A Project Report On

Home Automation System (Outdoor)

Submitted in partial fulfilment of the requirement

for the degree of

Bachelor of Engineering

In

Electrical Engineering

Submitted by

Ansari Rushan Ahmed (17DEE40)

Chaudhary Ishtiyaque(17DEE43)

MapariMaroof (15EE27)

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Under the guidance of

Prof. Shraddha Hule

Department of Electrical Engineering

ANJUMAN I ISLAM'S
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2019-2020

CERTIFICATE

This is to certify that the project report entitled **Home Automation System** is a bonfire work done under my guidance by

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During the academic year **2019-20** in partial fulfillment of the requirements for the award of degree of **Bachelor of Engineering in Electrical Engineering** from **University of Mumbai.**

Date-

Approved by Guide-

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CERTIFICATE OF APPROVAL

The foregoing dissertation entitled**Home Automation System** is hereby approved as a creditable study of Electrical Engineering presented by

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In a manner satisfactory to warrant is acceptance as a pre-requisite to their Degree in **Bachelor of Electrical Engineering.**

Internal Examiner
(Prof. Shraddha A. Sawant)

External Examiner

DECLARATION

I declare that this written submission represents my ideas in my own words and where others ideas or words have been included; I have adequately cited and referenced the original sources. I also declared that I have adhered to all principles of academic honesty and integrity and have not represented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission have not been taken when needed.

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ACKNOWLEDGEMENT

It gives me immense pleasure to present this project on **Home Automation System (Outdoor)** carried out at AIKTC, New Panvel in accordance with prescribed syllabus of University of Mumbai for Electrical Engineering. I express my heartfelt gratitude to those who directly and indirectly contributed towards the completion of this project. I would like to thanks **Mr.AbdulRazzak** Principal, ACEM for allowing me to undertake this guide **Prof. Shraddha Hule** for continuous support. I would like to thanks all the faculty members, non-teaching staffs of Electrical Engineering of our College for their direct and indirect support and suggestion for performing the project.

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ABSTRACT

The focus areas of this thesis in our group is on various aspects of Electrical, Electronics and Information technology in Home automation system (HAS) with low cost and wireless systems. Application of artificial intelligence techniques for recognition of various developments. The switch mode is used to control the home appliances. The main control system implements wireless technology to provide remote access even from a smart phone. The design remains as the existing switches are with more safety control with low voltage activating method. Presently, conventional wall switches located in different parts of the house makes it difficult for the elderly or physically handicapped people to do so. Remote control home automation system provides more modern solution with smart phones. In order to achieve this, a Bluetooth module is interfaced to the Arduino board at the receiver end while on the transmitter end, a GUI application on the cell phone sends ON/OFF commands to the receiver where loads are connected. By touching the specified location on the GUI, the loads can be turned ON/OFF remotely through this technology. The loads are operated through the Arduino board through opto-isolators and thyristors using triacs.

LIST OF FIGURES

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Chapter 1

Introduction

1.1 Introduction

In the present times, we have our smart phones controlling our TV operations and many hi-tech electronic systems. The recent trends as advanced by the computer technology deals with basic home automation which gives the facility of controlling house essential electrical equipments as LEDs, Fans, Air conditioners, UPSs and other electrical appliances at home using a remote control. The main question that arises is that this solution that makes life and time most easy to be managed? Yes, the answer is, the system is cost effective and can give the user, the ability to control any electronic device using the operator's smart phone. As we have it in the 21st century, time is money, new technologies are introduced to save our time. Home Automation system is introduced in the industry and commercial sector for a better standard of living as the world of science and technology advances. With the help of this system you can control your home appliances from your phone. The operator can turn ON/OFF your home appliances within the range span of Bluetooth.

1.2 Components Required

1) Arduino Uno
2) 2 Channel Relay (5 Volts)
3) Power Supply
4) Connecting Wires
5) Loads (Preferably Bulbs of 220Volts)
6) Bluetooth Module
7) Smartphone(Bluetooth Enabled)

1.3 Arduino Uno

The Arduino Uno R3 is a microcontroller board based on a removable, dual-inline-package (DIP) ATmega328 AVR microcontroller. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs). Programs can be loaded on to it from the easy-to-use Arduino computer program. The Arduino has an extensive support community, which makes it a very easy way to get started working with embedded electronics. The R3 is the third, and latest, revision of the Arduino Uno.

The Arduino Uno is a microcontroller board based on the ATmega328. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs), a 16 MHz resonator, a USB connection, a power jack, an in-circuit system programming (ICSP) header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features an ATmega16U2 programmed as a USB-to-serial converter. This auxiliary microcontroller has its own USB boot loader, which allows advanced users to reprogram it.

