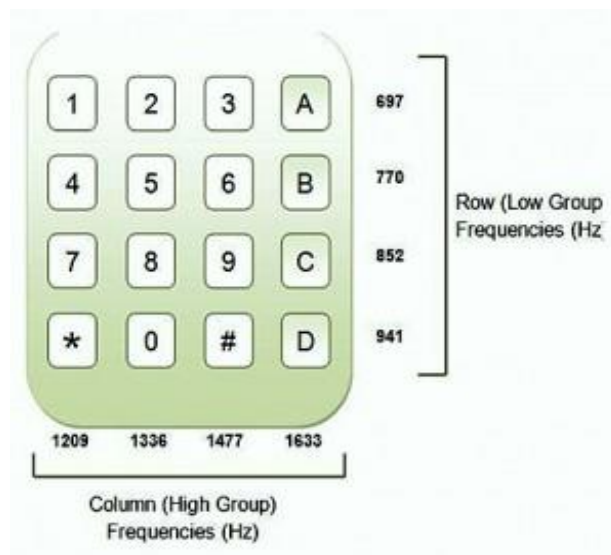
1. INTRODUCTION

The ability to be able to control every appliance in your home in much the same way--not just from one location but from every room in house and even remotely is the promise of home decades. Now-a-days, a house hold has a reach to broadband Internet access, home networks, and more sophisticated computer and consumer electronics products. The digitization of entertainment is sparking new interest in ways to tie together all of the systems within your home and make life more convenient and enjoyable. Also, there is a need to provide supporting systems to elderly and disabled. Conservative home automation solutions are mostly based on power line or wired communication technologies .These are complex, expensive, inflexible, and involved with time-consuming installations .Wireless home automation concept has been incorporated immensely to the new home and renovation projects due to the better improvements it provides in many domestic applications .The home automation needs to make use of latest technological advancements. The project aims to design and develop a home automation system which is wireless and can be controlled in multiple ways to give more accessibility and control over the system. The purpose is to develop and design an automation system which is accessible remotely at the same time locally in a user friendly way. Yet cost effective, robust, portable and easily operable so that it could be widely accepted for multiple needs. A single monitoring and control system will be developed which could be used, consumed by multiple user interface providing accessibility and control to the user. The objective of the proposed method is to use current technology components and implement it with communication technologies like GSM, Internet and speech recognition and to research and evaluate different user interface possibilities to provide more accessibility and control on home automation. Wireless communication in home automation is centered on low-power RF , GSM & DTMF based wireless communication modules. Voice commands, GSM messaging and web portal are to be used to control the automation of household electrical appliances

The device switching is achieved by Relays. Security preserved because these dedicated passwords owned and known by selected persons only. For instance, our system contains an alarm unit giving the user a remote on/off mechanism, which is capable of informing up to five different numbers over telephony network about the nature of the event. The underlying principle mainly relies up on the ability of DTMF (Double Tune Multi Frequency) ICs to generate DTMF corresponding to a number or code in the number pad and to detect the same number or code from its corresponding DTMF. In detail, a DTMF generator generates two frequencies corresponding to a number or code in the number pad which will be transmitted through the communication networks, constituting the transmitter section which is simply equivalent to a mobile set. In the receiver part, the DTMF detector IC, for example IC MT 8870 detects the number or code represented by DTMF back, through the inspection of the two transmitted frequencies.

2. DUAL-TONE MULTI-FREQUENCY

Generally, appliances used in our home are controlled with the help of switches. These days, you can see automation of these appliances using many technologies. This article presents the controlling of home appliances using DTMF technology DTMF is acronym for Dual Tone Multi Frequency. So, just think when you make call for customer care, they will ask you to press 1, 2 or any other number. When you press a number from your mobile, one particular action is happening. All this is because of DTMF. When a button is pressed in your mobile keypad, it will generate a tone of two frequencies. These tones are called row and column frequencies.



Generally, row frequencies are low frequencies and column frequencies are high frequencies. These frequencies for DTMF are chosen in such a way that they don't have harmonic relation with the others, so that they will not produce same tones. The column frequencies are slightly louder than the row frequencies to compensate for the high-frequency roll off of voice audio systems.

