

# Real Time System Development of Smart House Using LabVIEW

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**Abstract-** Smart home system is the use of advanced computer technology, network communication technology and automatic control technology. Technology has advanced so much that a lot of data and instruction can be stored in a small chip. The technology has also invaded our home space and made our daily activities very easy. . Now-a-days the demand for home automation systems in homes and offices are invariably increasing. The home automation system is a key for energy conservation that can be equipped in normal buildings. 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. Smart home system is very useful for family safety precaution as we cannot have manual security 24 hours a day. Smart system will be very helpful in maintaining a sustainable environment when we can control our electrical dependencies. The system is based on the LabVIEW software and can act as a security guard of the home. The system includes many subsystems such as lighting system, burglary alarm system, Fire Alarm System and temperature system, garden system. System is also controlled by Bluetooth through android phone. The system can monitor and control the house equipment's from anywhere in the house

**Keywords-** Smart Home; LabVIEW; Interfacing sensors; ARM LPC 2148; Bluetooth HC 05; Android Phone.

## I. INTRODUCTION

Smart house 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 concluding the family communication, family equipment automatic control, family safety precautions. As development of the electronic technology and communication technology, people have the high requirements for daily life and work, the smart home is more and more widely applied. Smart House is not a new term for science society but is still far more away from people's vision and audition. 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. Using LabVIEW software communication is able to overcome the disadvantages of wire transmission, can

get rid of geographical constraints, thus realize data transmitted over a long distance. This project presents the LABVIEW software based smart house system which control the internal lighting, external lighting, fire alarm, burglar alarm, temperature Systems and garden system in the house.

Smart house controlled by LabVIEW that controls main system. The main system consists of five parts; these five parts are connected to LabVIEW software as the main controller for these systems. The first subsystem 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, and burglar alarm system that signals the occurrence of a burglary. The second subsystem is lighting system that include the internal lighting of the house, and the ceil lighting outside the house. The third subsystem is remote control system for house controlling. The fourth subsystem is temperature system f++or air conditioner controlling. The fifth subsystem is garden system.

Smart house is also controlled by using android phone. For that we use Bluetooth module. By sending signal from android phone we control above five systems. Bluetooth module which is connected to the controller receives the commands which are sent by android mobile phone and transmits them to load through micro controller. The baud rate of Bluetooth module is 9600 bits/sec. After receiving command from module micro controller campers the received command with the predefined commands and executes the predefined operation.

## II. LITERATURE REVIEW

1.Basil Hamed "Design & Implementation of Smart House Control Using LabVIEW"(2012) [1]:

This paper presents smart house main control system. The main system consists of five parts; these five parts are connected to LabVIEW software as the main controller for these systems. The first subsystem 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, and burglar alarm system that signals the occurrence of a burglary. The second

subsystem is lighting system that include the internal lighting of the house, and the ceil lighting outside the house. The third subsystem is remote control system for house controlling. The fourth subsystem is temperature system for air conditioner controlling. The fifth subsystem is Main house power switching system to switch the power supply for all rooms in the house.

2. Dr. A.J. Patil, Rajesh R. Karhe, Mahesh S.Patil “Real Time System Development for home Automation using LabVIEW”(2013) [2]:

This literature presented the concept of smart home automation in an effort to reduce the energy consumption and wastage using advanced graphical software called LabVIEW. It provides the programming tools to code power system applications more easily, which saves programming time. With the development of low cost electronic components home automation migrated from being an industrial application to home automation. The home automation, our point of concern deals with the control of home appliances from a central location.

3. Akshatha N Gowda, Girijamba D L, Rishika G N, Shruthi S D, Niveditha S “Control4 Smart Home System using Lab VIEW” (2013) [3]:

This project includes many systems such as, internal light system, external light system, burglary alarm system and temperature system. Each of us needs comfort and safety in our life. Many real systems used in building don't have the flexibility and the ability to give users all comfort and safety that they need. Making a complete system is a big challenge because of the need to make many controlling system which can run in the same time. The aim of this project is to map the processes yielding optimal utilization of smart home technology, to ensure as many users as possible having access to the technology most relevant for their needs.

4. Chetana Sarode, Prof.Mr.H.S.Thakar “Intelligent Home Monitoring System” (2013)[4]:

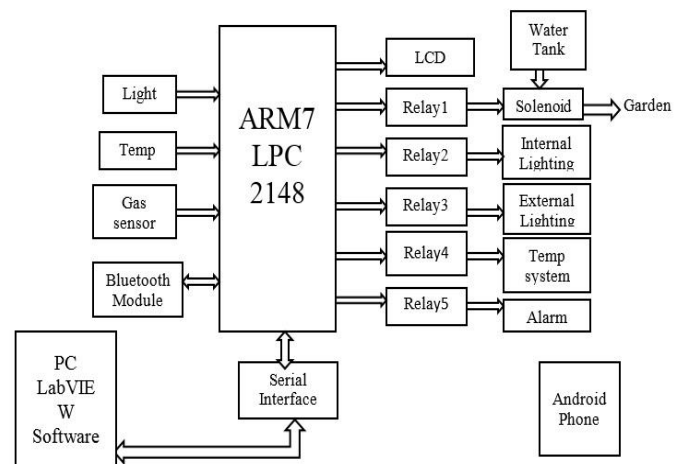
This paper presents the LABVIEW software based smart house system which control the internal lighting, external lighting, fire alarm, burglar alarm, and temperature Systems in the house. LABVIEW is a development system for industrial, experimental, and educational measurement and automation applications based on graphical programming, in contrast to textual programming-however, textual programming is supported in LabVIEW.