The Arduino has a large support community and an extensive set of support libraries and hardware add-on "shields" (e.g. you can easily make your Arduino wireless with our Wixel shield), making it a great introductory platform for embedded electronics. Note that we also offer a Spark Fun Inventor's Kit, which includes an Arduino Uno along with an assortment of components (e.g. breadboard, sensors, jumper wires, and LEDs) that make it possible to create a number of fun introductory projects. The name Arduino comes from a bar in Ivrea, Italy, where some of the founders of the project used to meet. The bar was named after Arduino of Ivrea, who was the margrave of the March of Ivrea and King of Italy from 1002 to 1014.

1.4 Features of The Arduino Uno:

FIG 1 ARDUINO UNO

- Microcontroller: ATmega328 Operating Voltage: 5V
- Input Voltage (recommended): 7-12V Input Voltage (limits): 6-20V
- Digital I/O Pins: 14 (of which 6 provide PWM output) Analog Input Pins: 6
- DC Current per I/O Pin: 40 mA DC Current for 3.3V Pin: 50 mA
- Flash Memory: 32 KB of which 0.5 KB used by bootloader SRAM: 2 KB (ATmega328)
- EEPROM: 1 KB (ATmega328)
- Clock Speed: 16 MHz

1.5 Arduino Analysis (Hardware):-

Arduino is open-source hardware. The hardware reference designs are distributed under a Creative Commons Attribution Share-Alike 2.5 license and are available on the Arduino website. Layout and production files for some versions of the hardware are also available.

Although the hardware and software designs are freely available under copyleftlicenses, the developers have requested the name Arduinoto be exclusive to the official product and not be used for derived works without permission. The official policy document on use of the Arduino name emphasizes that the project is open to incorporating work by others into the official product. Several Arduino-compatible products commercially released have avoided the project name by using various names ending in -duino.

Arduino microcontrollers are pre-programmed with a boot loader that simplifies uploading of programs to the on-chip flash memory. The default bootloader of the Arduino UNO is the optiboot bootloader. Boards are loaded with program code via a serial connection to another computer. Some serial Arduino boards contain a level shifter circuit to convert between RS-232 logic levels and transistor–transistor logic(TTL) level signals. Current Arduino boards are programmed via Universal Serial Bus (USB), implemented using USB-to-serial adapter chipssuch as the FTDI FT232. Some boards, such as later-model Uno boards, substitute the FTDI chip with a separate AVR chip containing USB-to-serial firmware, which is reprogrammable via its own ICSP header. Other variants, such as the Arduino Mini and the unofficial Boarduino, uses a detachable USB-to-serial adapter board or cable, Bluetooth or other methods. When used withtraditional microcontroller tools, instead of the Arduino IDE, standard AVR in-systemprogramming (ISP) programming is used.

1.6 The Arduino Board

It exposes most of the microcontroller's I/O pins for use by other circuits. The Diecimila, Duemilanove, and current Uno provide 14 digital I/O pins, six of which can produce pulse-width modulated signals, and six analog inputs, which can also be used as six digital I/O pins. These pins are on the top of the board, via female 0.1-inch (2.54 mm) headers. Several plug-in application shields are also commercially available. The Arduino Nano, and
Arduino-compatible Bare Bones Board and Boarduino boards may provide male header pins on the underside of the board that can plug into solderless breadboards.

Many Arduino-compatible and Arduino-derived boards exist. Some are functionally equivalent to an Arduino and can be used interchangeably. Many enhance the basic Arduino by adding output drivers, often for use in school-level education, to simplify making buggies and small robots. Others are electrically equivalent but change the form factor, sometimes retaining compatibility with shields, sometimes not. Some variants use different processors, of varying compatibility.

Figure 1.1 Arduino Uno Board

1.7 Arduino Analysis (Software) :-

1.7.1 Sketch

A program written with the Arduino IDE is called a sketch.[58]Sketches are saved on the development computer as text files with the file extension .ino. Arduino Software (IDE) pre-1.0 saved sketches with the extension .pde.

A minimal Arduino C/C++ program consist of only two functions:

- setup(): This function is called once when a sketch starts after power-up or reset. It is used to initialize variables, input and output pin modes, and other libraries needed in the sketch.
- loop(): After setup() has been called, function loop() is executed repeatedly in the main program. It controls the board until the board is powered off or is reset.

1.7.2 LED Example

Most Arduino boards contain a light-emitting diode (LED) and a load resistor connected between pin 13 and ground, which is a convenient feature for many tests and program functions. A typical program for a beginning Arduino programmer blinks a LED repeatedly. This program uses the functions pinMode(), digitalWrite(), and delay(), which are provided by the internal libraries included in the IDE environment. This program is usually loaded into a new Arduino board by the manufacturer.

1.8 Arduino Ide

Arduino IDE is an open source software that is mainly used for writing and compiling the code into the Arduino Module.

It is an official Arduino software, making code compilation too easy that even a common person with no prior technical knowledge can get their feet wet with the learning process. It is easily available for operating systems like MAC, Windows, Linux and runs on the Java Platform that comes with inbuilt functions and commands that play a vital role for debugging, editing and compiling the code in the environment.