Advantages of DTMF Controlled Home Automation System-

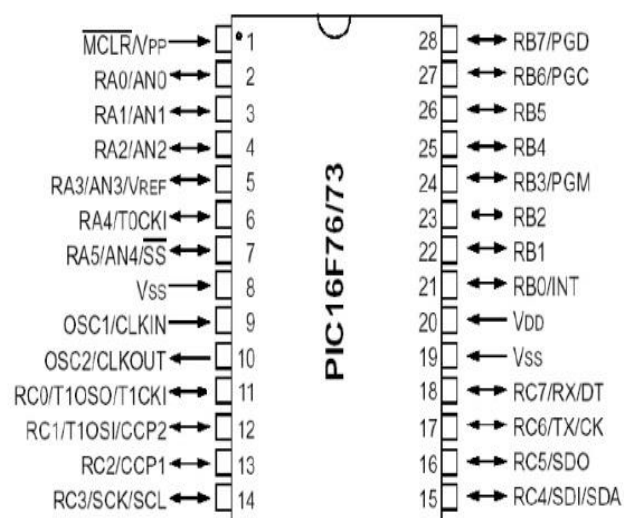
- One can control home appliances from anywhere.
- It is very low cost compared to other technologies like GSM.

3. PIC MICROCONTROLLER

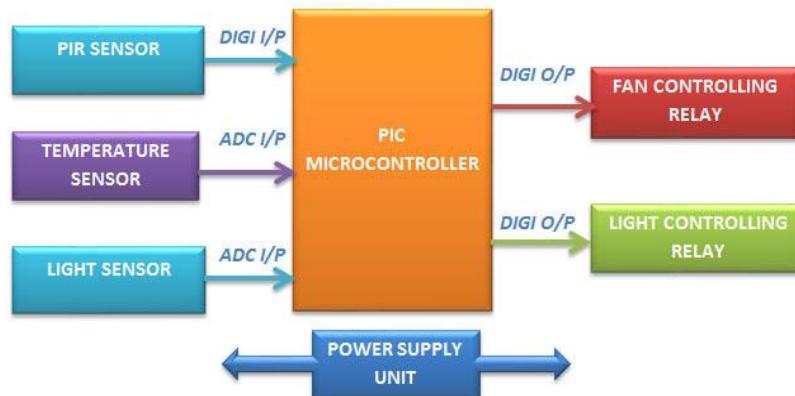
This powerful (200 nanosecond instruction execution) yet easy-to-program (only 35 single word instructions) CMOS FLASH-based 8-bit microcontroller packs Microchip's powerful PIC® architecture into 28-pin package and is upwards compatible with the PIC16C5X, PIC12CXXX and PIC16C7X device. The PIC16F73 features 5 channels of 8-bit Analog-to-Digital (A/D) converter with 2 additional timers, 2 capture/compare/PWM functions and the synchronous serial port can be configured as either 3-wire Serial Peripheral Interface (SPI™) or the 2-wire Inter-Integrated Circuit (I²C™) bus and a Universal Asynchronous Receiver Transmitter (USART).

Features:

- High Performance RISC CPU:
- High performance RISC CPU
- Only 35 single word instructions to learn
- All single cycle instructions except for program branches which are two-cycle
- Special Microcontroller Features:
- Power-on Reset (POR)
- Power-up Timer (PWRT) and Oscillator Start-up Timer (OST)
- Watchdog Timer (WDT) with its own on-chip RC oscillator for reliable operation
- Programmable code protection
- Power saving SLEEP mode
- Peripheral Features:
 - Timer0: 8-bit timer/counter with 8-bit presales
 - Timer1: 16-bit timer/counter with presales, can be incremented during SLEEP via external crystal/clock
 - Timer2: 8-bit timer/counter with 8-bit period register, percale and post scalar
- CMOS Technology:
 - Low power, high speed CMOS FLASH technology
 - Fully static design
 - Wide operating voltage range: 2.0 V to 5.5 V
 - High Sink/Source Current: 25 ma

PIN DESCRIPTION

4. BLOCK DIAGRAM



Home automation system mainly consists of these following components:

- PIC16f73 Microcontroller
- Encoder/Decoder
- Relay
- AC Load
- Crystal Oscillator
- Resistors
- Capacitors
- Power Supply Unit

PIC Controller:

This is the heart of the project, as we know the processor is the heart of any project. Here PIC controller takes that job. The chip used is Atmel 16F73. There are two memory blocks in each of these PIC controllers. The program Memory and Data Memory have separate buses so that concurrent access can occur. The program memory can be read internally using Special Function Registers in PIC. PIC 16F7X devices have a 13 bit program counter capable of addressing an 8K word x 14 bit program memory space. The PIC 16F73 devices have 8K x 14 words of FLASH program memory.

Power Supply:

A regulator IC 7805 is used for supplying power to the entire circuit. 7805 regulator IC is a voltage regulator integrated IC in 78xx series. There may have lots of fluctuations in the main supply voltage. So for Home Automation Project Using PIC Microcontroller, these voltage fluctuations will damage the entire circuit. The Voltage Regulator IC 7805 used here, protects the entire circuit from these voltage fluctuations by filtering the voltage variations and providing a constant output voltage to the entire circuit of Home Automation Project PIC Microcontroller. The 7805 Regulator IC provides a +5 Voltage of regulated power supply. Filtering capacitors are used along with the IC's respective pins with respect to the voltage levels

Fan and Light Controlling Relays:

The relay used in this Home Automation Project Using Embedded System, PIC Microcontroller is Relay (5v SPDT >1A). This relay module is suitable for office machine, domestic appliance, automobile, audio etc. These relays act as a Circuit Switch according to certain switching condition. Also the relay offers a high protection to the electrical appliances. According to the output from the Microcontroller, the relay controls the fan and the lights

LM35 Temperature Sensor:

LM35 IC is used to measure the temperature of a room. Temperature sensor LM35 is a precision IC with its output voltage proportional to the measured temperature level of a room in degree Celsius.

LDR (Light Dependent Resistor) or Photo resistor:

In the Home Automation Project, these LDR is used to detect the Light intensity level of a room and give signals or outputs to the PIC Microcontroller and according to the readings from the LDR; the Microcontroller controls the operations like, switch ON the light or any other activities

5. SPY ROBOT

In the spy robot we can capture the image in home. It consists of CCD camera, PIC 16F73 microcontroller, four movable wheels, three brush DC motors, three L298N motor drivers, LM7805 voltage regulator, and RF receiver module. The PIC 16F73 microcontroller which has 40 pins is used in construction of spy robot [5]. The voltage regulator LM7805 is used again to have stable power 5V for the microcontroller

6. WHY PIC MICROCONTROLLER

PICs are faster than 8051 microcontroller, PICs are more reliable (high noise immunity) and code-efficient than 8051s. PIC got an internal memory while 8051 don't have internal memory. PIC is a RISC microcontroller, that means it has a reduced set of instructions, more precisely 35 instructions. All of these instructions are executed in one cycle except for jump and branch instruction. PIC microcontroller is more chipper than ARM processor. ARM has a more complex instruction set than PIC microcontroller

7. CONCLUSION

So far we have always seen technology rise up and it never stops to amaze us. The engineers help in building technology for the betterment of people

- Increase your independence and give you greater control of your home environment.
- Make it easier to communicate with your family.
- Save you time and effort.
- Improve your personal safety.
- Reduce your heating and cooling costs.
- Increase your home's energy efficiency.
- Alert you audibly and visually to emergency situations.

REFERENCES

- [1] T. B. Zahariadis, Home Networking Technologies and Standards Artech .House, 2003.
- [2] W. Kastner, G. Neuschwandtner, S. Soucek and H.M.Newmann, Communication Systems for Building
- [3] Automation and Control, Proceedings of the IEEE, Vol. 93, Issue 6, pp.1178 – 1203, Jun. 2005.
- [4] J. Tu, W.W. Lin. J.C. Wang and Y.T. Lin, The Scenario Implementation of Home Networking, The 9th International Conference on Advanced Communication Technology, Vol., pp.1861 – 1863, Feb. 2007.
- [5] C. Suh and Y.B. Ko, Design and Implementation of Intelligent Home Control Systems, IEEE Transactions on Consumer Electronics, Vol. 54, No.3, Aug. 2008.
- [6] Home Network Technology & Connectivity Use: Ethernet, 802.11, Coax, and Powerline, Global Information, Inc., Sep. 2009.
- [7] Using Bluetooth in a system for integrated control of home digital network devices by Keller.T, Paczkowski,R.; Modelski, J.(IEEE journal)
- [8] Control of remote domestic system using DTMF byLadwa, S.M.; Kaarthik, R.S.; Dhara, A.R.; Dalei,N.(IEEE Journal)
- [9] <https://www.mepits.com/project/245/DIY-Projects/Home-Automation-Project-Using-Embedded-System,-PIC-Microcontroller---Part-2>