Real Time Smart House Data Logging System Using LabVIEW

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ABSTRACT: Smart home is a house that uses information technology to monitor the environment, control the electric appliance and communicates with the outer world. Smart home is a complex technology, at the same time it is developing. A smart home automation system has been developed to automatically achieve some activities performed frequently in daily life to obtain more comfortable and easier life environment. The system is based on the Lab VIEW software and can act as a security guard of the home. The system includes many subsystems such as lighting system, burglary alarm system, LPG leakage monitoring System, Fire Alarm System and temperature system. The system can monitor and control the house equipment's from anywhere in the house. This paper presents the hardware implementation of a multiplatform control system for house automation using LabVIEW. The approach combines hardware and software technologies

KEYWORDS: Smart Home, Lab VIEW, Microcontroller Interfacing sensors, Remote control.

I.INTRODUCTION

Home Automation is the housing extension of building automation system. This system is actually automating the residential activity. The trendiness of home automation has increased tremendously in recent years for the reason of higher usability and simplicity by using remote control, smart phones and tablet connectivity (through Wi-Fi, GSM, Bluetooth, Zigbee etc.). Smart home is a house that has intelligent control over the activities performed frequently in daily life to achieve more comfortable and safety life. A smart home is equipped with special structured wiring to enable occupants to program of automated home electronic devices by entering a single command based on LabVIEW. In Smart House system use LabVIEW program and remote control to monitoring different parameters and control the lighting systems in the smart house model. The main system consists of five parts; these five parts are connected to LabVIEW software as the main controller for these systems. The first system in smart house project is security systems that include fire alarm system used in announcing the outbreak of a fire and work to extinguish the fire, The second system burglar alarm system that signals the occurrence of a burglary. The third system is lighting system that includes the internal lighting of the house. The fourth system is temperature system. The fifth system include LPG gas sensor to announcing the overflow of gas. The smart house has two interfaces, computer interfacing, and remote control unit interfacing. Computer device that provided with LabVIEW software is the main controller unit for all systems in the house. It receives data from house sensors, process information and updates data for the difference systems, and transmit controlling signal to house systems and switching output devices. In addition, LabVIEW make the ability to monitor the important operations in the system to the users in order to be informed of the changes in the system.

II. RELATED WORK

Smart home system is the use of advanced computer technology, network communication technology and automatic control technology, which combines the relevant subsystem into a whole control system. The first "home computer" was an experimental system in 1966[1]. The Smart House Project was initiated in the early 1980's as a project of the National Research Center of the National Association of Home Builders (NAHB) with the cooperation of a collection of major industrial partners. Considerable efforts have been made to the development of smart house system [2]. Sharon Panth, Mahesh Jivani proposed a system for mobile phones having Android platform to automate Bluetooth interfaced microcontroller which controls a number of home appliances like lights, fans, bulbs and many more using

on/off relay. This represents the automated approach of controlling the devices in a household that could ease the tasks of using the traditional method of the switch. The disadvantage of Bluetooth is that the security in Bluetooth is good but it is much better in infrared technology [3]. Ihedioha Ahmed C. proposed a GSM based Home Automation system has worked as a remote sensing for the electrical appliances at home to check whether it is on or off and in the same time allowed the user to control the electrical appliances at home based on SMS technique. It also works as automatic and immediate reporting to the user in case of emergency for home security. This system has the drawback, SMS depends on the networks and there is a possibility of delayed delivery [4]. Vinay sagar K N, Kusuma S M proposed a Home Automation system that employs Internet based wireless system for multi-functional devices. Although the system has a low cost and flexible wireless solution to the home automation, there are still some limitations related to the wireless communication range and power failure [5]. Dhawan S. Thakur , Aditi Sharma proposed a Voice recognition home automation system is intended to control all lights and electrical appliances in a home or office using voice commands. The MATLAB software has been used to implement the voice recognition system. it is a very useful for the adults and physically disabled persons. Even the best speech recognition systems sometimes make errors. If there is noise or some other sound in the room, the number of errors will increase [6, 7]. Apurva Misra, Ajay K. Yadav, ShrikeshYadav, Ashwani K. Sonker proposed another home automation system for controlling home appliances remotely. The prime objective of this paper is to design a phone based remote controller for home automation. The system differs in that all communications occur over a fixed telephone line and not over the Internet. The system can be accessed using any telephone that supports dual tone multiple frequency (DTMF). The disadvantages of this system are Users are not provided with a graphical user interface, users have to remember an access code [8]. Home automation systems face four main challenges; these are high cost, inflexibility, poor manageability, and difficulty in achieving security. The main objectives of this paper are to design and implement a home automation system using Lab view that is capable of monitoring and controlling house appliances. The proposed system has a great flexibility by using RF technology .This will decrease the deployment cost and will increase the ability of upgrading, and system reconfiguration. The purpose of the system is to provide an efficient system to control day by day home appliances. This system gives clients to a simple and effective means of monitoring their various home appliances from a remote location i.e. without physically being present.