### III. PROBLEM DEFINITION

Each of us needs comfort and safety in our life. Many real systems used in building don't have the flexibility and the ability to give users all comfort and safety that they need. Making a complete system is a big challenge because of the need to make many controlling system which can run in the same time. People want to know family condition at any place, what's more, when their home come problem, they will soon receive relevant information, so that remote monitoring becomes a very important function for smart home system.

This project presents the LABVIEW software based smart house system which control the internal lighting, external lighting, fire alarm, burglar alarm, temperature Systems, and garden system in the house. By using android phone also we are going to control the system.

### IV. BLOCK DIAGRAM



The overall block diagram of the proposed system is shown in figure.

Here ARM7 LPC 2148 microcontroller is used to acquire data from different types of sensors.

The system is categorized into five modules explained below.

**1. Internal lighting System:** The internal lighting system consists of a PIR motion sensor, LDR sensor and lamps which are in contact with LabVIEW software program. This system will make an automatically lighting in the house when there is any movement inside it. LabVIEW will make 100% lighting for the lamp when it receives a movement signal from PIR motion sensor and the user can scheduler the time of running the system. When the PIR motion sensor detects a moving object, it will send a signal but it will be for a specific little time.

For this reason, 555 timer circuit is used to generate accurate time delays that will be more suitable for lamp lighting inside the house .

**2. External lighting System:** External lighting system depends on the reading of sun cell. The MAX 232 will transform the analog signal got from the sun cell to digital signal and send it to LabVIEW to analysts it. The LabVIEW software program can select the time of morning and night time to control the status of external light lamps. The LabVIEW software program will read and process the sun cell value and indicate to status of day \_ morning or night \_ in LabVIEW front panel monitor screen

**3. Fire Alarm System:** It is divided into three 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. There are many types of sensors which used in fire alarm system. Smoke detector and heat detector are used in the smart house. For fire alarm warning and for control the spread of fire and smoke, two applications are used to achieve the goal. We started with using alarm siren to generate a load wailing sound to express the presence of risk; moreover, we use gas solenoid valve to cut off the flow of gas to the house. LabVIEW will receive the signal from fire alarm sensor. After processing the input data, LabVIEW will send a set signal to alarm siren to make a load sound; also, this signal will set the gas solenoid valve to cut off the flow of gas to the house.

**4. Burglar Alarm System:** 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. A burglar alarm is a system designed to detect intrusion–unauthorized entry into a building or home.

**5. Temperature System:** The basic element in temperature system is the reading of temperature value from temperature sensor. For that, LM35 temperature sensor is used. LabVIEW reads the signal from LM35 sensor as variable analog value. After processing the structure in the program, LabVIEW will send a cooling or heating signal to the system, depending on the value of the sensor and the critical value of temperature that required. In the mechanism of temperature system programming, PWM system is used to control the heating and

cooling devices. 5V DC power supply is used to operate LM35 sensor.

**6. Garden system:** The basic element of garden system is water solenoid valve, which is a electromechanically operated valve. The valve is controlled by an electric current through a solenoid.

All the parameters from different sensors are acquired on LabVIEW.

## 7. Use Of 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. Graphical user interface: Design professionals use the drag-and-The following are the advantages of LabVIEW:drop user interface library by interactively customizing the hundreds of built-in user objects on the controls palette.

Drag-and-drop built-in functions: Thousands of built-in functions and IP including analysis and I/O, from the functions palette to create applications easily.

Modular design and hierarchical design: Run modular LabVIEW VIs by themselves or as sub VIs and easily scale and modularize programs depending on the application.

Multiple high level development tools: Develop faster with application specific development tools, including the LabVIEW State chart Module, LabVIEW Control Design and Simulation Module and LabVIEW FPGA Module.

Professional Development Tools: Manage large, professional applications and tightly integrated project management tools; integrated graphical debugging tools; and standardized source code control integration.

Multi platforms: The majority of computer systems use the Microsoft Windows operating system. LabVIEW works on other platforms like Mac OS, Sun Solaris and Linux. LabVIEW applications are portable across platforms.

Reduces cost and preserves investment: A single computer equipped with LabVIEW is used for countless applications and purposes it is a versatile product. Complete instrumentation libraries can be created for less than the cost of a single traditional, commercial instrument.

## V. PROPOSED SYSTEM

It is proposed to design and implement a real time system development of smart house using Arm7 LPC2148 microcontroller and LabVIEW software. The smart house has two interfaces, computer interfacing, and remote control unit interfacing i.e. our smart phone. 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 different systems, and transmit controlling signal to house systems and switching output devices. LabVIEW makes the ability to monitor the important operations in the system to the users in order to be informed of the changes in the system. Users can also control the different systems abilities, and choose the best system that required. In addition to LabVIEW interface for the smart house, Android mobile phone with android app is available to control some applications in the house. In this system all the sensor parameters to be stored in Excel file for further analysis and to take corrective action if any.

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