CHAPTER - 1

INTRODUCTION

Consider setting up a security system that can alert you to things like smoking, excessive power use, attempted burglaries, and obtrusive movements within your house. How about turning something in your house turn on or off without even standing or going to that place by just pressing a button in your phone. Home automation is all about this, and there are countless uses for it. In reality, sophisticated home automation is already created to track of household item's inventory, log its usage with an Radio Frequency Identification, create a shopping list, and even make orders for replacements automatically.

A "smart home" is one that can identify you, recognise your preferences for lighting etc. is happening in a room to you from anywhere in the world via the internet. It is possible to combine heating, cooling etc. and other systems into one that can be managed from a single place. This gives you the ability to actively involve your house while managing your busy life. Nowadays, it's uncommon to get a house without some kind of automation. These systems might range from automated air conditioners that maintain a certain temperature to burglar alarms, high-tech security gates, and television remote controls.

1.1 AUTOMATION

Automation uses information technology and controlling of systems to run machinery and industrial tools & processes in smallest amount of intervention possible. In the context of industrialization, automation goes beyond mechanisation. Human sensory and mental needs are greatly reduced by automation, yet mechanisation gave human operators technologies so they can assist them according to the physical demands of their jobs.

Automated systems plays a bigger role in both daily life and the world economy. By combining automated technologies with organisational and mathematical skills, engineers build complicated systems for a variety of tasks. There are now many human responsibilities in industries that cannot be automated. Modern mechanical and computer systems are unable to recognise patterns, understand language, or produce language at human levels.Currently, human skill is required for jobs involving subjective evaluation. Beyond manufacturing, automation has made a significant difference in a variety of highly visible areas. Automated telephone switchboards and answering machines have largely taken the role of once-ubiquitous telephone operators. Automated systems can perform medical procedures like initial screening in radiography or the electrocardiograph, as well as laboratory examination of genes of human beings, plasmas in blood, cells, and tissues, much more quickly and accurately.

Automated teller machines have decreased the necessity of going to the bank to get cash and complete transactions. The transition of the global economy from rural services in the 20th century, and from services to industrial in the 19th was largely brought about by automation.

1.1.1 Office automation

It is the practise of producing, gathering, storing, modifying, and transmitting office information electronically in order to carry out essential services. Storage of Raw data, transmission in electronic systems, and administration of information in electronics business are its core duties.

1.1.2 Building automation

Operation offered by a building's control system is referred to as building automation. A computerised, intelligent network of electrical components known as a control system is used to monitor and manage a building's mechanical and lighting systems. A distributed control system is exemplified by a building automation system. Building automation system (BAS) core functions include maintaining a building's temperature within a predetermined range, providing lighting in accordance with an occupancy schedule, keeping track of device failures and system performance, and warning building engineering staff via email and/or text message. Compared to an uncontrolled building, the BAS functionality lowers building energy and maintenance expenses.

1.1.3 Power automation

Automated management and testing of power plants and substations etc. for fault identification, efficacy, and efficiency is referred to as power automation. It is possible to get a stable municipal or governmental electrical system, that commonly includes distant transformers and power sub-system components that are challenging to access. It enables the tracking of different power units, the transfer of data on their condition and overall health, and even the automatic diagnosis and upkeep of power units.

1.1.4 Home automation

Automation in home refers to a new trend in which features and appliances in private homes are more automated, often using technology that was either too expensive, impractical, or just not conceivable in previous decades. All the features that a building automation system offers, are also included in home automation. However, there is a distinction in that home automation places a greater emphasis on comforts through ergonomics and simplicity of use.
The ability to monitor and manage viruses and other things according to the comfort and demands of the user makes home automation popular in the modern world. The difficult thing is to make them more affordable to instal at home and to use in a variety of ways.

A growing number of services will be tracked and managed. The "VOICE ACTIVATED ARDUINO BLINDS" project is a proposal for home automation utilising an android phone and bluetooth, as depicted in figure 1.1., which has advantages for ease, power efficiency, and security.

