Project Report

on

HOME AUTOMATION WITH IOT

Submitted in partial fulfillment of the
requirement for the award of the degree of

Bachelor of Technology in Computer Science

and Engineering

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CANDIDATE'S DECLARATION

We here by certify that the work which is being presented in the project/dissertation, entitled **"HOME AUTOMATION USING ARDUINO"** in partial fulfillment of the requirements for the award of the B.Tech degree computer science and engineering submitted in the School of Computing Science and Engineering of Galgotias University, Greater Noida, is an original work carried out during the period of September, 2022 to December and 2022, under the supervision of Mr. Nitin Jain , Department of Computer Science and Engineering/Computer Application and Information and Science, of School of Computing Science and Engineering , Galgotias University, Greater Noida

The matter presented in the thesis/project/dissertation has not been submitted by us for the award of any other degree of this or any other places.

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CERTIFICATE

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Signature of Program Chair   **Signature of Dean**

Date: 22 December, 2022

Place: Greater Noida

Abstract

Current there is no specific model or project which can completely automize all theelectrical appliances in our houses. If there are some models for this in the market, then they are not cost effective. So basically we are here trying to make the lifestyleof the customer very convenient and specially it can be a boon for the specially challenged peoples.

Here we are automating all the electrical appliances in our homes just with the helpof one voice command. We convert house into a smart house by giving control on your smartphone/tablet and touch panels .You can control lighting, curtains,home cinema, media servers, surveillance, climate control, back ground music, we customize just as per your taste and design. Our Home automation give you controlof Climate, Security,Equipment, Lights, camera, projector, tv, projection screen, window drapes, conferencing unit, with options of adding sensors to create scenes as per your mood and requirement.

In our prototype we have used the following tools:
- Arduino Uno
- 2 Channel Relay
- BT Voice command
- Breadboard
- DC Motor
- LED

Home automation has high potential for sharing data between family members ortrusted individuals for personal security and could lead to energy saving measureswith a positive environmental impact in the future. We have successfully achieved Our objective of automizing our houses.

There are several new technologies which can become a part of home in the nearfuture:

- Increased efficiency, control, and customization
- Integration of Smart home devices
- Development of smart appliances

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CHAPTER-1

Introduction

Nowadays, we have remote controls for our television sets and other electronic systems, which have made our lives real easy. Have you ever wondered about home automation which would give the facility of controlling tube lights, fans and other electrical appliances at home using a remote control? Off-course, Yes! But, are the available options cost-effective? If the answer is No, we have found a solution to it. We have come up with a new system called Arduino based home automation using Bluetooth. This system is super-cost effective and can give the user, the ability to control any electronic device without even spending for a remote control. This project helps the user to control all the electronic devices using his/her smartphone. Time is a very valuable thing. Everybody wants to save time as much as they can. New technologies are being introduced to save our time. To save people's time we are introducing Home Automation system using Bluetooth . With the help of this system you can control your home appliances from your mobile phone. You can turn on/off your home appliances within the range of Bluetooth.

COMPONENTS REQUIRED

1)ARDUINO UNO
2)2 CHANNEL RELAY(5v)
3)BLUETOOTH MODULE HC05
4)POWER SUPPLY
5)LOAD(BULB 220V)
6)CONNECTING WIRES
7)BREAD BOARD
8)SMARTPHONE(BLUETOOTH ENABLED)

CHAPTER-2

ARDUINO UNO Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world. The project's products are distributed as open-source hardware and software, which are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form, or as do-it-yourself (DIY) kits. Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or Breadboards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project. The Arduino project started in 2003 as a program for students at the Interaction Design Institute Ivrea in Ivrea, Italy, aiming to provide a low-cost and easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats, and motion detectors.

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 Arduin of Ivrea, who was the margrave of the March of Ivrea and King of Italy from 1002 to 1014.

