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Research Article

Labview Application: Home Automation Security Alarm

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ABSTRACT
Our paper presents the basic purpose of a home alarm system is to keep us and our family safe, and keep our home safe from crime and theft. This system is based on the LABVIEW software and can act as a security guard of the home. When the alarm is triggered, it emits a loud sound design to frighten away intruders. An alarm security system is absolutely essential for anyone who wants to protect their property from those who might try to steal it. Similarly it can protect anyone who is living in the home. An alarm system has following components- the input devices (which trigger the alarm), the output devices (which communicate the alarm like speakers) and the control panel (networks between the devices and is an interface for user). This system has keypad at front door and sensors at back doors and side windows which activate or deactivate the alarm based on programming in LABVIEW software.

Key words: Application, Security, Home.

1 Introduction

1.1 Home Automation System

The purpose of home alarm system is to alert the homeowners to unauthorized entry attempts into the houses. Home security systems should be evaluated by and installed in regard to the areas in which burglars are most likely to enter your residence in which burglars are most likely to enter your residence. Studies have shown that most intruders or would be intruders will enter through a front door, by either forcing it open or simply kicking it in. Others enter through ground floor windows or the back door of the home which may offer more privacy and less lighting than a front door entrance. With the development of new electronic technologies and their integration with older, traditional building technologies, smart house is at last becoming a real possibility [1]-[11].

Home security has been a major issue where crime is increasing and everybody wants to take proper measures to prevent intrusion. In addition there was a need to automate home so that user can take advantage of the technological advancement in such a way that a person getting off the office does not get melted with the hot climate [12]-[20]. There are many other reasons why people need security at their homes. The first reason that this system is established is to create a peace of mind for people, so that they can feel safe inside or outside of their homes. This will help them to execute their work without any fear of their security. The other reason is to help in getting timely information about visitors at house. Through the use of security cameras users are able to monitor the situation at their homes and get timely information about persons visiting their homes .The main electronic control for a home security system is the security system control panels which have circuitry and contact points to connect to security alarm sensors, sirens, security cameras, telephone connections and remote keypads. These contain circuitry for four, eight or more hardwired home security zones, telephone line monitor, keypad, battery bays and several remote keypad.

Conventional security systems keep homeowners, and their property, safe from intruders. A smart home security system, however, offers many more benefits [21]-[26].

Home automation technology notifies homeowners of any problems, so that they can investigate. Artificial intelligence programs keep track of the homeowner's habits, and other important information, and notify emergency personnel when necessary [27]-[37].

This paper presents a LABVIEW based Home alarm system that allows user to protect home from all sides using sensors and keypad by providing security on detection of intrusion via alarm signal using Buzzer alarm [38]-[40].

1.2 Basic Block Diagram

To protect home from unauthorized entities, three possible cases are taken as shown below.

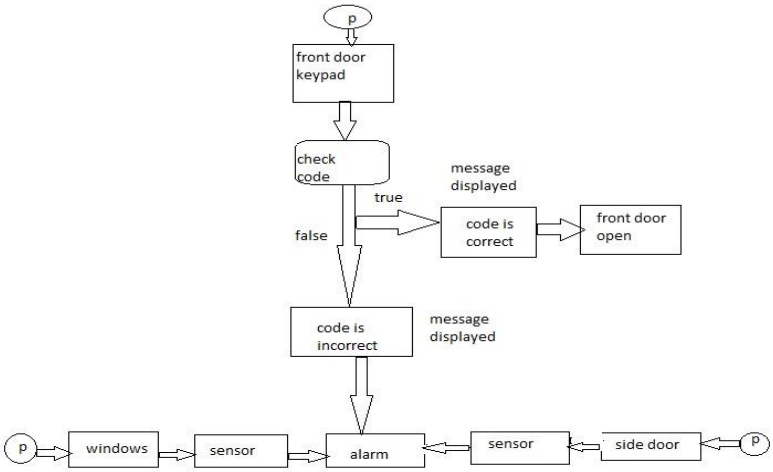

Fig 1: Basic block diagram of Home automation system

First case considers entry from front door only where keypad is connected. Other two cases consider the possible entries from side doors or side windows. The home alarm system is created in lab view by setting a suitable code for alarm to work. The code for actual alarm is fixed. To run the home alarm system in lab view, the setup made as shown in Figure 2, we assume that a person can enter the home either through front door, side door or windows. In first case, the person will enter the code through keypad; if the code is not matched with the fixed value of code then a written warning will be displayed. If again the code is not correct then buzzer alarm will ring. It is noted that after 3 seconds, our system automatically clears the code which we enter earlier. In second case, the person will enter through side doors or the windows [41]-[43].

The side door and side windows have sensors with them. Sensor senses the signal and transmits it to the alarm. In this way when any person comes from any of the entry zone, the whole procedure is followed in a similar manner.

2 Literature Survey

2.1 Introduction

The concept of home automation has been around since the late 1970s. But with the enhancement of technology and smart services, people's expectations have changed a lot during the course of time to perfectly turn the traditional house into smart home, and also think that what a home should do or how the services should be provided and accessed at home to became a smart home and so has the idea of home automation systems.

A home automation system means to grant the end users to manage and handle the electric appliances. If we look at different home automation systems over time, they have always tried to provide efficient, convenient, and safe ways for home inhabitants to access their homes. Regardless of the change in user's hope, growing technology, or change of time, the appearance of a home automation system has remained the same.

Many existing, well-established home automation systems are based on wired communication such as Arduino based and raspberry pi based home automation systems. This does not pose a problem until the system is planned well in advance and installed during the physical construction of the building. But for already existing buildings the implementation cost goes very high. In contrast, Wireless systems can be of great help for automation systems like Bluetooth, Wi-Fi and IOT based home automation systems. With the advancement of wireless technologies such as Wi-Fi, cloud networks in the recent past, wireless systems are used every day and everywhere.

2.2 Challenges Of Home Automation Systems

Home automation systems suffer four main challenges; these are poor manageability, inflexibility, difficulty in achieving security and high cost of ownership. The main objectives of this research is to design and implement a home automation system using IoT that is capable of controlling and automating most of the house appliances through an easy manageable web interface. The proposed system has a great flexibility by using Wi-Fi technology to interconnect its distributed sensors to home automation server. This will decrease the deployment cost and will increase the ability of upgrading, and system reconfiguration.

2.3 Different Ways To Implement Home Automation System

Bluetooth Based Home Automation System Using Cell Phones

In Bluetooth based home automation system the home appliances are connected to the Arduino BT board at input output ports using relay. The program of Arduino BT board is based on high level interactive C language of microcontrollers; the connection is made via Bluetooth. The password protection is provided so only authorized user is allowed to access the appliances. The Bluetooth connection is established between Arduino BT board and phone for wireless communication. In this system the python script is used and it can install on any of the Symbian OS environment, it is portable. One circuit is designed and implemented for receiving the feedback from the phone, which indicate the status of the device [23]-[28].

Zigbee Based Home Automation System Using Cell Phones

To monitor and control the home appliances the system is designed and implemented using Zigbee. The device performance is record and store by network coordinators. For this the Wi-Fi network is used, which uses the four switch port standard wireless ADSL modern router. The network SSID and security Wi-Fi parameter are preconfigured. The message for security purpose first process by the virtual home algorithm and when it is declared safe it is re-encrypted and forward to the real network device of the home. Over Zigbee network, Zigbee controller sent messages to the end. The safety and security of all messages that are received by the virtual home algorithm. To reduce the expense of the system and the intrusiveness of respective installation of the system Zigbee communication is helpful [33].

Gsm Based Home Automation System Using Cell Phones

Because of the mobile phone and GSM technology, the GSM based home automation is lure to research. The SMS based home automation, GPRS based home automation and dual tone multi frequency (DTMF) based home automation, these options we considered mainly for communication in GSM. In figure shows the logical diagram the work of A. Alheraish, it shows how the home sensors and devices interact with the home network and communicates through GSM and SIM (subscriber identity module). The system use transducer which convert machine function into electrical signals which goes into microcontroller. The sensors of system convert the physical qualities like sound, temperature and humidity into some other quantity like voltage. The microcontroller analysis all signal and convert them into command to understand by GSM module. Select appropriate communication method among SMS, GPRS and DTFC based on the command which received GSM module.

