

Smart House Using LabVIEW And Bluetooth Technology

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Abstract- Smart home is a house that uses various technologies to monitor and control the home appliances with the help of various sensors. The definition of smart house is that, it is a combination or use of various technologies and services through home networking for a better quality of life style. In terms of convenience it help people in optimizing their living style, securing a living condition and in turn enable people to reduce bills from a variety of energy consumption in a house. A real time smart house system has been developed to obtain more easier and comfortable life style by automatically performing the activities or task which we do frequently in our daily life. The system is based on the LabVIEW software and Bluetooth technology. The main system includes many subsystems such as lighting system, temperature system, burglary alarm system, Fire Alarm System and garden system. Using LabVIEW we are monitoring the system and by using Bluetooth module through android phone we are controlling the system. Thus the remote monitoring and controlling the house equipment's is possible by using LabVIEW and smart phone respectively.

Keywords- LabVIEW; Interface sensors; ARM LPC 2148; Bluetooth HC 05; Android Phone.

I. INTRODUCTION

Smart house system is nothing but the use of advanced computer technology, network communication technology and automatic control technology, which combines the relevant subsystem into a whole control system for family safety, for automatic control over home equipment's and for family communication. Day-by-day the electronic technology and communication technology gets developed so the requirement about life style and work for people gets increased. We can easily control home's mechanical systems and appliances over your cellular phone, and the lighting in your home can be set to save your money when you leave the room. This project presents the LABVIEW software based smart house system which monitoring the internal lighting, external lighting, fire alarm, burglar alarm, temperature Systems and garden system of the house and controlling these all systems by using Bluetooth module through android phone.

Smart house system using LabVIEW monitors main system. The main system consists of five subsystems; these five subsystems are connected to smart phone wirelessly using Bluetooth technology and it act as the controller for main systems. The first subsystem in smart house project is lighting system which controls the internal and external lights of the house. Second system is Temperature system which control the air-conditioning of house. Third system is fire alarm system in which when leakage of gas occurs then alarm will on for security purpose. The fourth system is Burglar alarm system in which unauthorized entry will identified using IR sensor. The Fifth system is garden system in which water is given to garden by using android app.

II. LITERATURE REVIEW

[1] Prof. V. M. Kulkarni, P. P. Whon “ Design and Development of Real Time Smart House and Data Logging System Using LabVIEW” (2016):

In this paper Smart House system is based on LabVIEW software for monitoring different parameters such as light, gas, smoke, burglary with the help of different sensors and controlling the subsystems of the smart house model using microcontroller . The main aim of this project is to implement a multiplatform controlling system by using LabVIEW programming for achievement of home automation system. This is simply a combination of hardware and software technology. The smart house model consist of different subsystems such as lighting system in which internal and external lighting of house is controlled. The second subsystem is temperature system in which air-conditioning of house is controlled. The third subsystem is fire alarm system in which if leakage of LPG gas occurs then automatically buzzer will make sound to indicated the occurrence of risk, The fourth subsystem is burglary system in which if unauthorized person enter into house means if any burglary is occur then a loud sound produce to announce the danger.

[2] Mr. C. S. Patil , Mr. Mahesh S. Patil, Mr. Rajesh R. Karhe “Real Time Data Acquisition and Home Parameters Monitoring using LabVIEW”(2013):

This paper represents importance of data acquisition board for monitoring and controlling the home parameters like humidity, intensity of light and temperature by using powerful instrumentation and analysis software called LabVIEW. AVR ATmega16L microcontroller is used to control the system. The sensors like LM35, LDR and humidity are used to sense temperature, intensity of light and humidity respectively. Here sensors sense the parameter and give data to microcontroller. Then ATmega16L process the data and displayed on 16*2 LCD. This paper gives an idea for how to read and write data using LabVIEW and which bits are essentials for serial communications as well the importance of VISA which is very important tool for LabVIEW coding.

[3] Mr. Mahesh S. Patil, Mr. Sachin S. Nerkar “Real Time Data Acquisition System for Smart Home using LabVIEW” (2014): This paper presents how data acquisition board is helpful for monitoring and controlling the home parameters like humidity, intensity of light and temperature by using powerful instrumentation and analysis software called LabVIEW. AVR ATmega16L microcontroller is used to control the system. The sensors like LM35, LDR and humidity are used to sense temperature, intensity of light and humidity respectively. Here sensors sense the parameter and give data to microcontroller. Then ATmega16L process the data and displayed on 16*2 LCD. This paper gives an idea for how to read and write data using LabVIEW and which bits are essentials for serial communications as well the importance of VISA which is very important tool for LabVIEW coding.

[4] J. Mahesh, Shirisha Tadoju “Remote Home Automation System using Android Application” (2015):

This paper describe the overall design of Home Automation System (HAS) using low cost, short range wireless communication technology called Bluetooth. If we do daily routine task automatically then the life environment become easy and comfortable. So to achieve this, smart phone is a most suitable, reliable and flexible device. In this project the system is controlled using Bluetooth technology with the help of smart phone which is android based. Home appliances like light, temperature are controlled through smart phone. This is very beneficial for physically handicapped people. They can control home appliances from anywhere of the house.