Features of the 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
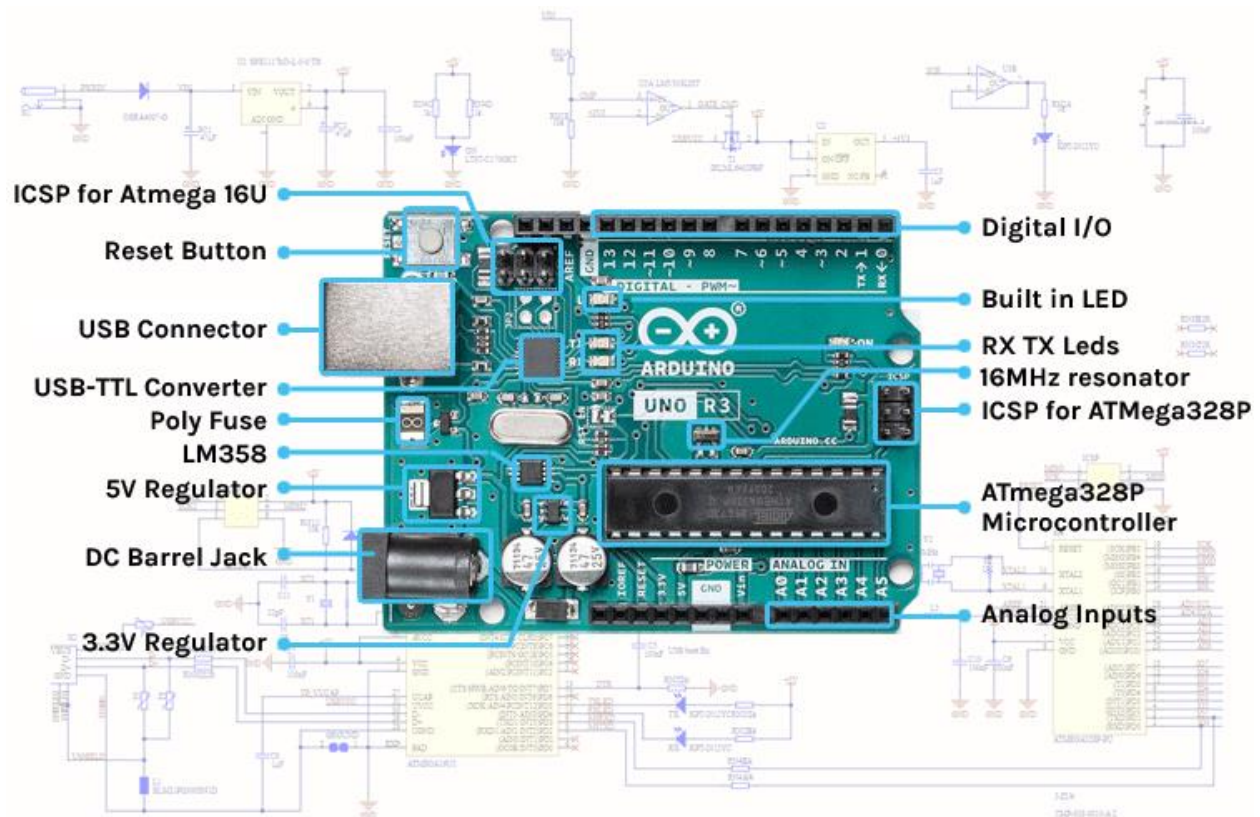
DC Current per I/O

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

ARDUINO HARDWARE PART:-

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 copyleft licenses, 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. Most Arduino boards consist of an Atmel 8-bit AVR

microcontroller (ATmega8, ATmega168, ATmega328, ATmega1280, ATmega2560) with varying amounts of flash memory, pins, and features. The 32-bit Arduino Due, based on the Atmel SAM3X8E was introduced in 2012. The boards use single or double-row pins or female headers that facilitate connections for programming and incorporation into other circuits. These may connect with add-on modules termed shields. Multiple and possibly stacked shields may be individually addressable via an I²C serial bus. Most boards include a 5 V linear regulator and a 16 MHz crystal oscillator or ceramic resonator. Some designs, such as the LilyPad, run at 8 MHz and dispense with the onboard voltage regulator due to specific form-factor restrictions. 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 RS232 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 chips such 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, use a detachable USB-to-serial adapter board or cable, Bluetooth or other methods. When used with traditional microcontroller tools, instead of the Arduino IDE, standard AVR in-system programming (ISP) programming is used.

The Arduino board 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.