Figure 1.1 - Home automation using an android phone. [1]

Different types of bracing, including GSM, WIFI, and Bluetooth, have been initialled as a result of the growth of wireless technology. Every connection has a specialised use and unique specification.
To send the commands we wish to deliver, we will use the bluetooth module in this project to link the system's hardware with the Android app.

The project is built on arduino nano and bluetooth module. On the transceiver end, the bluetooth connects to the android app and used to get the commands and these will be sent to the receiver end via bluetooth module which then transfers to the arduino and the motor driver to control the motion of the motors connected with the motor driver. The motion of the motors will further control the motion of the blinds.

1.2 PROJECT AIM

This projects' goal is to develop and build automation system which brings technology in contact of a non- living thing i.e. curtains. This system will help in automation of blinds so that they can turn on or off by the commands given by phone.

1.3 PROJECT OBJECTIVE

The goal of this paper is to develop a home automation system that can remotely turn any household item—in this example, curtains—on or off using a microphone. The bluetooth module and Arduino Nano are employed, and the orders were delivered via an Android app, resulting in low-cost and simple hardware.

Main objective is :

1. To remotely control some household things using an android phone.
2. To build a system that can do things itself on commands without human physical intervention in the task.

1.4 PROBLEM STATEMENT

Nowadays there are advancements in technologies coming up with each passing day. Many home automation projects comes to light where the household appliances can be controlled using any technology but why not bring this advancement in the non- living things too like the door, windows, curtains etc. so this project aims at bringing automation in curtains that can open or close by using an app so the person himself/ herself doesn't have to go out to open or close them.

1.5 PROJECT SCOPE

A system that creates wireless remote control for the curtains used at home is what is intended to be created. The programme offers capabilities like switch mode control and voice command control and is made to work on Android devices. The system, which is in charge of controlling

the electrical equipment, can be used in households, small workplaces, and shopping centres. the creation of a tech-friendly atmosphere. The method uses HAS while incorporating technology. We may employ commonplace technology for a different perspective by using it.

1.6 FEASIBILITY

The project uses low budget devices & softwares that makes it economical & technically feasible as well as practicable.

1.6.1 Economic Feasibility

This project's foundation is an Android phone built with basic electronic components such an Arduino, a Bluetooth module, a motor driver, etc. Which are economically feasible to adopt and have inexpensive buildings.

1.6.2 Technical feasibility

It is based upon embedded radio technologies that are relatively current with existing wireless technology. It is therefore highly valued by technology.

1.6.3 Operational feasibility

Anyone with even a little familiarity with an Android phone will find this programme to be incredibly user-friendly and simple to use. It could be advantageous for those with limited physical strength to operate household appliances with a single button.
Therefore, it can be implemented.

1.7 PROJECT MANAGEMENT

Any project's management may be divided quickly into several phases (fig 1.2). The following stages have been separated within our project:

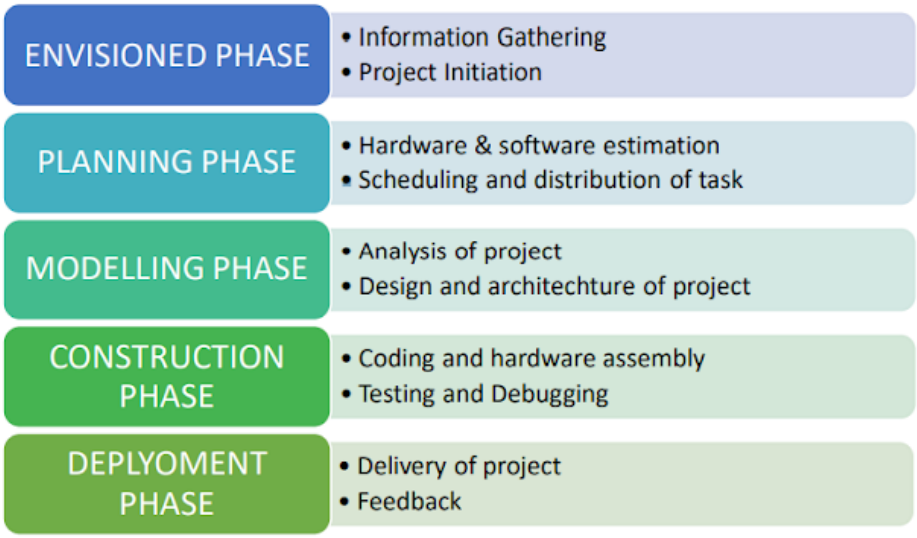


Figure 1.2 - Model of phases of project management [2]

