

Multiple Parameter Sensing for Home Automation

Shruti Virupaksh Deshinge
Electronics and Telecommunication department
Sinhgad College of Engineering,
Pune, India

Prof. Makrand N. Kakatkar
Electronics and Telecommunication department
Sinhgad College of Engineering,
Pune, India

Abstract— As the technology rapidly growing it impact on the every part of day to day life. Home automation is the use and senses the different parameters and monitors this parameter remotely. Also these days number of elder people which stay alone in home is increases so we need to create safety solution for them. So that we proposed the system which contains the different sensors which senses the conditions send this data serially and monitor on the PC. The PIR sensor is used to detect the motion in the room. Safety is important if we are not in the home so for detection of intrusion in the home Door on/off sensor include in the system. Detection of gas leakage and fir plays significant role in home automation so that for this gas sensor MQ6 and for fir LM35 temperature sensor is used. For checking water level in the tank water sensor is used. These sensors are connected to the controller witch send data serially on PC where we monitor these data. Advantage of this system is that it is not costly and easily installed and for this infrastructure planning is not required.

Keywords—PIR- passive infrared sensor, MQ6

I. INTRODUCTION

The similar word for home automation is the smart home. Smart Home is energy efficiency, comfort, safety and advance systems are of a growing number of homes around the world. The smart homes access by the remote location. Once this development is spread across the world then everyone can control the home remotely from anywhere. The same as with people, the home automation system required some information. This information is come from commands and programs. But now days this commands and programs are partly replace by the different sensors. Therefore the sensors are the foundation stone of the home automation. As the all sensors are chosen by us considering the specification the range and quality of the sensors determine what system is capable of doing and how effectively it operates. The proposed system contains different sensors to monitor the surrounding conditions.

The older people forget to switch off lights or fan so that we can monitor that also they may forget to switch off cylinder leading to LPG gas leakage and causing robbery in home because of forget to close the door. For all this purpose different sensor is used in the system. The PIR sensor detects the motion in the room and the status is transmits. These all data we can monitor on PC. The main purpose of the system describes in this paper is that system senses the condition continuously and these sensor are connect to the PIC18F4520 which has 10-bit ADC inside to convert analog data into digital form. Depending upon output of ADC the corresponding action will take place means with respect to that string will transmits serially by using MAX232 to laptop

or PC. these components, incorporating the applicable criteria that follow.

Rasika S. Ransing and Manita Rajput proposed system contains a Wireless Sensor Network to develop smart home system for elder people to provide them safe, help them ease their work and secure living. In this paper, sensors like temperature sensor, LPG sensor, Contact sensor and fire detection sensor, gas leakage detection and door is closed or open detection, respectively [1]. Omar Abdulwahabe Mohamad, Rasha Talal Hameed used the suitable routing protocol. proposed the system sensors are monitored remotely. The major challenge for proposed system of smart home security is how to determine the suitable routing protocol which ensures the data transmitted [2]

II. SYSTEM ARCHITECTURE

The system architecture describes the simple block diagram of the proposed system which is shown in figure 1. The system contains the different sensor like temperature, gas, Door on/off, water level sensor and PIR sensor. All sensor interfaces with PIC18F4520. The LCD is used to display all sensor parameter. To transmit the sensor parameter on the PC system contains the MAX232 and RS232 serial.

The Water level sensor is used for detection of water level in the tank. It gives indication when tank is full or empty. The motion in the room is detected by the PIR sensor. If no one in the house and door is closed and unauthorized person come and open the door this indication is given by the door on off sensor. Detection of the LPG gas is very important in the house for that purpose MQ6 gas sensor is used which detects the gas in the air depending upon the concentration in the air. The temperature sensor is for two purposes first for the detection of temperature in the room and second for the detection of fire in the house. If temperature increases beyond certain limit then indication given by the sensor.

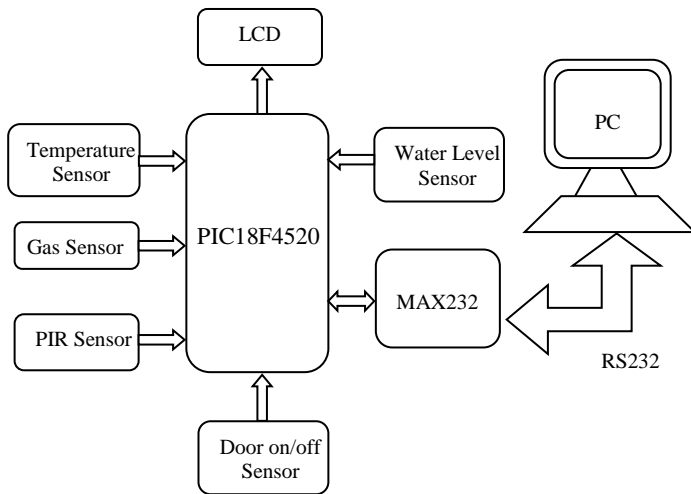


Figure 1 Block diagram of the proposed system

In this way all sensors are given indication to the PIC18F4520. The PIC controller recognizes it and sends this data serially to the PC by using MAX232. These all parameter is displayed on the LCD also and it is received on the PC. For display or receiving this data on PC system contained the Flash Magic where by selecting the COM port the data which is transmitted by PIC is displayed on the Flash Magic Terminal.

III. HARDWARE IMPLEMENTATION

The proposed system offers an effective solution for sensing the environmental condition in the home. The hardware used in the system is nothing but the all sensors and they interfaced with the controller PIC18F4520. The description of each sensors and PIC18F4520 are giving below:

A. PIC18F4520

PIC18F4520 families offer the advantages such as high-computational performance at economical price with additional flash memory. They are available in 40-pin packages. The PIC18F4520 has the following features:

- 32 Kbytes flash program memory
- 13 A/D channels
- 5 bidirectional I/O ports
- One standard CCP module and one Enhanced CCP module
- Parallel Slave Port

It has enhanced addressable USART which provides RS-232 communication module and support LIN bus protocol. The 16-bit baud rate generation for resolution and automatic baud rate detection include in USART. 10-bit A/D converter of PIC18F4520 contains programmable acquisition time, allowing for channel to be selected and conversion to be initiated without waiting for a sampling period and thus reduce code overhead.

B. Temperature Sensor

The temperature sensor used in the system is LM35 which is precision integrated-circuit temperature sensor. This device gives output voltage linearly proportional to Celsius temperature. This device provides typical accuracies of $\pm 1/4^\circ\text{C}$ at room temperature and $\pm 3/4^\circ\text{C}$ over a full -55°C to 150°C temperature range so that any external calibration or trimming is not required. LM35 sensor draws $60\mu\text{A}$ current from supply and self-heating is below 0.1°C in still air.

C. Gas sensor

The gas sensor is used to detection of gas in the surrounding if the specific gas concentration increases above the threshold value, which most of the time used as part of safety system. Gas sensor gives the output in mV and hence it interface with the ADC of PIC. MQ-6 uses SnO₂ sensitive material. The SnO₂ has lower conductivity in clean air and it is increases if the gas concentration rises. This sensor strongly sensitive to propane, butane and LPG gases. The sensor out goes high when concentration is exceeds beyond the certain threshold value. The gas sensor is important because some gases are harmful to human and animal life so if the concentration increases in surrounding this should be detectable so we used gas sensor in many cases.

D. PIR Sensor

The full form of PIR sensor is “Passive Infrared”, “IR Motion” or “Pyroelectric” sensor. PIR sensor is used to detect the motion in the sensor’s range. It has the rectangular size. The output given by the PIR sensor is in the pulse form. When motion detected then gives digital high pulse and digital low when idle(no-motion detected). This pulse length is depends upon the register and capacitor in the circuit. The PIR sensor sensitivity range is up to 20 feet (app. 6 m) and $110^\circ \times 70^\circ$ detection range. It requires 3V-9V input voltage but the 5V is the ideal input voltage.

E. Door ON/OFF Sensor

The Door sensor also called as the magnetic contact switch sensor is use to determine door position. If the door is closed and there is no one in the house and after that also the door is get open then this sensor gives indication. So user recognized that some unauthorized person entered in the house.

F. Water Level Sensor

Water sensor is used to detect the water level in the tank. The sensor consist the small copper roads. This sensor gives indication when tank is full otherwise it is in ideal condition.

IV. SOFTWARE IMPLEMENTATION

The MPLAB IDE v8.89 software is used programming for the PIC18F4520. In MPLAB the code can easily written and upload into PIC. Only main part consider while creating new project. Carefully select the all library path and check the environmental variable of desktop or laptop and check the path for MPLAB tool.

The Flowchart of the proposed system is shown in below figure 2. The flowchart describes the working of the whole system. It starts from the Initialization of PIC and sensor. After that program check the output of each sensor and transmit the data and also displayed on the LCD.

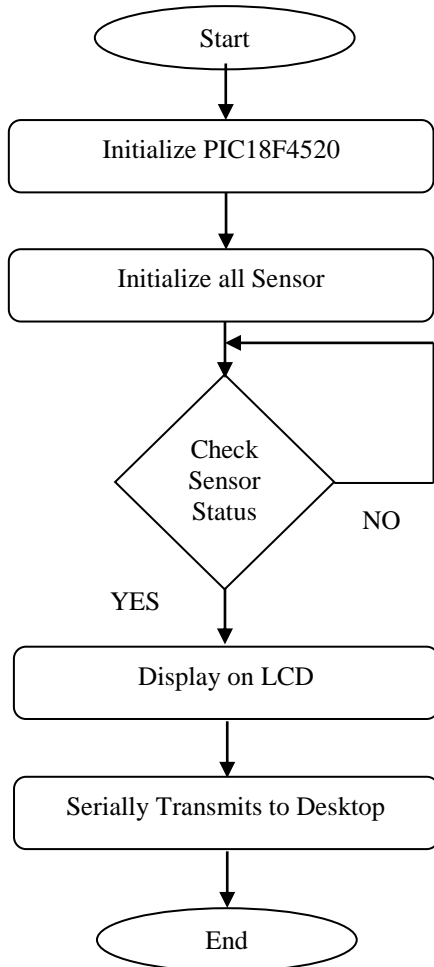


Figure 2 Flowchart of the proposed system

V. RESULTS

The actual setup of the proposed system is shown in the Figure 3. All sensors are interface to PIC18F4520 and data serially transmit using MAX232. The data which is transmitted by the PIC is displayed on the Flash Magic.

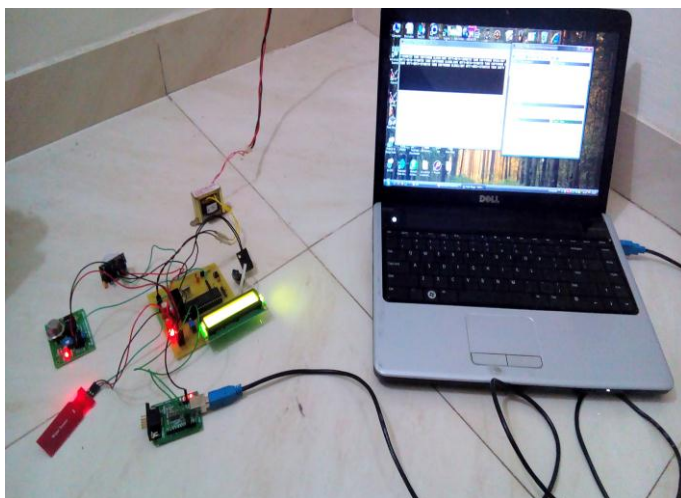


Figure 3 Actual setup of total proposed system.

Figure 4 shows the total hardware part of the PIC18F4520. The supply is given by the regulated power supply to the PIC. All sensors are connected to the different channel of the PIC pins. The Temperature sensor and water level sensor are connected to the RA0/AN0(pin 2) and RC3(pin 18). The RA1/AN1(pin 3) and RD1(pin 20) are used for MQ6 gas sensor and PIR sensor. Door on/off sensor are connect to the RD0(pin 19) to PIC.

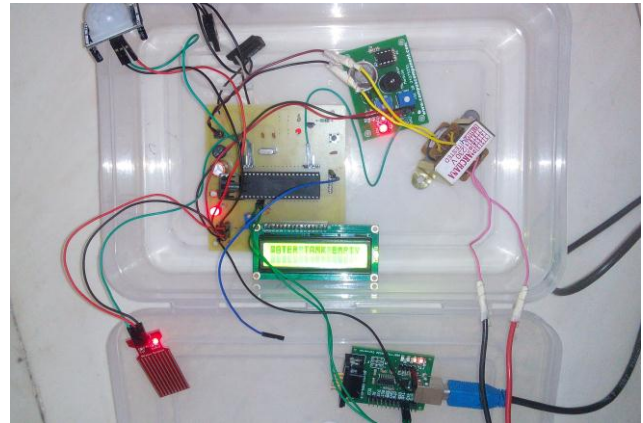


Figure 4 Interfacing of different sensor to PIC18F4520

Serially Transmitted data should be displayed on the personal computer or desktop. For this Flash Magic is used which contains the terminal to display the receiving data. For this first we select the COM port of the USB connector which displayed in the device manager. The COM port number in the device manager and the Flash Magic Terminal should be same.

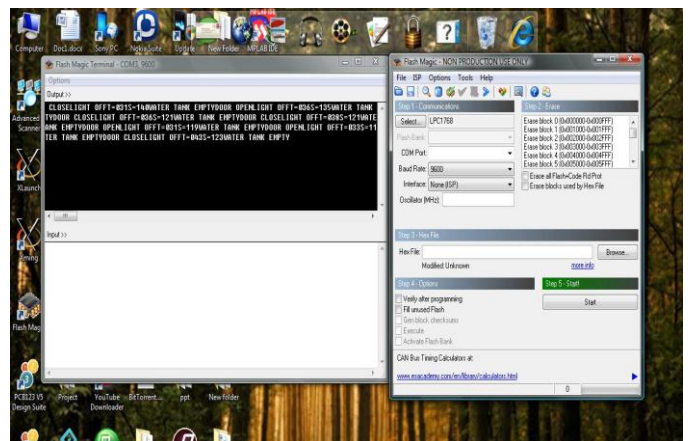


Figure 5 different sensor status displayed on the Flash Magic

The receiving data on Flash Magic Terminal is shown in the Figure 5. It contains the status of the all sensor. If the status is change then transmitted data by PIC change and this is receive by the Flash Magic.

In this way the status of all sensor parameters are detected and displayed on the PC terminal in the house.

VI. CONCLUSION

The proposed system is used to monitor the all parameters in the house. The sensor is best option for sensing the parameter independently and sends the status to the controller. The controller used is PIC which has 10-bit ADC. These convert the analog data to digital and transmit serially to PC. In this way the different parameter is sensed by sensor independently. So that Home Automation systems are enhancing the convenience, safety, comfort, and energy efficiency of a growing number of homes around the world.

ACKNOWLEDGMENT

I would extremely thankful to all referees for their helpful guidance which gives me support to complete my idea and improve quality of the paper. Also I would like to thank my Project Guide, Prof. M. N. Kakatkar for his valuable guidance.

REFERENCES

- [1] Rasika S. Ransing, Manita Rajput, "Smart Home for Elderly Care, based on Wireless Sensor Network", International Conference on Nascent Technologies in the Engineering Field, IEEE 2015
- [2] Omar Abdulwahabe Mohamad, Rasha Talal Hameed, "Smart Home Security Based on Optimal Wireless Sensor Network Routing Protocols", ECAI - International Conference – 7th Edition Electronics, Computers and Artificial Intelligence Bucharest, ROMÂNIA, 25-27 June, 2015
- [3] Christopher Osiegbu, Seifemichael B. Amsalu, Fatemeh Afghah, "Design and Implementation of an Autonomous Wireless Sensor-based Smart Home", 24th International conference on Computer Communication and Network, IEEE, Las Vegas, 3-6 Aug 2015, pp. 1-7
- [4] Yong Tae Park Pranesh Sthapit Jae-Young Pyun, "Smart Digital Door Lock for the Home Automation", TENCON IEEE Region 10 cOnference, Singapore, 23-26 Jan 2009, pp. 1-6.
- [5] Deepak C.Karia, Vispi Adajania, Manisha Agrawal and Swapnil Dandekar, "Embedded Web Server Application Based Automation and Monitoring System", International Conference on Signal Processing, Communication, Computing and Networking Technologies, IEEE, Thuckafay 21-22 July 2011, pp. 634-637