ARDUINO SOFTWARE PART:-

IDE The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java. It originated from the IDE for the languages Processing and Wiring. It includes a code editor with features such as text cutting and pasting, searching and replacing text, automatic indenting, brace matching, and syntax highlighting, and provides simple one-click mechanisms to compile and upload programs to an Arduino board. It also contains a message area, a text console, a toolbar with buttons for

common functions and a hierarchy of operation menus. The source code for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution. The Arduino IDE employs the program avrdude to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

Sketch

A program written with the Arduino IDE is called a sketch. 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. Blink 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.

RELAY:

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations. A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. Solid-state relayscontrol power circuits with no moving parts, instead using a semiconductor device to perform switching. Relays with calibrated 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". Magnetic latching

relays require one pulse of coil power to move their contacts in one direction, and another, redirected pulse to move them back. Repeated pulses from the same input have no effect. Magnetic latching relays are useful in applications where interrupted power should not be able to transition the contacts. Magnetic latching relays can have either single or dual coils. On a single coil device, the relay will operate in one direction when power is applied with one polarity, and will reset when the polarity is reversed. On a dual coil device, when polarized voltage is applied to the reset coil the contacts will transition. AC controlled magnetic latch relays have single coils that employ steering diodes to differentiate between operate and reset commands.

A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. Solid-state relayscontrol power circuits with no moving parts, instead using a semiconductor device to perform switching. Relays with calibrated 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". 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.

2 channel relay features:

 Number of Relays: 2

Control signal: TTL level

Rated load: 7A/240VAC 10A/125VAC 10A/28VDC

Contact action time: 10ms/5ms

Types:-

1)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.

2)Contactor

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.

3)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". These safety relays have to follow design rules and manufacturing rules that are defined in one main machinery standard EN 50205 : Relays with forcibly guided (mechanically linked) contacts. These rules for the safety design are the one that are defined in type B standards such as EN 13849-2 as Basic safety principles and Well-tried safety principles for machinery that applies to all machines. Force-guided contacts by themselves can not 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 energised, 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 unenergised position, so that when energised, 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. Force-guided contact relays are made with different main contact sets, either NO, NC or changeover, and one or more auxiliary contact sets, often of reduced current or voltage rating, used for the monitoring system. Contacts may be all NO, all NC, changeover, or a mixture of these, for the monitoring contacts, so that the safety system designer can select the correct configuration for the particular application. Safety relays are used as part of an engineered safety system.

APPLICATIONS OF RELAY:-

Relays are used wherever it is necessary to control a high power or high voltage circuit with a low power circuit, especially when galvanic isolation is desirable. The first application of relays was in long telegraph lines, where the weak signal received at an intermediate station could control a contact, regenerating the signal for further transmission. High-voltage or high-current devices can be controlled with small, low voltage wiring and pilots switches. Operators can be isolated from the high voltage circuit. Low power devices such as microprocessors can drive relays to control electrical loads beyond their direct drive capability. In an automobile, a starter relay allows the high current of the cranking motor to be controlled with small wiring and contacts in the ignition key. Electromechanical switching systems including Strowger and Crossbar telephone exchanges made extensive use of relays in ancillary control circuits. The Relay Automatic Telephone Company also manufactured telephone exchanges based solely on relay switching techniques designed by Gotthilf Ansgarius Betulander. The first public relay based telephone exchange in the UK was installed in Fleetwood on 15 July 1922 and remained in service until 1959. The use of relays for the logical control of complex switching systems like telephone exchanges was studied by Claude Shannon, who formalized the application of Boolean algebra to relay circuit design in A Symbolic Analysis of Relay and Switching Circuits. Relays can perform the basic operations of Boolean combinatorial logic. For example, the boolean AND function is realised by connecting normally open relay contacts in series, the OR function by connecting normally open contacts in parallel. Inversion of a logical input can be done with a normally closed contact. Relays were used for control of automated systems for machine tools and production lines. The Ladder programming language is often used for designing relay logic networks. Early electro-mechanical computers such as the ARRA, Harvard Mark II, Zuse Z2, and Zuse Z3 used relays for logic and working registers. However, electronic devices proved faster and easier to use. Because relays are much more resistant than semiconductors to nuclear radiation, they are widely used in safety-critical logic, such as the control panels of radioactive waste-handling machinery. Electromechanical protective relays are used to detect overload and other faults on electrical lines by opening and closing circuit breakers.

RELAY H152S MODULE

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 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. On the other side of the module we have these 2 sets of pins. The first one has 4 pins, a Ground and a VCC pin for powering the module and 2 input pins In1 and In2. The second set of pins has 3 pins with a jumper between the JDVcc and the Vcc pin. With a configuration like this the electromagnet of the relay is directly powered from the Arduino Board and if something goes wrong with the relay the microcontroller could get damaged.

BLUETOOTH MODULE(HC-05 Bluetooth Module)

HC-05 Specification:

Bluetooth protocal: 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

Overview

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.This serial port bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate)3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Bluecore 04-External single chip Rluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature).

Bluetooth Module HC-05

The Bluetooth module HC-05 is a MASTER/SLAVE module.By default the factory setting is SLAVE.The Role of the module (Master or Slave) can be configured only by AT COMMANDS.The slave modules cannot initiate a connection to another Bluetooth device, but can accept connections.Master module can initiate a connection to other devices.The user can use it simply for a serial port replacement to establish connection between MCU and GPS, PC to your embedded project, etc.

Pin Description:- The HC-05 Bluetooth Module has 6pins. They are as follows:

ENABLE: When enable is pulled LOW, the module is disabled which means the module will not turn on and it fails to communicate.When enable is left open or connected to 3.3V, the module is enabled i.e the module remains onand communication also takes place.

Vcc: Supply Voltage 3.3V to 5V

GND: Ground pin

TXD & RXD: These two pins acts as an UART interface for communication

STATE: It acts as a status indicator.When the module is not connected to paired with any other bluetooth device,signal goes Low.At this low state,the led flashes continuously which denotes that the module is not paired with other device.When this module is connected to/paired with any other bluetooth device,the signal goes High.At this high state,the led blinks with a constant delay say for example 2s delay which indicates that the module is paired.

BUTTON SWITCH: This is used to switch the module into AT command mode.To enable AT command mode,press the button switch for a second.With the help of AT commands,the user can change the parameters of this module but only when the module is not paired with any other BT device.If the module is connected to any other bluetooth device, it starts to communicate with that device and fails to work in AT command mode.

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-3

BLOCK DIAGRAM

BLOCK DIAGRAM OF HOME AUTOMATION SYSTEM USING ARDUINO AND

BLUETOOTH MODULE

CIRCUIT DIAGRAM

CIRCUIT DIAGRAM OF HOME AUTOMATION SYSTEM USING ARDUINO AND

BLUETOOTH MODULE

Chapter-4

APPLICATIONS

Home Is Where the Smart Is Evmachine-to-machine communication, and you understand you're not the most tech-savvy consumer, it's impossible that you've missed the abundance of home automation products filling the shelves and ads of every home improvement store. Suddenly an ordinary errand for light bulbs will leave you wondering if your lamp could send you a message alerting you that the light bulb needs to be replaced. Furthermore, if your lamp is talking to you, could your refrigerator and sprinkler system be too? Experts say: Yes, the possibilities are endless. If that's the case, where do you begin? Any day-to-day, repeatable process is automatable with smart home applications. The greater the control and flexibility of these processes, the more energy and cost savings the resident experiences, which are factors anyone who pays utilities strives to moderate. The smart home revolution is likely to be more of an evolution, with the incorporation of one or two home systems at a time, gradually automating our households through smart mobile devices. However, with these elements of efficiency comes the question of ease of use. Will it bring you enjoyment or exasperation? With so many brands and models already available in an evergrowing market, how do you know which is best for you? Lighting Control: Leaving the Dark Ages and Stepping Into the Light Smart lighting allows you to control wall switches, blinds, and lamps, but how intuitive is a lighting control system? It turns out, quite; its capabilities are extensive. You're able to schedule the times lights should turn on and off, decide which specific rooms should be illuminated at certain times, select the level of light which should be emitted, and choose how particular lights react through motion sensitivity, as seen with Belkin's WeMo Switch + Motion, which is both affordable and easy to use with its plug-and-play simplicity. HVAC Regulation: No Longer Burned by Your Heating Bill As fuel costs rise and the availability and sustainability of our resources becomes a greater concern, heating/cooling our homes efficiently is less a budgetary bonus and more of a necessity. Over the past year, smart thermostats and automated home heating systems have become more readily available and easily incorporate into any home. Heating and cooling our homes consumes an average of 50% of energy costs yearly, making daily HVAC regulation progressively rewarding. Maintaining a substantial lead among the nearly non-existent competition, the Nest Learning Thermostat, learns your heating and cooling preferences over time, eliminating the need for programming and is accessible from your smartphone app. With automated HVAC you are able to reduce the heat when a room is unoccupied, and increase or decrease it at specific times based on your schedule and occupancy.