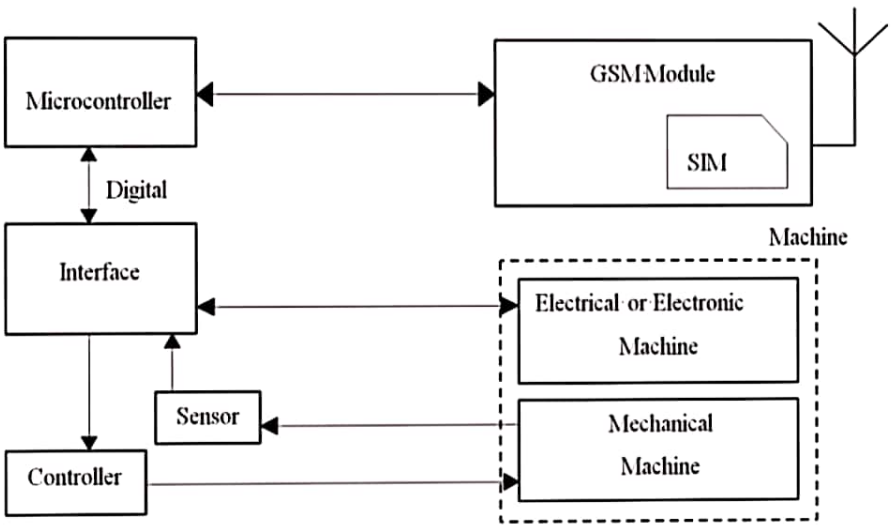

Fig 3 : Mobile-based home automation from the work of A. Alheraish

Wi-Fi Based Home Automation System Using Cell Phones

Wi-Fi based home automation system mainly consist three modules, the server, the hardware interface module, and the software package. The figure shows the system model layout. Wi-Fi technology is used by server, and hardware Interface module to communicate with each other. The same technology uses to login to the server web based application. The server is connected to the internet, so remote users can access server web based application through the internet using compatible web browser. Software of the latest home automation system is split to server application software, and Microcontroller (Arduino) firmware. The Arduino software, built using C language, using IDE comes

with the microcontroller itself. Arduino software is culpable for gathering events from connected sensors, and then applies action to actuators and pre programmed in the server. Another job is to report and record the history in the server DB. The server application software package for the proposed home automation system is a web based application built using asp.net. The server application software can be accessed from internal network or from internet if the server has real IP on the internet using any internet navigator supports asp.net technology. Server application software is culpable of, maintain the whole home automation system, setup, configuration. Server use database to keep log of home automation system components, we choose to use XML files to save system log.

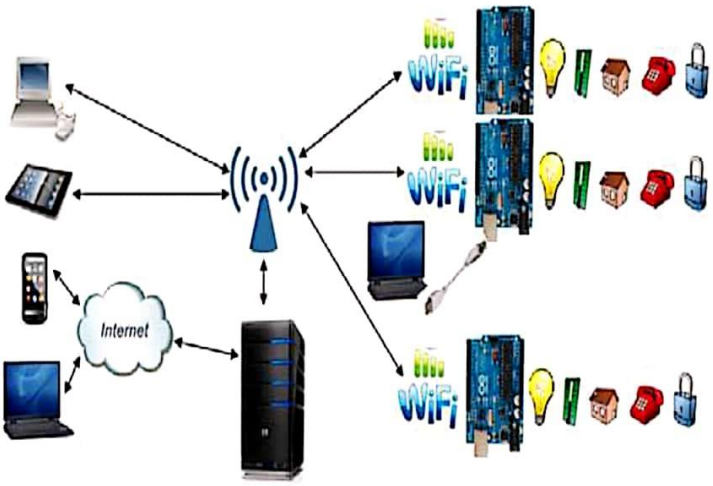

Fig 4: The WiFi based home automation system layout

Home Automation Using Rf Module

The important goal of Home Automation System is to build a home automation system using a RF controlled remote. Now technology is accelerating so homes are also getting smarter. Modern homes are deliberately relocating from current l switches to centralized control system, containing RF controlled switches. Today traditional wall switches situated in various parts of the home makes it laborious t for the end user to go near them to control and operate. Even further it turns into more problematic for the old persons or physically handicapped people to do so. Home Automation using remote implements an easier solution with RF technology. In order to accomplish this, a RF remote is combined to the microcontroller on transmitter side that sends ON/OFF signals to the receiver where devices are connected. By operating the stated remote switch on the transmitter, the loads can be turned ON/OFF globally using wireless technology.

Home Automation Using Android Adk

The devices of home are associate to the ADK and the Connection is established between the Android device and ADK. The devices of house are link to the input/output ports of the board (EMBEDDED SYSTEM) and their current situation will have passed to the ADK. The microcontroller board (Arduino ADK) is based on the ATmega2560. It has a USB host connection to associate with Android based phones, and that is based on the MAX3421e IC. The two important features of Android Open Accessory Protocol 2.0(AOAP) are as follows:

It has audio output that is from the Android device to the component and it also support for the component serves as one or more Human Interface Devices (HID) to the Android device. This paper depends upon Android and Arduino platform in which both are FOSS(Free Open Source Software). Including motion sensors for safety systems will detect an unauthorized action and it will automatically notice the user through cell phone or the security system.

Cloud Based Home Automation System

Home Automation using cloud based system focuses on design and implementation of home gateway to collect data about data from home appliances and then send to the cloud-based data server to get store on Hadoop Distributed File System, it is process using MapReduce and use to implement a monitoring tasks to Remote user Presently home Automation System is persistently developing its resilience by assimilating the current characteristics which gratify the rising interest of the people. This paper presents the design and development of home automation system that use the cloud computing as service. The current system consists of three important units: the first part is cloud server, handle and controls the data and information of client and users and the status of devices.The hardware interface module is the second part which is to implement the relevant connection to the actuators and sensing devices which give the

physical service. Last part is Home Server, which construct the hardware device and gives the user interface. This paper focus to build the web services using cloud which is need for security and storage and availability of the data. The current system is cost efficient, reliable and comfortable which also gives a secured home automation system for entire family.

The system is made up of various client modules for various platforms.

Cloud server Cloud Server is a central server aims on implementing services to the other sub modules. Central server serves as the data respiratory system and brain. It implements three connections to the three sub modules via home system, web configuration tool and mobile. The server evaluates the data it takes from the house, send current status to the mobile device and vice versa. A database is managing by the server and it is status gets updated as per the changes done at home end.

Embedded Program for Hardware Circuit Microcontroller, and.

Internet Client for any desktop or mobile phones.

Raspberry Pie Home Automation With Wireless Sensors Using Smart Phone

Home Automation System has been developed with Raspberry Pi by reading the algorithm and subject of Email. Raspberry Pi guarantees to be an efficient platform for implementation powerful, and economic smart home automation. home automation using Raspberry pi is better than any other home automation methods in several ways. For example, DTMF (dual tone multi-frequency) using home automation, the call tariff is a big demerit, which is not the problem in their proposed method. In Home Automation using web server, the design of web server and the memory space required is dismiss by this method, because it just uses the already established web server service given by G-mail. LEDs were used to identify the switching action. This System is efficient and flexible interactive.

Sending Commands To The Raspberry Pi

The script running on server side of our laptop or on a web server receives the input commands from the user and appropriately sends it to the client (Raspberry Pi). In this, we will be using those input commands to turn a light ON/OFF. When we give the command to turn ON a light by the server side script, the data and information gets relayed to the Raspberry Pi and its GPIO pin will turns ON a relay. The system can send current updates to the server to detect whether the light is ON/OFF.