A range of Arduino modules available including Arduino Uno, Arduino Mega, Arduino Leonardo, Arduino Micro and many more.
Each of them contains a microcontroller on the board that is actually programmed and accepts the information in the form of code.

The main code, also known as a sketch, created on the IDE platform will ultimately generate a Hex File which is then transferred and uploaded in the controller on the board.

The IDE environment mainly contains two basic parts: Editor and Compiler where former is used for writing the required code and later is used for compiling and uploading the code into the given Arduino Module.

This environment supports both C and C++ languages.

The IDE environment is mainly distributed into three sections

1. Menu Bar
2. Text Editor
3. Output Pane

1.9 Relay

A relay is classified into many types, a standard and generally used relay is made up of electromagnets which in general used as a switch. Dictionary says that relay means the act of passing something from one thing to another, the same meaning can be applied to this device because the signal received from one side of the device controls the switching operation on the other side. So relay is a switch which controls (open and close) circuits electromechanically. The main operation of this device is to make or break contact with the help of a signal without any human involvement in order to switch it ON or OFF. It is mainly used to control a high powered circuit using a low power signal. Generally a DC signal is used to control circuit which is driven by high voltage like controlling AC home appliances with DC signals from microcontrollers.

An Electromagnet plays a major role in the working of a relay. It is a metal which doesn't have magnetic property but it can be converted into a magnet with the help of an electrical signal. We know that when current passes through the conductor it acquires the properties of a magnet. So, when a metal winded with a copper wire and driven by the sufficient power supply, that metal can act as a magnet and can attract the metals within its range.

Movable Armature:

Movable armature is a simple metal piece which is balanced on a pivot or a stand. It helps in making or breaking the connection with the contacts connected to it.

Contacts: These are the conductors that exist within the device and are connected to the terminals.

Yoke: It is a small metal piece fixed on a core in order to attract and hold the armature when the coil is energized.

Spring (optional): Few relays don't need any spring but if it is used, it is connected to one end of the armature to ensure its easy and free movement. Instead of a spring, a metal stand like structure can be used.

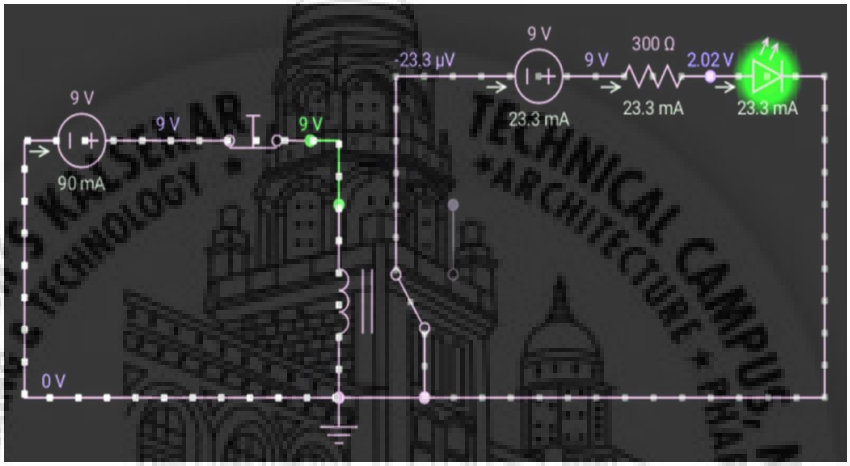

FIG 2 Relay In Normally Opened Condition

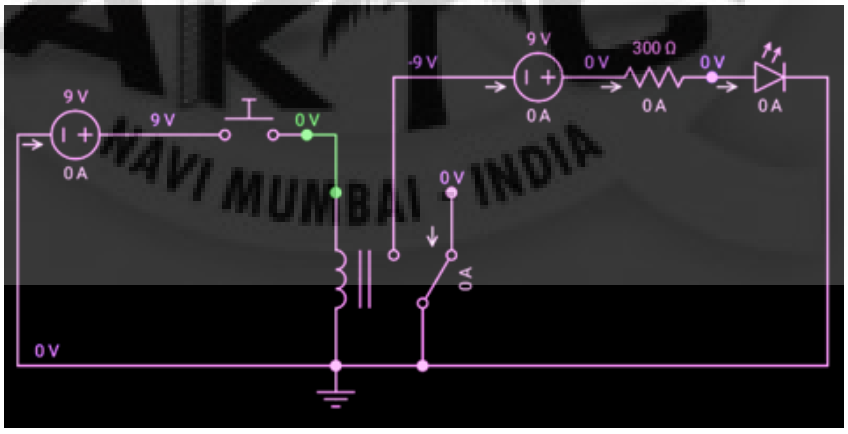

FIG 2.1 Relay In AClosed Condition

1.9.1 Electrical Relay Contact Tip Materials

- Ag (fine silver)

1. Electrical and thermal conductivity are the highest of all the metals.

2. Exhibits low contact resistance, is inexpensive and widely used.

3. Contacts tarnish easily through sulphurisation influence.

- AgCu (silver copper)

1. Known as “Hard silver” contacts and have better wear resistance and less tendency to arc and weld, but slightly higher contact resistance.