Lawn Irrigation Systems: The Grass is Always Greener

A lush and healthy lawn is a source of pride for most homeowners, but the weather doesn't always cooperate and provide the adequate elements for a flourishing landscape. For decades we've relied on sprinkler systems to keep our yards at peak presentation, but at what cost? The average American home spends approximately 30% of their daily water usage on lawn and garden maintenance. Nearly half of that amount is wasted due to inefficiency. If you apply that statistic to the national average, up to 4.5 billion gallons of water is wasted per day through ineffective watering methods. If we reflect upon the monetary impact of this, it results in Americans spending over a thousand dollars a year in water, with a portion of that being waste. The global effects are even greater when you consider the growing concern over climate change and the dramatic decrease in agricultural natural resources. However, sprinkler control systems, like Skydrop, are providing water regulation through real-time communication with local weather data. If a

rainstorm develops and deposits two inches of rainwater on your lawn, the automated sprinkler detects the saturation and disables its scheduled watering. Conversely, the system will be alerted to dry conditions and supply the necessary amount of nourishment, without over-watering.

Smart Appliances: What's for Dinner?

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. While these appliance options seem a bit superficial and convenience based, there is a conservation factor as well. By automating your kitchen appliance and making them accessible from your smart device, you're able to sever the electricity supplied to unused appliances and reduce your energy consumption and costs. Considering the number of appliances the average household owns; this could save a substantial amount of money over time.

Security Systems: Knock, Knock…

Who's there? The Internet of Things. While efficiency and conservation are certainly IoT benefits, its potential to have improved control over home security is a primary focus. Smart locks, like Kwikset's Kevo, a Bluetooth enabled electronic deadbolt, and various connected home security systems, such as iSmartAlarm, offer a variety of features including door and window sensors, motion detectors, video cameras and recording mechanisms. All of which are connected to a mobile device and accessible via the cloud, thus enabling you to access real-time information on the security status of your home. Naturally, there is a great deal of scrutiny regarding the level of trust in controlling your home's security system via a mobile device, but it begs earnest exploration when weighing the potential benefits and peace of mind it provides homeowners.

Chapter-5

CONCLUSION

The system as the name indicates, 'Home automation' makes the system more flexible and provides attractive user interface compared to other home automation systems. In this system we integrate mobile devices into home automation systems. A novel architecture for a home automation system is proposed using the relatively new communication technologies. The system consists of mainly three components is a BLUETOOTH module, Arduino microcontroller and relay circuits. WIFI is used as the communication channel between android phone and the Arduino microcontroller. We hide the complexity of the notions involved in the home automation system by including them into a simple, but comprehensive set of related concepts. This simplification is needed to fit as much of the functionality on the limited space offered by a mobile device's display. This paper proposes a low cost, secure, ubiquitously accessible, auto-configurable, remotely controlled solution. The approach discussed in the paper is novel and has achieved the target to control home appliances remotely using the WiFi technology to connects system parts, satisfying user needs and requirements. WiFi technology capable solution has proved to be controlled remotely, provide home security and is costeffective as compared to the previously existing systems. Hence we can conclude that the required goals and objectives of home automation system have been achieved. The system design and architecture were discussed, and prototype presents the basic level of home appliance control and remote monitoring has been implemented. Finally, the proposed system is better from the scalability and flexibility point of view than the commercially available home automation systems.

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