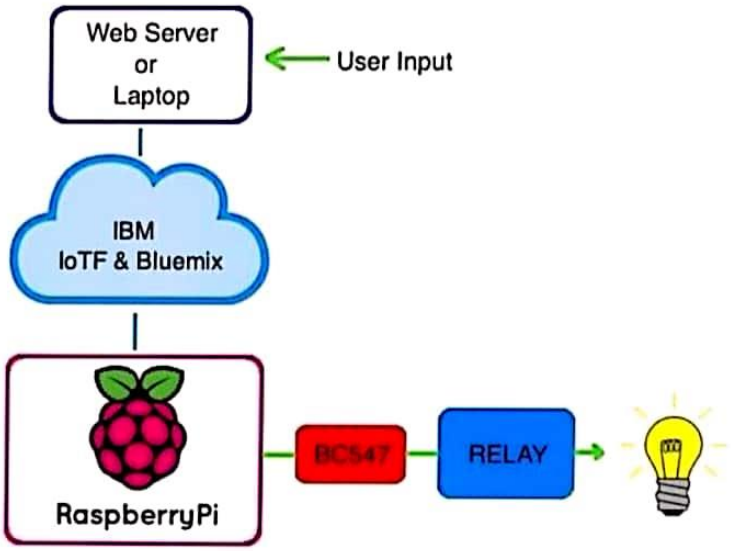

Fig 5: Sending Commands to Raspberry pi

Receiving Data From The Raspberry Pi

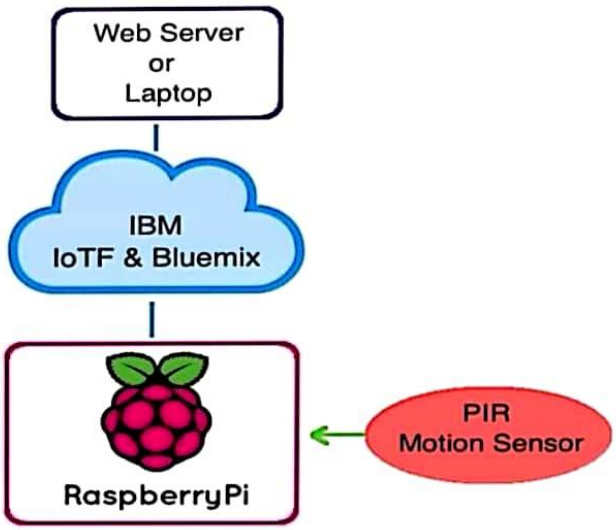

Fig 6: Receiving data from Raspberry pi

Using PIR motion sensor we can send the data signal to the Raspberry Pi, we just run a script which can reads the sensor by a GPIO pin and transmit the data to overall system through the IoTF platform. This can then be look by the IoTF console.

Wireless Home Automation System Using Iot

This system uses mobiles or computers to control basic home control and function automatically through internet from anywhere around the world globally, an automated home is sometimes called a smart home. It is meant to save the electric power and human energy. The proposed system is a distributed home automation system, consists of server i.e. Wi-Fi module, sensors. Server controls and monitors the various sensors, and can be easily configured to handle more hardware interface module (sensors). The Arduino board, with built in Wi-Fi module acts as web server. Automation System can be accessed from the web browser of any local PC using server IP, or remotely from any PC or mobile handheld device connected to the internet with appropriate web browser through server real IP (internet IP). Wi-Fi technology is selected to be the network infrastructure that connects server and the sensors. Wi-Fi is chosen to improve system security (by using secure Wi-Fi connection), and to increase system mobility and scalability.

Survey of different home automation system shows that there are various kinds of technologies used to implement this type of system. All the proposed systems have been presented and compared in this paper which reveals some merits and demerits of the systems. This review explained different home automation system e.g. Web based, Bluetooth-based, mobile-based, SMS based, ZigBee based, Arduino microcontroller based, Android app based, IOT based and cloud-based. Due to its performance, simplicity, low cost and reliability home automation system is making its position in global market, that day is not so far when every home will be the smart home.

Comparison Table

Serial no.	System	Communication Interface	Controller User	Interface	Applications	Merits
1	Wi-Fi based using Arduino microcontroller through IOT	Wi-Fi	Arduino	Web Application and android	Temperature and motion detection,	Low cost, Secure, Remotely controlled

				App	monitoring and controlling appliances	
2	Smart Task Scheduling Based using Arduino and Android	Wired X10 and Wireless Zig bee	Android	Arduino Application	Energy Management and task scheduling with power and cost	Energy-efficient and Highly scalable
3	Web service and android app Based using Raspberry pi	Web server and interface card	Raspberry pi	Android application	Controlling shutter of window	Autonomous, and Quite scalable
4	Cloud Based Using Hadoop System	Cloud based data server uses Hadoop technology	Home gateway and router	Smart device	Monitoring and Controlling Home Appliances	Effectively manage Semi structured and unstructured data, Reduce computational burden of smart devices
5	Cloud Based Using Zig Bee Microcontroller	Zig bee wireless Network	Smart Socket	PC or Android Phone	Entrance control management, monitoring the power consumption,temperature and humidity	Convenience, safety, and Power saving
6	Wireless Sensors Based with mobile Technology	Cloud-based data server	PCB circuits	Mobile Application	Monitor the home conditions and power consumption of appliance	Low power consumption and system cost efficiency
7	Android based using Arduino	Micro Web Server	Arduino Mega 2560 and the Arduino Ethern	Android App	Light switches, Temperature, Humidity sensors, Intrusion detection, Smoke/Gas sensor	Feasibility and Effectiveness
8	Konnex-Bus based using raspberry pi	SIP Provider	Raspberry pi and Konnex Bus	Mobile App	Light control, Temperature	Performance improved, energycons

					Monitoring	umption could be Reduced.
9	Bluetooth Based using Arduino	Bluetooth	Arduino	Python supported mobile	Controlling	Secured and Low cost
10	GSM Based Using Arduino	SMS	Arduino	Smartphone App	Control appliances	Simplicity

3 Methodology

In this paper we are using Lab VIEW NI to design a home alarm system which protects our family and valuable items from thieves.

Block Diagram

Front Panel Window

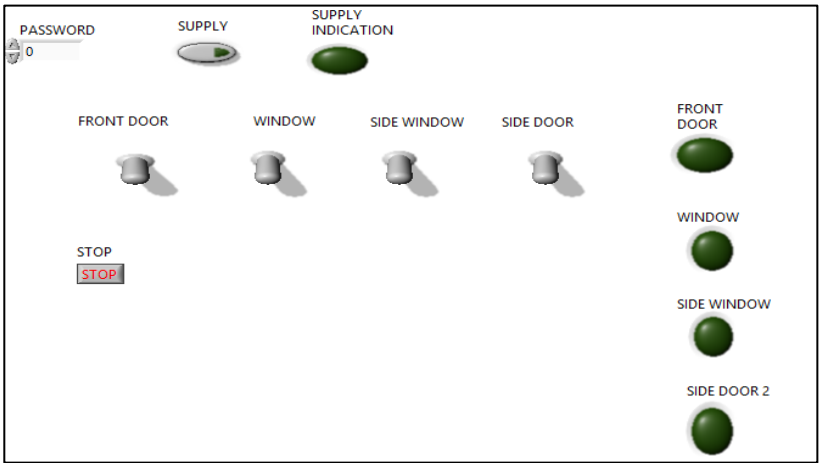

Fig 7: Front panel Window

3.3.2 Output Window

True Condition

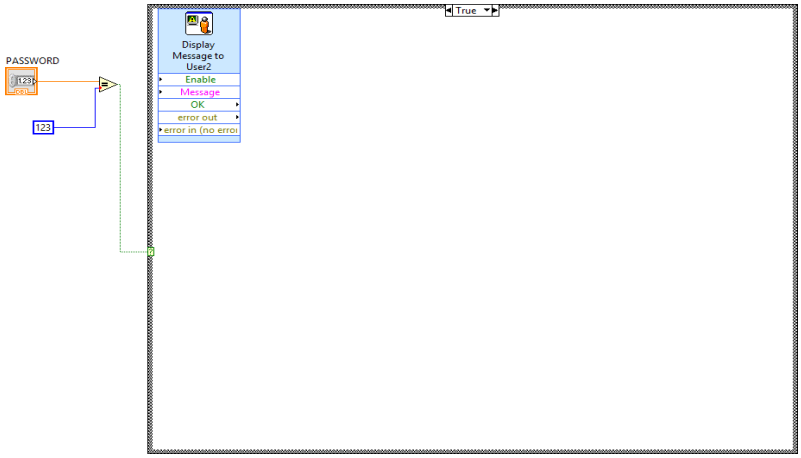

Fig 8: Output Window for true condition

False Condition

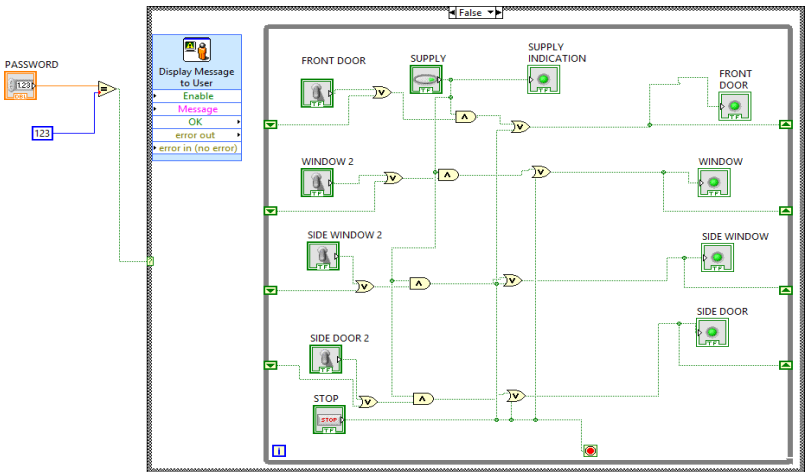

Fig 9: Output Window for False Condition

3.4 Vis Used

3.4.1 Case Structure

It contains one or more sub diagrams, or cases, exactly one of which executes when the structure executes. The value wired to the selector terminal determines which case to execute

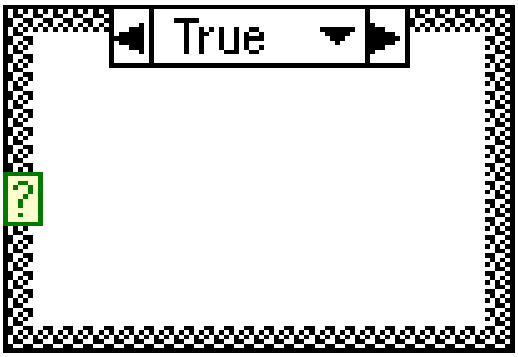

Fig 10: Window for case structure

3.4.2 Display Message To User Express Vi

It displays a standard dialog box that contains an alert or a message for users.

3.5 Dialog Box Options

Parameter	Description
Message to Display	Contains the text to display in the dialog box.

Buttons to Display	Contains the following options: **First button name**—Specifies the text that appears on the first button. By default, the text on the first button is OK. **Second button name**—Specifies the text that appears on the second button. By default, the text on the second button is Cancel. This option is available only when you place a checkmark in the **Display second button** checkbox. **Display second button**—Specifies whether a second button is displayed in the dialog box.

3.6 Input/Output Table

3.6.1 Inputs Table

Parameter	Description
Message	Contains the text to display in the dialog box.
Enable	Enables or disables the Express VI. The default is ON or TRUE.
error in	Describes error conditions that occur before this node runs.

3.6.2 Output Table

Parameter	Description
OK	Returns TRUE when you click the first button in the dialog box and FALSE when you click the second button.
error out	Contains error information. This output provides standard error out functionality

3.7 While Loop

Repeats the code within its sub diagram until a specific condition occurs. A While Loop always executes at least one time.

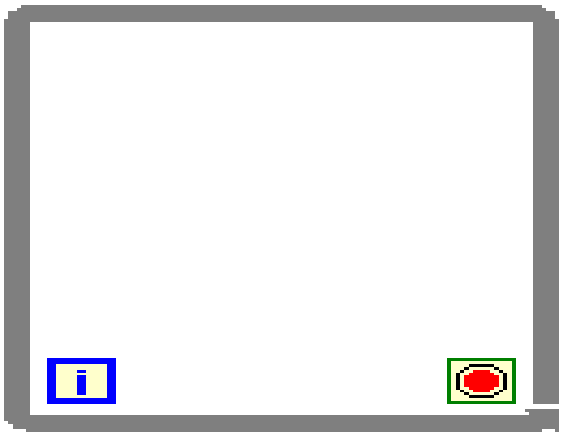

Fig 11: Window for While loop

- **ITERATION TERMINAL —** Provides the current loop iteration count. The loop count always starts at zero for the first iteration. If the iteration count exceeds 2,147,483,647, or 231-1, the iteration terminal remains at 2,147,483,647 for all further iterations. If you need to keep count of more than 2,147,483,647 iterations, you can use shift registers with a greater integer range.
- **CONDITIONAL TERMINAL—** Evaluates a Boolean input value to determine whether to continue executing the While Loop. To specify whether the loop stops for a TRUE or FALSE Boolean value, configure the continuation behavior of the loop. You also can determine when the

loop stops by wiring an error cluster to the conditional terminal.

4 Results Analysis Conclusion & Future Work

4.1 Result Analysis

If the person will enter the code through keypad at front door and the code is not matched with the fixed value of code then a written warning will be displayed i.e. code is incorrect and buzzer alarm will ring. If entered code is matched with fixed code then a message will be displayed that code is correct and buzzer alarm will not ring if the person will enter through side doors or the windows. Then side door and side windows sensors sense the signals and transmit it to the alarm and buzzer alarm will ring at that time.

4.1.1 False Condition

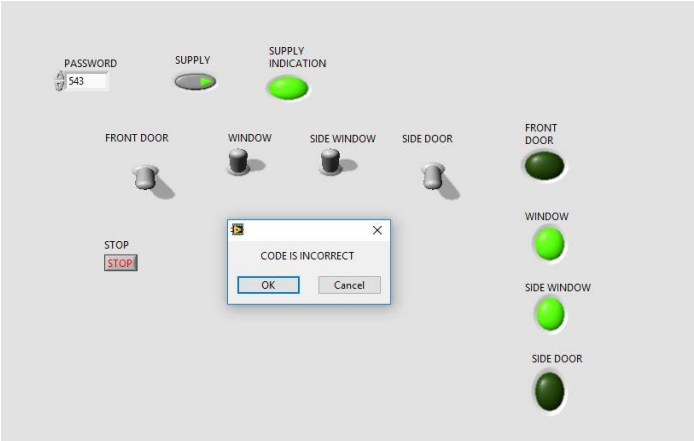

Fig 12: Output window for false condition

4.1.2 True Condition

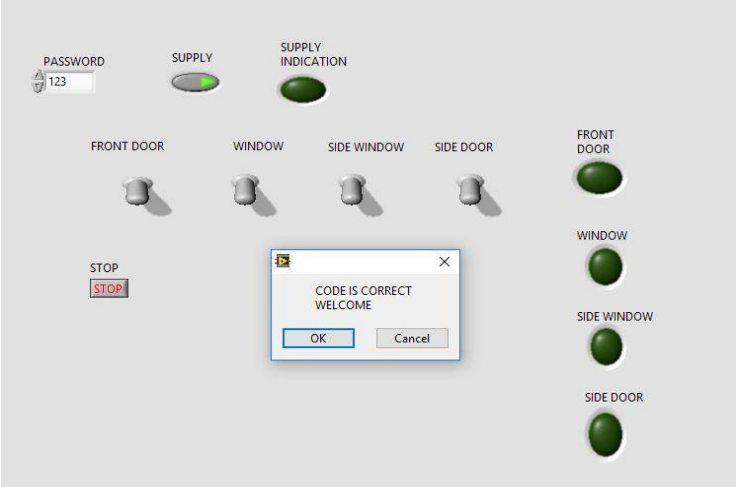

Fig 13: Output window for true condition

4.2 Conclusion

This paper represents importance of home alarm system against any illegal activities. Installing home security systems are not status symbols anymore but rather they have become a great necessity in today's environment. A properly secured and monitored home can definitely give you that peace of mind for you and for our family. The fear of theft and burglary always annoys many people. When lock and keys become less safe, one can seek the help of electronic security systems or Home Alarm System.

4.3 Future Scope

Even though home automation isn't a new industry, it still isn't a standard for most homeowners. Because this is an industry that has experienced slow growth for a few decades now it's hard to predict where exactly home automation is headed in the next several years.

Still, considering that personal electronic devices like smart phones and tablets are in our hands or pockets all day long, it seems only natural that home automation which can easily interact with these personal devices is close to being just as important to homeowner, too.

4.3.1 Introduction Of New Technology For Home Automation

One big change expected in coming years is the introduction of new technology for use in home security systems. Just this last year, ADT released a user friendly home security system that can connect with up to 16 different security cameras and can be easily managed from an internet browser by anyone with intermediate computer skills.

Even more advanced is the face-recognition camera by Netatmo, also introduced in 2015. This camera can be programmed to recognize certain faces, like friends and family members, and will send an alert to the administrator's smart phone when they arrive at their front door and if the unrecognized face arrives at your front door, you will also receive an alert and be able to watch a live feed from your smart phone.

4.3.2 Reducing Energy Consumption Through Smart Home Products

At modernize, we believe strongly in doing everything we can create more sustainable homes. As the modern world continues to place a high priority on green living and reducing consumption of energy created from nonrenewable sources, we expect that smart home products will be heavily used as energy saving tools. Currently, the majority of smart home devices that control heating and air conditioning systems and lighting systems can be easily controlled from any internet capable devices. This allows users to program their systems while away from home, lower thermostat temperatures, or program lights to only be used during certain times of the day.

Newer to the market, and still not widely used, are systems like the Bosch Sensortec, which not only allows users to monitor their heating and cooling system but also smartly monitor the home itself. This system can measure heating, cooling, humidity, and air quality and will make the necessary adjustments if these levels are found to be unsafe or out of balance.

4.3.3 Increasing Family Security Through Smart Home Products

Another area expected to grow in popularity in the near future is the use of smart home products to increase family safety, specifically related to fire protection and carbon monoxide monitoring. The same company that created the Nest, a smart thermostat, has released Nest Protect. The Nest Protect is a fire alarm and carbon monoxide detector that connects with smart phones and other internet enable devices. Anytime a concern arises, an alert is sent to your smart phone, allowing you to act immediately to protect your home and family.

4.3.4 Monitoring And Protection Of Internet Enable Devices

Lastly, as the number of devices in home rapidly increases, we expect further integration of smart home products aimed at monitoring and protecting internet enabled devices. Last year, Disney released Circle with Disney, an internet monitoring device that connects straight to the wireless router in the home and controls all the internet capable devices from there. It not only does this device monitor access to restricted sites, but it can control just how much time is spent on certain websites and internet connect applications. So, if a child needs homework, Circle with Disney only access to permitted sites.

All in all, it is an exciting future for the world of home automation. Advances in technology are allowing home owners to make the lives of their family safer and more cost effective through the use of smart home devices.

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