III. RELEVANCE

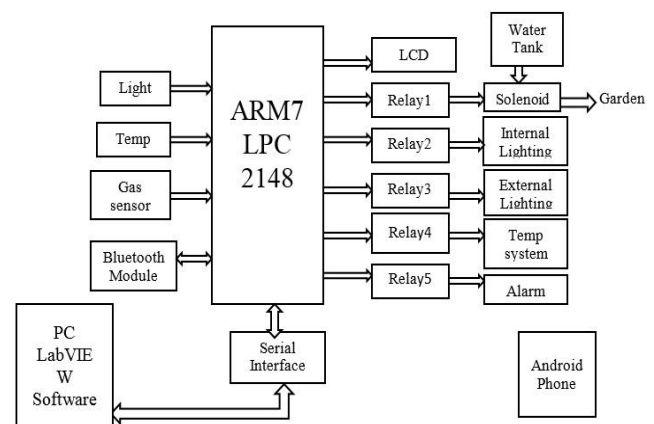
In early days, people are more conscious about their family, they want to know the family condition at any place when their home comes in problem, they will soon receive relevant information, so that remote monitoring becomes a very

important function for home monitoring and controlling. Now a days people are busier in their work, they want to control home appliances automatically for better comfort and safety. So to achieve this requirement smart house is the best option. LabVIEW software communication is able to overcome the disadvantages of wire transmission and it get rid of geographical constraints so it realize that data transmitted over a long distance. LabVIEW software based smart house system which monitor the internal lighting, external lighting, fire alarm, burglar alarm, temperature Systems and garden system of the house. And Bluetooth based smart phone control the some applications of the house.

IV. BLOCK DIAGRAM WITH DISCRPTION

Below figure shows the basic block diagram of smart house system using LabVIEW software and Android app.

The Proposed system consist of ARM7 LPC2148 microcontroller for controlling purpose. Various sensors such as light sensor, temperature sensor, gas sensor are connected to ARM7 LPC2148. Status is displayed on 16x2 LCD. Five relays are used to connect different types of load such as water solenoid valve, light bulb, air conditioner to microcontroller. PC having LabVIEW software is connected to microcontroller by using UART. The Bluetooth module HC 05 also connected to microcontroller through UART. Bluetooth device wirelessly connected to android phone.



The internal lighting system consists of a PIR means passive infrared sensor and lamps which are in contact with LabVIEW software program. PIR short for passive infrared sensor. It is an electronic sensor used to measure infrared (IR) light radiating from objects those are in its field. This sensor mostly applicable in motion detector circuits. It used to detect the movement or motion of human being around the range of

14m from the sensor. When PIR sensor sense the motion it give signal to microcontroller and controller process it and pass on/off signal to load through relay. At the same time signal passes to PC and on front panel of LabVIEW we can observe the status of internal lighting system.

The external lighting system consists of a LDR means Light Dependent Resistor sensor and lamps which are in contact with LabVIEW software program. Light Dependent Resistor (LDR) also known as photoconductor or photocell, is a device which has a resistance which varies according to the amount of light falling on its surface. When LDR sense light intensity inside the room accordingly the light will be turn on or off. External lighting means light which are outside of the house. When LDR sense data it will give signal to microcontroller. Then controller process the data and accordingly lamps will on/off.

The fire alarm system is designed to detect the unwanted presence of fire by monitoring environmental changes associated with combustion to control the spread of fire and smoke. Gas leakage leads to severe accidents resulting in material losses and human injuries. Hence, LPG leakage detection is essential to prevent accidents and to save human lives. To detect the LPG, MQ- 2gas sensor is employed. This sensor can be operated at +5V. The sensitivity of this sensor is very high and it has quick response time. System is divided into two parts, the first part is the signal that reach from fire alarm system 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, and finally the controlling system and data processing by LabVIEW.

In burglar alarm system if any unauthorized person enter into house then the burglar alarm make sound. This subsystem is consist of IR sensor. IR means infrared sensor. Burglar alarm system plays role of security guard. This system keeps house safe from unknown persons or thief. The design of Burglar alarm system used in smart house system is similar to the design used for fire alarm system. It is divided into two 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.

The basic element in temperature system is LM35 temperature sensor, relay and air-conditioner. LM35 is a precision IC temperature sensor with its output proportional to the temperature (in° C).The sensor circuitry is sealed and therefore it is not subjected to oxidation and other processes. The temperature measurement of LM35 is more accurate than

thermistor. It also possess low self-heating and does not cause more than 0.1°C temperature rise in still air .The LM35 series output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 is more preferable than linear temperature sensors because it calibrated in Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration. The operating temperature range is from -55°C to 150°C.The output voltage varies by 10mV in response to every °C in ambient temperature, i.e. its scale factor is 0.01V/°C.