CHAPTER - 2

LITERATURE REVIEW

2.1 HISTORY OF HOME AUTOMATION

Since there has been home automation Actually, a simple home automation system called the television remote control was created in 1893, long before World War 1. (1914). Its creation is the result of a number of unofficial research and suggestions made by computer enthusiasts who want a better way to swiftly and conveniently execute jobs at home. Simpler systems that can automatically control security lights have evolved into more sophisticated systems which can control doors and change any tv/radio channel.

2.2 AUTOMATION IN HOME

"Home automation systems" are electronic & electrical devices that enable the automation of domestic appliances in homes and other residential buildings. The most recent wave of automation has developed into a significant one, resulting in a flood of manufacturers of home automation systems and devices on the market today.
According to their control systems, the many types of home automation systems include:

1. Individual Control Systems - First of their kind to appear on the market; in these, each appliance has a different control only for it.

2. Distributed Control Systems - Emergency shut-down is these systems' primary characteristic. With this system, you may configure or modify the control settings for a number of related devices, such as the thermostat settings.

3. Central Control Systems - No matter if you are at home or not abroad, these computerized systems are designed to manage the operations of several utilities at

once. Anywhere on the globe, you can use a phone or the internet to access the control system.

Based on the carrier mode, there are many types of home automation systems:

1. Powerline carrier Systems
   Home automation systems that use powerline carriers, or existing wiring in the house, are the least expensive kind. These might be as simple as X10-based light timers or as complex as systems that need to be installed by a qualified specialist.

2. Wireless systems
   Wireless automation systems in home uses radio frequency technologies which frequently work on lights.

3. Hardwired systems
   The most dependable and pricey home control systems are those that are "hardwired" or "wired." These systems can function over specialised "bus" cables. Therefore, it is advisable to consider them while a house is being built. Hardwired systems are the best choice for bigger houses since they can complete many jobs simultaneously, swiftly, and with high reliability. Additionally, they can connect additional systems in the house, combining interior and exteriors into a single one which is simple and quick to use.

4. IP (Internet Protocol) control system
   An IP automation connects with cyberspace and assigns an IP address to each device it controls, and builds a local area network (LAN) inside the house. As a result, the house may be accessed remotely and controlled in real time while live video is streaming.

2.3 RELATED WORKS

With home automation, we may use a mobile device to access and control the appliances in our home. Although the term "home automation" can sometimes apply to solitary programmable devices like sprinkler systems and thermostats, it more accurately describes homes where nearly all of the electrical outlets, lights, appliances, and HVAC systems are linked to a remote

controlled network. From the perspective of home security, this comprises your alarm system as well as each door, window, lock, and smoke detector, as well as security cameras and other sensors that are connected to it. You can access and manage the appliances in your house using a mobile device with home automation from anywhere in the globe. Although the term "home automation" can sometimes apply to solitary programmable devices like sprinkler systems and thermostats, it more accurately describes homes where nearly all of the electrical outlets, lights, appliances, and HVAC systems are linked to a remote control network.From the perspective of home security, this comprises your alarm system as well as each door, window, lock, smoke detector, security camera, and other sensors that are connected to it.

2.3.1 HOME AUTOMATION DEVELOPMENTS

Only larger business buildings and affluent homes have automated central control of all systems until quite recently. Building automation, which frequently just consists of heating, cooling, and lighting systems, seldom provided more sophisticated management. "Smart" appliances and gadgets that can be wired or wirelessly connected to a local area network are the first and most evident benefactors of this method. