

# Intelligent Home Automation and Security System

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**ABSTRACT:** In today's scenario safer home security is required, As the technology is improved in the field of electronics. They have entered the fields like industry, medicine, telecommunication and also home automation. This paper introduces an intelligent home automation system which is developed using PIC microcontroller with the ZigBee wireless communication technology, speech recognition techniques and GSM network technology. This home automation system is typically employed to secure the home from outside people and make the user to know about their visitors using mobile. It also allows the user to decide about opening the door. Mobile devices are ideal in providing a user interface in a home automation system and this paper evaluates development of a low cost surveillance system using different sensors built around the microcontroller. This system controls home appliances using voice commands with the help of HM2007 chip.

*Keywords:* HM2007 chip, Intelligent home, PIC microcontroller, ZigBee module, GSM Module

## I.INTRODUCTION

Home automation systems are developed in recent years that make use of emerging technologies for the development and making the automation easy with good performance. Most of the systems make use of a web server and mobile communication for controlling the home appliances. ZigBee is developed in recent years, a short-range wireless communications technology, with low power, low data rate, short distance, low cost, safe and reliable. The Central Processing Unit for the proposed system is developed using the PIC microcontroller which is a low cost and efficient controller used in many applications. Here combined embedded system technology with the wireless technology. This system facilitates the two-way communication between the mobile user and the visitors. The person can ask the purpose of visiting from the visitor from any remote location and also secures the home from strangers having wrong ideas in their mind. This System

with user mobile includes user modes options such as active and hibernate mode. The user mobile also includes options for viewing visitors, turning on the bulb at particular time, two way communication facility, offline option and activating alarm system etc. This system controls lights, fans, Tv, Fridge viewing of the house interiors for surveillance purposes and provides an indication in case of any occurrence of intrusion. Wireless based home automation systems decrease installation cost and effort and enhance system flexibility and scalability. In Home automation system there are collections of interconnected devices for controlling various functions within a house. Mobile devices are ideal in providing an user interface in a home automation system, due to their portability and their wide range of capabilities. Home Automation is becoming an inevitable thing in our fast developing environment and current life style. In a situation where there is high level of theft, there is need for better security system. This tends to utilize the availability of GSM network, mobile phone and electronics circuit to achieve an automated system which is programmed to work as a thinking device to accomplish this purpose. To secure it against theft, crime, powerful security system is required not only to detect but also pre-empts hazards. In this paper the alerting sensors with low-power consumption are placed where an intruder must pass through. According to the sensor's signals received by microcontroller, a call is established to mobile station through a GSM modem and thus warns the presence of unauthorized user in the home to owner-occupier. This type of systems have a facility of capturing of the visitors/intruder photographs and sends a copy to the user mail which is registered.

## II. EXISTING METHODOLOGIES

[a] There are many existing technologies which make use of Bluetooth technology to ensure security and is used to control the home appliances. This type of systems make use of Arduino Bluetooth board and an interactive python program is used in the cell phone to provide the user interaction. The I/O ports of the Bluetooth board and relays are used for interfacing with the devices which are to be controlled. The Bluetooth is a password protected to ensure that the system is secure and not misused by an intruders. This type of systems has a drawback of the range around 10 meters only.

[b] There exists some systems which makes use of the dual tone multi frequency used in telephone lines. System uses standard public-switched telephone lines. The system includes three components, first is the DTMF receiver and ring detector. The second part is the I/O interface

unit. The third part is the PC which is ideal for performing online operations. The PC detects the ringing of the line and then authenticates the user. After this the user will be allowed to use the keypad tones to control the devices as required. This type of systems have similar DTMF tones all over the world and has a drawback that the number of appliances is limited by the number of keys in the keypad.

### **III. PROPOSED METHODOLOGY**

The proposed system helps in safeguarding the home and makes the home more secure and safe. The central processing unit for the system is developed using PIC 18F8722 for both transmission and reception. This IC has better performance and efficiency. It is programmed using the embedded c program for control and giving commands through the zigbee communication. PIC controller contains two serial communications ports that enables us to connect the two peripherals that can communicate through the RS 232 communication. At the reception unit we connect the GSM module and the Zigbee module for controlling and communication purposes. Hence the overall system integrates all the modules via wireless communication like zigbee and gsm technologies. The user gets an immediate alert when someone enters near the gate, As soon as the object is sensed the image will be captured and sends an alert to the user. The system make use of Raspberry pi camera to capture high definition image. System consists of many sensors like ultrasonic sensor to detect the intruder on their physical presence and vibration sensor for sensing the vibration signal. System also utilizes light sensor to detect day light to switch off the bulb, temperature sensor for switching off the fan and IR sensor for controlling the gate motion etc which are connected to relays and microcontroller. There is an advanced application included in this proposed system which uses flash memory to store the data like image or names of the family members. IR sensors can be used at the room door, such that when a family members enters near the door an alert is sent to the user mobile. Based on the alert the user can open the door. The system is divided into two main units such as transmission unit and Reception unit.

### **IV. TRANSMISSION UNIT**

The transmission unit consist of a voice module to get speech as input and give the control signal to the PIC microcontroller. The voice is sampled into digitized signal and compared with the voice stored in the memory and the data is transferred through the serial communication of PIC for ON/OFF operation of home appliances. The zigbee module connects to the PIC

microcontroller through RS232 serial communication and data transmission between the transmission and reception module is done serially. The Fig. 1 shows the transmission part of the proposed system.

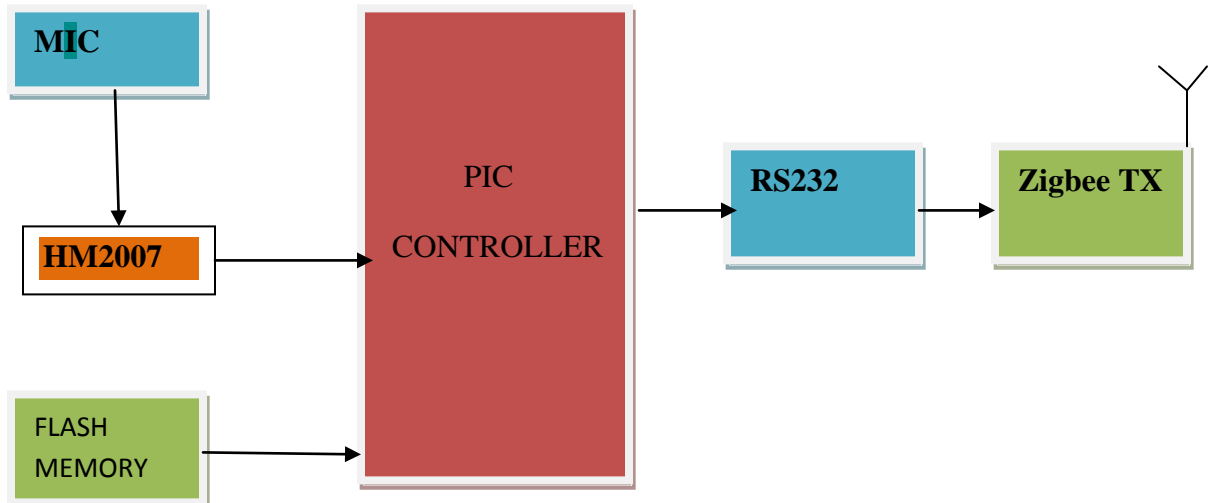


Fig. 1. Block Diagram of transmission unit

### V. VOICE RECOGNITION MODULE

The voice recognition module consists of HM 2007 IC, SRAM and keypad. In this module there exist two operations manual and CPU mode. The mode is selected through the keypad and the error code is generated by chip for the correct input from an user. The control signal from the chip is given to controller for the process. The speech recognition system will process the signal and store the command in a static RAM IC. The data from the speech recognition module and the data or command stored in a separate memory location is compared using switch case statement in the program so that the command for each appliance is triggered through wireless communication. Figure 2 shows the schematic of the speech recognition board

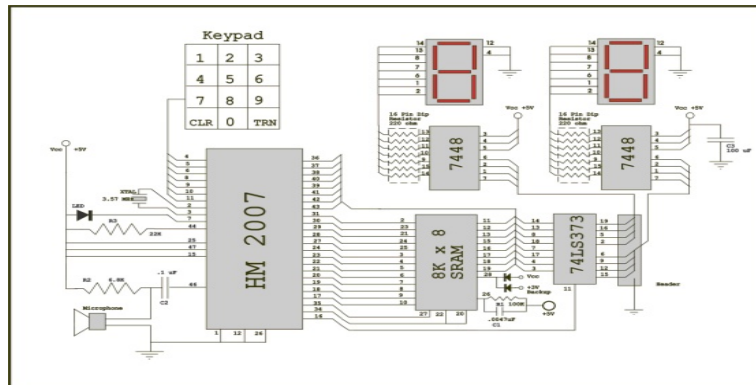


Fig. 2.schematic of the speech recognition module

### VI. RECEPTION UNIT

The reception unit has a switching circuit using relays for controlling the home appliances that operates at 240v but the operating volts of microcontroller is 5v, hence we use relays which is an electromechanical switch that ON/OFF the appliances depending on the signal obtained from the controller by allowing the current to flow when the internal coil is magnetized. The signal is generated at the different pins of the PIC microcontroller depending on the digitalized commands received by the zigbee module. The reception module includes different sensors to detect the smoke or leakage and on/off of tv, fan, fridge. The module also contains the alarm for alerting the neighbours when an intrusion occurs. The GSM module is connected on the other serial port RS232 for sending message to a particular number when the sensors generate the signal. This is implemented for security purpose. The below figure 3 shows block diagram of reception unit

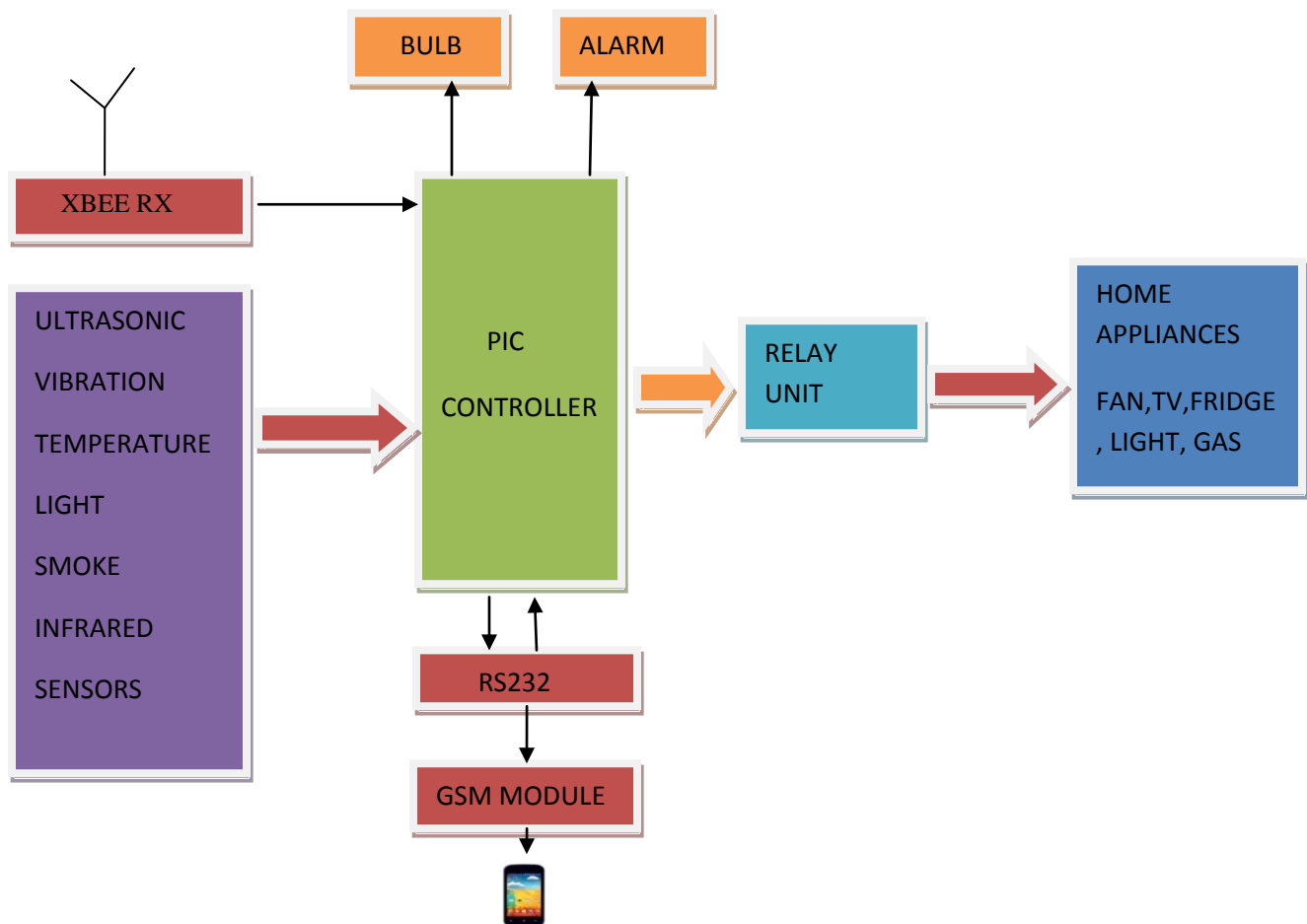


Fig. 3.Block Diagram of receiver unit

Serial communication registers are initialized and the data is serially transmitted through the zigbee module by placing the data in TXREG register. At the receiver side, received data through RCREG register is stored in a separate memory location. The turn ON/OFF of relay depends on the received data. The ADC value is processed and compared with predefined value for triggering GSM module by sending data signal through RS 232 in the controller.

## VII. CONCLUSION AND FUTURE WORK

In this paper the home appliances which are connected to PIC microcontroller were controlled successfully from a mobile devices. This system provides an efficient framework for a working man/women by enabling them to monitor home appliances from anywhere. The proposed approach provides high accuracy and security.

In the future work well advanced sensors can be used for a reliable solution in providing remote monitoring. The features of GPRS/GSM can be explored to design the system to offers longer communication.

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