- Platinum, Gold and Silver Alloys

1. Excellent corrosion resistance, used mainly for low-current circuits.

The Arduino Relay module allows a wide range of microcontroller such as Arduino, AVR ,PIC, ARM with digital outputs to control larger loads and devices like AC or DC Motors, electromagnets, solenoids, and incandescent light bulbs. This module is designed to be integrated with 2 relays that it is capable of control 2 relays.The relay shield use one QIANJI JQC-3F high-quality relay with rated load 7A/240VAC,10A/125VAC,10A/28VDC.The relay output state is individually indicated by a light-emitting diode.

1.9.2 Types Of Relays

1 Safety/ Force Guided Contacts Relay

A 'force-guided contacts relay' has relay contacts that are mechanically linked together, so that when the relay coil is energized or de-energized, all of the linked contacts move together. If one set of contacts in the relay becomes immobilized, no other contact of the same relay will be able to move. The function of force-guided contacts is to enable the safety circuit to check the

status of the relay. Force-guided contacts are also known as "positive-guided contacts", "captive contacts", "locked contacts", "mechanically linked contacts", or "safety relays".

Force-guided contacts by themselves cannot guarantee that all contacts are in the same state, however they do guarantee, subject to no gross mechanical fault that no contacts are in opposite states. Otherwise, a relay with several normally open (NO) contacts may stick when energized, with some contacts closed and others still slightly open, due to mechanical tolerances. Similarly, a relay with several normally closed (NC) contacts may stick to the un energized position, so that when energized, the circuit through one set of contacts is broken, with a marginal gap, while the other remains closed. By introducing both NO and NC contacts, or more commonly, changeover contacts, on the same relay, it then becomes possible to guarantee that if any NC contact is closed, all NO contacts are open, and conversely, if any NO contact is closed, all NC contacts are open.

It is not possible to reliably ensure that any particular contact is closed, except by potentially intrusive and safety-degrading sensing of its circuit conditions, however in safety systems it is usually the NO state that is most important, and as explained above, this is reliably verifiable by detecting the closure of a contact of opposite sense.

2 Latching Relay

A latching relay (also called "impulse", "bi-stable", "keep", or "stay" relays) maintains either contact position indefinitely without power applied to the coil. The advantage is that one coil consumes power only for an instant while the relay is being switched, and the relay contacts retain this setting across a power outage. A latching relay allows remote control of building lighting without the hum that may be produced from a continuously (AC) energized coil.

In one mechanism, two opposing coils with an over-center spring or permanent magnet hold the contacts in position after the coil is de-energized. A pulse to one coil turns the relay on and a pulse to the opposite coil turns the relay off. This type is widely used where control is from simple switches or single-ended outputs of a control system, and such relays are found in a vionics and numerous industrial applications.

Another latching type has a remanentcore that retains the contacts in the operated position by the remanent magnetism in the core. This type requires a current pulse of opposite polarity to release the contacts. A variation uses a permanent magnet that produces part of the force required to close the contact; the coil supplies sufficient force to move the contact open or closed by aiding or opposing the field of the permanent magnet. A polarity controlled relay needs changeover switches or an H bridge drive circuit to control it. The relay may be less expensive than other types, but this is partly offset by the increased costs in the external circuit.

In another type, a ratchet relay has a ratchet mechanism that holds the contacts closed after the coil is momentarily energized. A second impulse, in the same or a separate coil, releases the contacts. This type may be found in certain cars, for headlamp dipping and other functions where alternating operation on each switch actuation is needed.

3 Contactor Relay

A contactor is a heavy-duty relay with higher current ratings, used for switching electric motors and lighting loads. Continuous current ratings for common contactors range from 10 amps to several hundred amps. High-current contacts are made with alloys containing silver. The unavoidable arcing causes the contacts to oxidize; however, silver oxide is still a good conductor. Contactors with overload protection devices are often used to start motors.

4 Coaxial Relay

Where radio transmitters and receivers share one antenna, often a coaxial relay is used as a TR (transmit-receive) relay, which switches the antenna from the receiver to the transmitter. This protects the receiver from the high power of the transmitter. Such relays are often used in transceivers which combine transmitter and receiver in one unit. The relay contacts are designed not to reflect any radio frequency power back toward the source, and to provide very high isolation between receiver and transmitter terminals. The characteristic impedance of the relay is matched to the transmission line impedance of the system, for example, 50 ohms.

5 Machine Tool Relay

A machine tool relay is a type standardized for industrial control of machine tools, transfer machines, and other sequential control. They are characterized by a large number of contacts (sometimes extendable in the field) which are easily converted from normally open to normally closed status, easily replaceable coils, and a form factor that allows compactly installing many relays in a control panel. Although such relays once were the backbone of automation in such industries as automobile assembly, the programmable logic controller (PLC) mostly displaced the machine tool relay from sequential control applications.