III.SYSTEM MODELLING

In Proposed system we use LabVIEW program and remote control to monitoring different parameters and control the lighting systems in the smart house model

A. Hardware Implementation:

1. Remote Control unit implementation:

Remote control is one of the device used in smart house application. It's a device used for remote operation of a specific system. Remote control used to send control signal to the room control unit to turn on or off load. Room receiver unit is also controlled by using Labview. The remote control section consists of an encoder and a transmitter. Whenever we press any key on the remote, the encoder generates corresponding signal and sends this signal by using transmitter. Communication between remote control unit and room unit is achieved by RF Module. RF module can transmit to about 200 ft. in building and 700 ft. in open ground.

2. Central unit implementation:

Central unit used to make some central operation in the house. This unit is central installed unit in the house because of its connection with LabVIEW via microcontroller. This unit enables the user to control load. This can be achieved by incorporating AVR controller which has powerful features like in system programming, 23 Programmable I/O Lines, Programmable Serial USART and SPI Serial Interface. It receives data from house sensors, process information and finally transmit signal to house systems output devices of the central unit. Computer device that provided with LabVIEW software is the main unit for system in the house. It also monitors status of output devices and control load of central unit. This unit enables the user to control load of Room unit using Labview control panel via RF module. Central unit will monitor and control the fire alarm, burglar alarm, temperature Systems, LPG leakage monitoring and lighting system in the house.

AVR Microcontroller:

The Atmel AVR ATmega8 is a low-power CMOS 8-bit microcontroller based on the AVR RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega8 achieves throughputs approaching 1MIPS per MHz, allowing the system designed to optimize power consumption versus processing speed.

Fire Sensor:

Fire alarm system plays very vital role in today's smart house systems. Our system equipped with detection of fire. It is basically divided into three parts, the first part is the signal that reach from fire sensors as an indicator for announcing the outbreak of a fire in the house, the second part is the output signal that send after the processing of input signal using microcontroller and after processing the input data, it will send a set signal to buzzer to produce sound to express the presence of risk.

IR Sensor:

The design of Burglar alarm system used in smart house system. IR Sensor has been choosen for Burglar Alarm System. It is divided into three parts; the first part is the signal that reaches from burglar alarm sensors when its trigger threshold has been reached after any a specific danger in the house. The second part is the output signal that send after the processing of input signal, and finally making loud sound using buzzer as an indicate the occurrence of a burglary.

LM 35:

The basic element in temperature system is the reading of temperature value from temperature sensor. For that, LM35 temperature sensor is used. This sensor is connected directly with microcontroller. LabVIEW reads the signal from LM35 sensor as variable analog value. After processing signal using microcontroller, it will send a signal to the system, depending on the value of the sensor and the critical value of temperature, if temperature is higher than critical value then it sends a set signal to turn on the fan.

MQ 6:

The design of LPG leakage monitoring system is proposed for home safety. This system detects the leakage of the LPG and alerts the consumer about the leak by making sound using buzzer and also able to monitor the status on Labview control panel. LPG leakage monitoring system used MQ 6 gas sensor. Sensitive material of MQ-6 gas sensor is SnO2, which is high sensity to Propane, Butane and LPG gas.

PIR Sensor:

The internal lighting system consists of a PIR motion sensor which is in contact with LabVIEW software program. This system will make an automatically lighting in the house when there is any movement inside it. When the PIR motion sensor detects a moving object, it will send a signal to the microcontroller to turn on the light.