In this system we are controlling the water motor for garden area automatically through smart phone. As we send signal from smart phone Bluetooth module receive it and send signal to controller.

All the parameters from different sensors are acquired on LabVIEW.

V. CIRCUIT DIAGRAMS

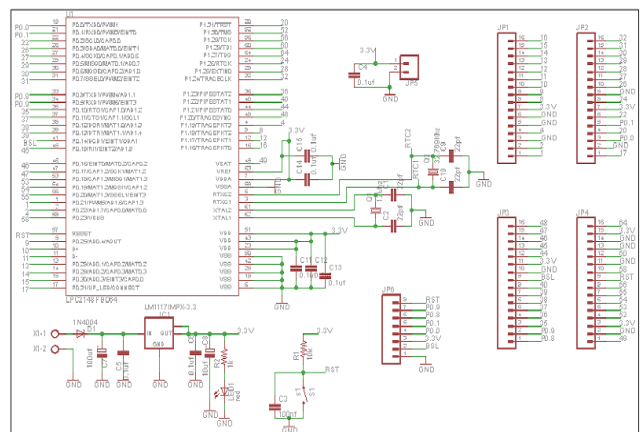


Fig. Schematic of Smart House Using LabVIEW and Bluetooth Technology

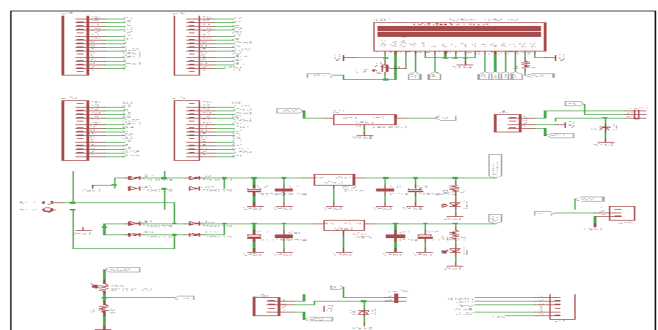


Fig. Schematic of Smart House Using LabVIEW and Bluetooth Technology

VI. SOFTWARE DISCRPTION

LabVIEW

LabVIEW (Laboratory Virtual Instrumentation Workbench) software is a highly productive development environment that engineers and scientists use for graphical programming and unprecedented hardware integration to rapidly design and deploy measurement and control systems.

Introduction to Virtual Instruments

VI or virtual instrumentations means LabVIEW programs. Their appearance and operation imitate physical instruments so the name is VI. Every VI uses functions that manipulate input from the user interface or other sources and display that information or move it to other files or other computers. A VI contains the following three components:

- Front panel—Acts as the user interface.
- Block diagram— It represent graphical source code that defines the functionality of the VI.
- Icon and connector panel— Identifies the interface to the VI so that you can use the VI in another VI. A VI within another VI is called a subVI. A subVI corresponds to a subroutine in text-based programming languages.

VI. EXPERIMENTAL RESULTS

The experimental setup is shown in Fig A. When power supply is given, sensors starts sensing the corresponding parameters. Simultaneously the sensed values send to LabVIEW front panel as shown in fig B.



Fig. A

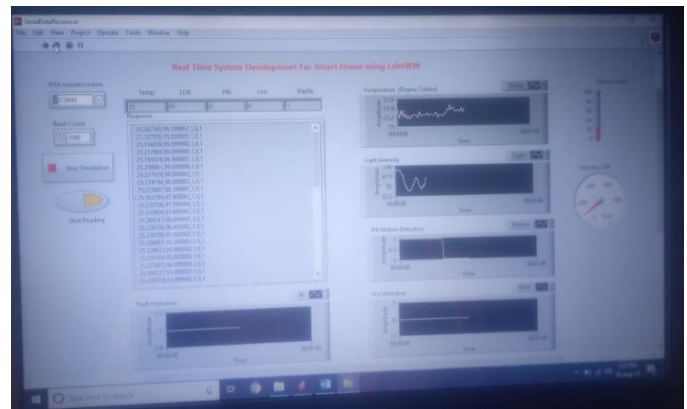


Fig. B

VII. CONCLUSION

In this highly developing era, where directly or indirectly everything is dependent on computation and information technology, LabVIEW and Bluetooth technology proves to be a smart, economic and efficient platform for implementing the home automation. The main objective of this work is to provide a technology oriented and low cost system to make an advanced home automation. Remote access is a wonderful feature that came because of Bluetooth. The system monitors using LabVIEW and controls home appliances through smart phone. So, person can easily know the current situation of home appliances and change the state of appliances

FUTURE SCOPE

The results obtained for monitoring and controlling using LabVIEW and Bluetooth technology so far are satisfactory but the results can even further be improved by considering Internet so that the remote access of home can be easily done. It is possible to interface camera for surveillance purpose also so that safety of house become more efficient.

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