A relay allows circuits to be switched by electrical equipment: for example, a timer circuit with a relay could switch power at a preset time. For many years relays were the standard method of controlling industrial electronic systems. A number of relays could be used together to carryout complex functions (relay logic). The principle of relay logic is based on relays which energize and de-energize associated contacts. Relay logic is the predecessor of ladder logic, which is commonly used in programmable logic controllers.

6 Multi-Voltage Relays

Multi-voltage relays are devices designed to work for wide voltage ranges such as 24 to 240 VAC and VDC and wide frequency ranges such as 0 to 300 Hz. They are indicated for use in installations that do not have stable supply voltage

7 Polarized Relay

A polarized relay places the armature between the poles of a permanent magnet to increase sensitivity. Polarized relays were used in middle 20th Century telephone exchanges to detect faint pulses and correct telegraphic distortion.

8 Reed Relay

A reed relay is a reed switch enclosed in a solenoid. The switch has a set of contacts inside an evacuated or inert gas-filled glass tube which protects the contacts against atmospheric corrosion; the contacts are made of magnetic material that makes them move under the influence of the field of the enclosing solenoid or an external magnet.

Reed relays can switch faster than larger relays and require very little power from the control circuit. However, they have relatively low switching current and voltage ratings. Though rare, the reeds can become magnetized over time, which makes them stick 'on' even when no current is present; changing the orientation of the reeds with respect to the solenoid's magnetic field can resolve this problem.

Sealed contacts with mercury-wetted contacts have longer operating lives and less contact chatter than any other kind of relay.

9 Safety Relays

Safety relays are devices which generally implement safety functions. In the event of a hazard, the task of such a safety function is to use appropriate measures to reduce the existing risk to an acceptable level.

10 Solid-StateContactor

A solid-state contactor is a heavy-duty solid state relay, including the necessary heat sink, used where frequent on-off cycles are required, such as with electric heaters, small electric motors, and lighting loads. They are activated by AC control signals or DC control signals from programmablelogic controllers (PLCs), PCs, transistor-transistor logic (TTL) sources, or other microprocessor and microcontroller controls.

11 Solid-State Relay

A solid-state relay (SSR) is a solid state electronic component that provides a function similar to an electromechanical relay but does not have any moving components, increasing long-term reliability. A solid-state relay uses a thyristor, TRIAC or other solid-state switching device, activated by the control signal, to switch the controlled load, instead of a solenoid.

An optocoupler(a light-emitting diode (LED) coupled with a photo transistor) can be used to isolate control and controlled circuits.

12 Static Relay

A static relay consists of electronic circuitry to emulate all those characteristics which are achieved by moving parts in an electro-magnetic relay.

13 Time Delay Relay

Timing relays are arranged for an intentional delay in operating their contacts. A very short (a fraction of a second) delay would use a copper disk between the armature and moving blade assembly. Current flowing in the disk maintains magnetic field for a short time, lengthening release time. For a slightly longer (up to a minute) delay, a dashpot is used. A dashpot is a piston filled with fluid that is allowed to escape slowly; both air-filled and oil-filled dashpots are used. The time period can be varied by increasing or decreasing the flow rate. For longer time periods, a mechanical clockwork timer is installed. Relays may be arranged for a fixed timing period, or may be field adjustable, or remotely set from a control panel. Modern microprocessor-based timing relays provide precision timing over a great range.

1.9.3 Applications Of Relay:-

Relays have a wide range of applications starting from washing machines at homes to the telecommunication systems at the International space station, relays can be found everywhere. The following are a few key applications:

Relays are used in electronic circuits and home appliances for isolating low voltage or DC circuits from high voltage AC circuits.

Relays are the backbone of industrial process automation systems.

They are used in combination with PLCs for process control.

They are one of the key components in an automation cabinet.

Used for signaling and control in railway networks.

In motor control circuits for motor switching, protection as well as control.

In substations and power distribution centers for sensing various faults and operating the circuit breaker.

1.9.4 Relay Selection Considerations

The following factors must be considered while selecting a relay for any application.

Nominal voltage: The voltage at which the relay coil is designed to operate.

Rated power: The power consumed by the relay coil at normal room temperature.

Contact rating: The current carrying capacity and voltage rating of the relay contacts

Contact mechanism: The number of contacts required and the contact configuration (NO/NC/changeover).

Environmental protection: the degree of sealing required, meaning, whether the external casing of relay is necessary or not?

Insulation resistance: Insulation resistance between any two sets of contacts and that between the contacts and the coil.

Physical dimensions of the relay: Size of the relay.

1.9.5 Channel Protective Relay Module

1. Overview

We can control high voltage electronic devices using relays. A Relay is actually a switch which is electrically operated by an electromagnet. The electromagnet is activated with a low voltage, for example 5 volts from a microcontroller and it pulls a contact to make or break a high voltage circuit.