3. Room unit implementation:

The room receiver unit consists of four relays, each relay is connected to separate load to turn on/off the appliances. The room receiver unit communicates with central unit via RF communication. It receives the serial data from the transmitter. To decode the received data decoder is used according the decoded signal the corresponding relay will be turn on/off. User can also operate the load by using Labview interface.
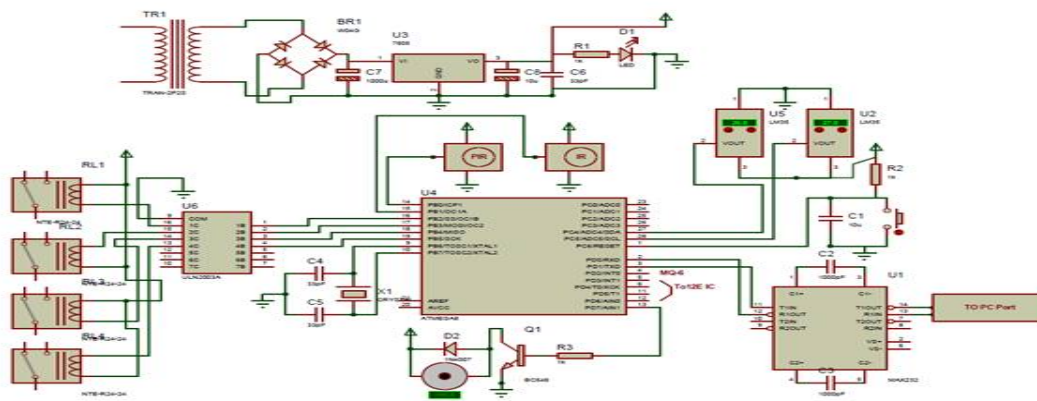

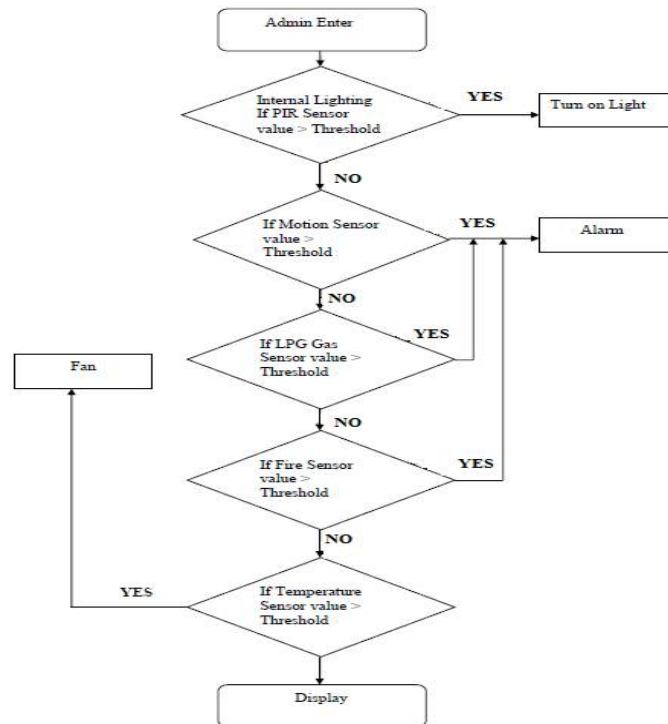Fig. 1 Smart House System Circuit Diagram

Fig. 2 Work Flow of the System

B. Software Implementation:
1. LABVIEW Interface:
LabVIEW(Laboratory Virtual Instrumentation Engineering Workbench) is a platform and development environment for a visual programming language from National Instruments. LabVIEW is commonly used for data acquisition, instrument control, and industrial automation on a variety of platforms including Microsoft Windows, various flavours of UNIX, Linux, and Mac OS. Lab VIEW is a development system for industrial, experimental, and educational measurement and automation applications based on graphical program in contrast to textual programming however, textual programming is supported in LabVIEW. LabVIEW ties the creation of user interfaces (called front panels) into the development cycle. LabVIEW programs/subroutines are called virtual instruments (VIs). Each VI has three components:

- Block diagram
- Connector panel
- Front panel

IV. RESULTS

After the successful connection, the data of sensors are sent to Labview for monitoring of the system. The figure shows the Front Panel of Smart House System which will allow us to monitor and control the system. It has login access for security. The Front Panel of Smart House System gives the information about the temperature system, burglary alarm system, LPG leakage monitoring System, Fire alarm system of the house. It also gives the status of the lights which we can control remotely. All the required data is stored in Excel file. The stored data can be analyzed at anytime.
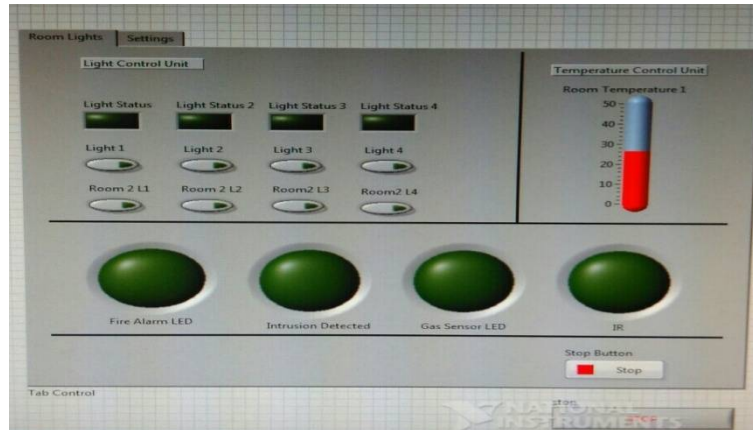
Fig. 3 Front Panel of Smart House System

a. Login (Username and Password)

The system has login access for security purpose. Only by inserting proper user name and password user can able to initiate the system.
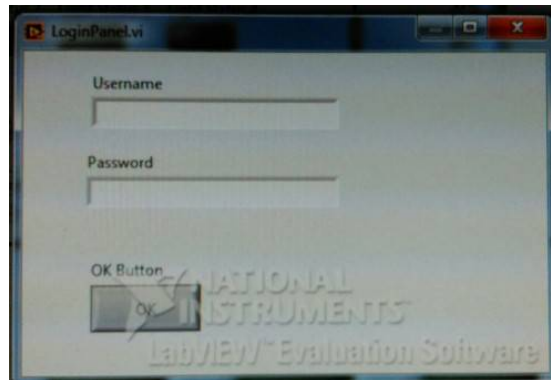

Fig. 4 LabVIEW Program Login System

b. Data storage

In this system all the sensor parameters will be stored in Excel file for further analysis and to take corrective action if any.

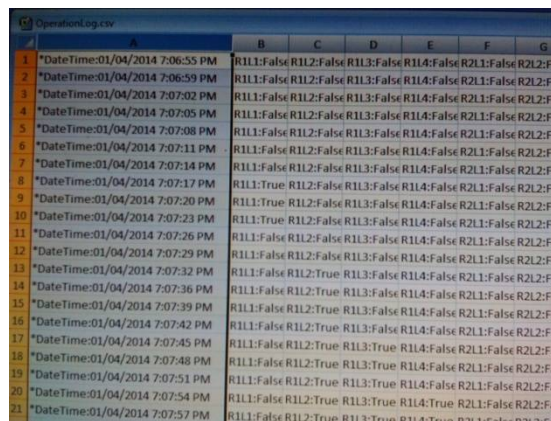Fig. 5 LabVIEW Software Program Excel File

V.CONCLUSION

Smart home is a house that has intelligent control over the activities performed frequently in daily life to achieve more comfortable and safety life. A smart home is equipped with special structured wiring to enable occupants to program of automated home electronic devices by entering a single command based on LabVIEW. It minimizes the power losses and it provides safety for us and for Smart home. The smart home technology provides totally different flexibility and functionality than the conventional installations.

REFERENCES

[1]   Chetana Sarode, Prof.Mr.H.S.Thakar, 'Intelligent Home Monitoring System', International Journal of Engineering Research and Applications (IJERA), Vol. 3, Issue 1, pp.1446-1450 , 2013.
[2]   Dr. Basil Hamed, 'The Design and Implementation of Smart House Control Using Lab VIEW', International Journal of Soft Computing and Engineering (IJSCE), Vol. 1, Issue 6, pp. 98-106, 2012.
[3]   Sharon Panth, Mahesh Jivani, 'Home Automation System (HAS) using Android for Mobile Phone', International Journal of Electronics and Computer Science Engineering, Vol. 3, Issue 1, 2011.
[4]   Ihedioha Ahmed C. ,'Home Automation Using Global System for Mobile Communications (GSM)', International Journal of Emerging Technologies in Engineering Research (IJETER), Vol. 4, Issue 1, pp. 54-58, 2016.
[5]   Vinay sagar K N, Kusuma S M,'Home Automation Using Internet of Things', International Research Journal of Engineering and Technology ,Vol. 2, Issue 3 , pp. 1965-1970, 2015.
[6]   Dhawan S. Thakur, Aditi Sharma, 'Voice Recognition Wireless Home Automation System Based On Zigbee', IOSR Journal of Electronics and Communication Engineering, Vol. 6, Issue 1, pp. 65-75 , 2013.
[7]   Amrutha S, Aravind S, Ansu Mathew, Swathy Sugathan, Rajasree R, Priyalakshmi S ,'Voice Controlled Smart Home', International Journal of Emerging Technology and Advanced Engineering , Vol. 5, Issue 1, pp. 272-276, 2015.
[8]   ApurvaMisra, Ajay K. Yadav, ShrikeshYadav, Ashwani K. Sonker ,'An Advanced Home Automation System Using Mobile Phone', International Journal Of Electrical And Electronics Engineers, Vol. 7, Issue 1, pp. 209-213, 2015.
[9]   Lab VIEW user Manual, 2003 Edition, National Instruments.
[10]   http://www.ni.com/labview/