FIG 2.2: 2 CHANNEL RELAY

As an example for this Arduino Relay Tutorial we will use the HL-52S 2 channel relay module, which has 2 relays with rating of 10A @ 250 and 125 V AC and 10A @ 30 and 28 V DC. The high voltage output connector has 3 pins, the middle one is the common pin and as we can see from the markings one of the two other pins is for normally open connection and the other one for normally closed connection.

2. Circuit Schematic

You can control a relay using the Arduino Board, one 1K and one 10K resistors, 1 BC547 transistor, One 6V or 12V relay, one 1N4007 diode.

So we can see that the 5 volts from our microcontroller connected to the Vcc pinfor activating the relay through the Optocoupler IC are also connected to the JDVcc pin which powers the electromagnet of the relay. So in this case we got no isolation between the relay and the microcontroller.

In order to isolate the microcontroller from the relay, we need to remove the jumper and connect separate power supply for the electromagnet to the JDVcc and the Ground pin. Nowwith this configuration the microcontroller doesn't have any physical connection with the relay, it just uses the LED light of the Optocoupler IC to activate the relay.

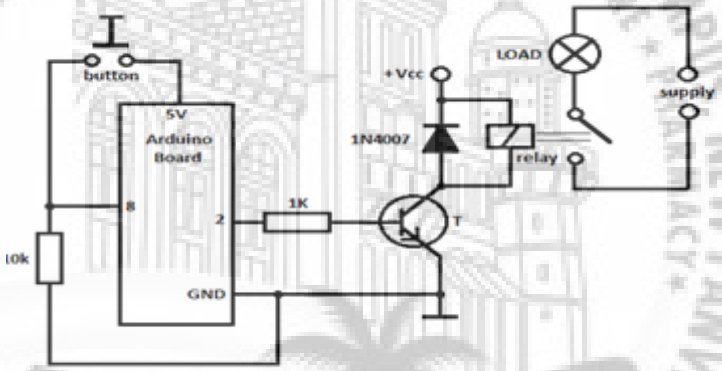

FIG 2.3- ARDUINO UNO USING A 2 CHANNEL RELAY

There is one more thing to be noticed from this circuit schematics. The input pins of the module work inversely. As we can see the relay will be activated when the input pin will be LOW because in that way the current will be able to flow from the VCC to the input pin which is low or ground, and the LED will light up and active the relay.When the input pin will be HIGH there will be no current flow, so the LED will not light up and the relay will not be activated.

We cannot use the 5V from the USB to power up the transistor and the LOAD because the USB port usually delivers only 100mA, and this is not enough to switch the relay and the LOAD. That is why you must use an external power supply (Vcc) that is between 7 to 12 volts to power up the Arduino board and the transistor + relay. The load uses its own power supply, for instance

if you use a light bulb then you might connect it to the 110/220V mains or any other power source.

DO NOT connect in any ways the main power supply that drive the LOAD to the arduino and transistor circuitry!

Turn OFF the relay with delay we can use this code example to introduce a delay in your circuit. The variable "stayON" is used to delay() the program execution with the desired amount of time. In our case after the button is pressed the relay will be switched ON and after 5 seconds will the turned OFF.

1.Pins in the low voltage group are connected to Arduino, including three pins:

2.GND pin needs to be connected to GND (0V)

3.VCC pin needs to be connected to VCC (5V)

4.IN pin receives the control signal from Arduino

5.Pins in the high voltage group are connected to high voltage a device, including three pins (usually in screw terminal):

6.COM pin is the common pin. It is used in both normally open mode and normally closed mode

7.NO pin is normally open pin. It is used in the normally open mode

8.NC pin is normally closed pin. It is used in the normally closed mode

Relays with caliberate operating characteristics and sometimes multiple operating coils are used
to protect electrical circuits from overload or faults. In modern electric power systems these functions are performed by digital instruments still called "protective relays."

3. 2 Channel Relay Features:

1) Number of relays : 2

2) Rated load: 7A/240v AC

3) Contact time: 10ms/5ms

FIG 2.4 :2 CHANNEL RELAY BOARD

1.10 Bluetooth Module(Hc-05)

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module,designed for transparent wireless serial connection setup.The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless communication.

HC-05 Specification:

Bluetooth protocol: Bluetooth Specification v2.0+EDR

Frequency: 2.4GHz ISM band

Modulation: GFSK(Gaussian Frequency Shift Keying)

Emission power: ≤4dBm, Class 2

Sensitivity: ≤-84dBm at 0.1% BER

Speed: Asynchronous: 2.1Mbps(Max) / 160 kbps, Synchronous: 1Mbps/1Mbps

Security: Authentication and encryption

Profiles: Bluetooth serial port

Power supply: +3.3VDC 50mA

Working temperature: -20 ~ +75Centigrade

Dimension: 26.9mm x 13mm x 2.2 mm

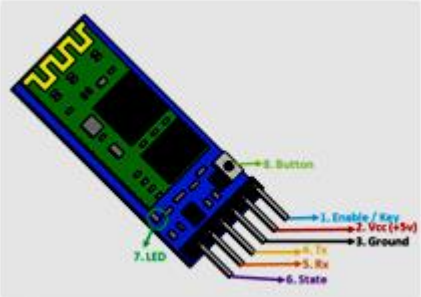

FIG 3 – Bluetooth Module HC-05

HC-05 Default Settings:-

Default Bluetooth Name: ‚HC-05'

Default Password: 1234 or 0000

Default Communication: Slave

Default Mode: Data Mode

Data Mode Baud Rate: 9600, 8, N, 1

Command Mode Baud Rate: 38400, 8, N, 1

Default firmware: LINVOR

Chapter 2

DESIGNING

Designing

2.1 Block Diagram

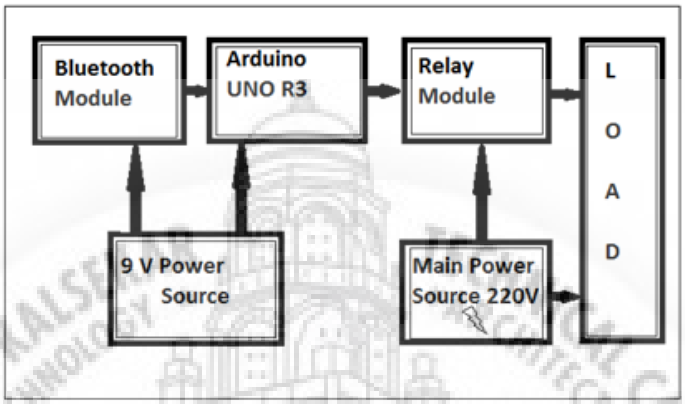

Fig 4 :Block Diagram Of Home Automation System Using Arduino And Bluetooth Module

2.2 Circuit Diagram

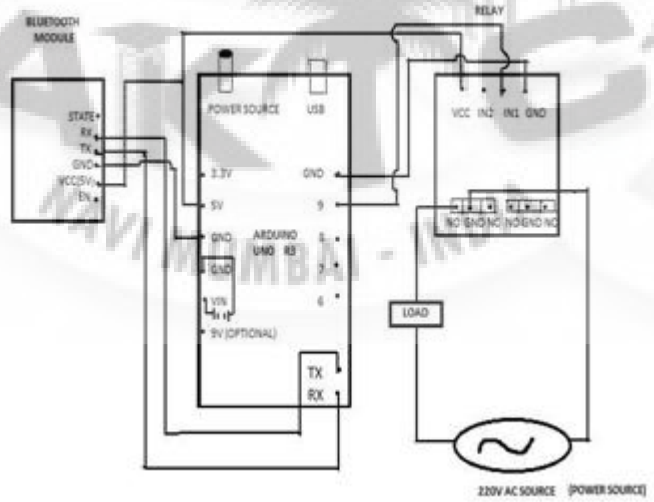

Fig 5: Circuit Diagram Of Home Automation System Using Arduino And Bluetooth Module

Chapter 3

Coding

3.1 Code Program

Coding:

String inputs;

#define relay1 2 //Connect relay1 to pin 9 #define relay2 3 //Connect relay2 to pin 8 #define relay3 4 //Connect relay3 to pin 7 #define relay4 5 //Connect relay4 to pin 6 #define relay5 6 //Connect relay5 to pin 5 #define relay6 7 //Connect relay6 to pin 4 #define relay7 8 //Connect relay7 to pin 3 #define relay8 9 //Connect relay8 to pin 2 void setup()

{

Serial.begin(9600); //Set rate for communicating with phone pinMode(relay1, OUTPUT); //Set relay1 as an output pinMode(relay2, OUTPUT); //Set relay2 as an output pinMode(relay3, OUTPUT); //Set relay1 as an output pinMode(relay4, OUTPUT); //Set relay2 as an output pinMode(relay5, OUTPUT); //Set relay1 as an output pinMode(relay6, OUTPUT); //Set relay2 as an output pinMode(relay7, OUTPUT); //Set relay1 as an output pinMode(relay8, OUTPUT); //Set relay2 as an output digitalWrite(relay1, LOW); //Switch relay1 off digitalWrite(relay2, LOW); //Swtich relay2 off digitalWrite(relay3, LOW); //Switch relay1 off digitalWrite(relay4, LOW); //Swtich relay2 off digitalWrite(relay5, LOW); //Switch relay1 off digitalWrite(relay6, LOW); //Swtich relay2 off digitalWrite(relay7, LOW); //Switch relay1 off digitalWrite(relay8, LOW); //Swtich relay2 off

}

void loop()

{

while(Serial.available()) //Check if there are available bytes to read

{

delay(10); //Delay to make it stable

char c = Serial.read(); //Conduct a serial read if (c == '#'){

break; //Stop the loop once # is detected after a word

}

inputs += c; //Means inputs = inputs + c

}

if (inputs.length() >0)

```
{
Serial.println(inputs);

if(inputs == ‚A‘)
{
digitalWrite(relay1, LOW);
}
else if(inputs == ‚a‘)
{
digitalWrite(relay1, HIGH);
}
else if(inputs == ‚B‘)
{
digitalWrite(relay2, LOW);
}
else if(inputs == ‚b‘)
{
digitalWrite(relay2, HIGH);
}
else if(inputs == ‚C‘)
{
digitalWrite(relay3, LOW);
}
else if(inputs == ‚c‘)
{
digitalWrite(relay3, HIGH);
}
else if(inputs == ‚D‘)
{
digitalWrite(relay4, LOW);
}
else if(inputs == ‚d‘)
{
digitalWrite(relay4, HIGH);
```

```
}
else if(inputs == ,E')
{
digitalWrite(relay5, LOW);
}
else if(inputs == ,e')
{
digitalWrite(relay5, HIGH);
}
else if(inputs == ,F')
{
digitalWrite(relay6, LOW);
}
else if(inputs == ,f')
{
digitalWrite(relay6, HIGH);
}
else if(inputs == ,G')
{
digitalWrite(relay7, LOW);
}
else if(inputs == ,g')
{
digitalWrite(relay7, HIGH);
}
else if(inputs == ,H')
{
digitalWrite(relay8, LOW);
}
else if(inputs == ,h')
{
digitalWrite(relay8, HIGH);
}
inputs='';}
```

Chapter 4

APPLICATIONS

4.1 Turn Your Webcam into a Security Camera

Instead of installing a surveillance camera you can always use the webcam for keeping track on your children as it can successfully perform the activity of taking note of all activities. Also it is cheap and very minute and the activities can be checked with the help of the internet. Install a Wireless Intercom You are busy eating your food and suddenly you see the vegetables are over. You call out to your spouse to give you some who is busy in some work. You have to scream at the top of your voice which is very embarrassing. Instead of shouting you could simply attach a wireless intercom and call out to her and ask her for the vegetable. In this way you can save your energy and time too.

4.2 Smart Phone to Smart Home

Fig 6 - Smart Home Applications

Will smart kitchen appliances actually make you a better cook? Maybe. Smart refrigerators, such as LG's Smart ThinQ, allow you to scan grocery store receipts and keep an inventory of your items, and alerts you if an item is about to expire. More impressively, it suggests recipes based on your refrigerator's contents and lets you know when you need to replace items. Smart ovens synch with your smartphone and automatically preheat to the correct temperature based on a recipe selected from your database.

4.3 Smart Apartments And Communities

Make the management of apartment buildings and communities smarter and simpler. Built-in smart technology and management platforms enable you to manage your residential properties more efficiently. Smart locks let you create virtual keys for residents, and allow for conditional access for needed repairs while residents are not home. Intelligent connected thermostats let your resident control their temperature more efficiently while at home or away. Smart lighting can turn lights on and off for both efficiency and security.

4.4 Lighting Fixtures

Great lighting design can show off your home in the best light. Today's LED lighting technology allows for new fixture styles and the ability to layer light to create the perfect illumination for every space in your home. You can choose from an incredible variety of styles, including track and rail lighting, recessed lights, under-cabinet lights, and decorative chandeliers and sconces in new styles enabled by LED technology. Lighting can also assist with wellness with new bulbs and fixtures that can vary from warm to cool light, making your lighting match the intensity and hue of the natural light of the day.

4.5 Boardroom Technology

Productivity for important rooms in your New York business such as a conference room, boardroom, or executive office is increased when all the smart technology and subsystems work together with simple control. When presenting to clients from a laptop, pressing a single "Presentation" button dims lights, lowers blackout shades, turns on video display, and audio. By integrating everything in a room from audio, video, lights, window treatments, networking, and communications you have complete and easy control from a single touch screen, keypad, remote or mobile device. No more walking over to turn off lights and lower shades or wasting time and getting frustrated during in-person or video conference meetings.

Chapter 5

CONCLUSION

The project has proposed the idea of smart homes that can support a lot of home automation systems. A smart home contains a connection between wireless communication, sensors, monitoring and tracking. Smart homes are a huge system that includes multiple technologies and applications that can be used to provide security and control of the home easily. This project discussed the designed modules like sensors' circuits, monitoring and tracking of the home through IP camera, mobile notifications and home navigator. There are a variety of enhancements that could be made to this system to achieve greater accuracy in sensing and detection. There are a lot of other sensors that can be used to increase the security and control of the home like pressure sensor that can be put outside the home to detect that someone will enter the home. Changing the way of the automated notifications by using the GSM module to make this system more professional.

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5.1 References

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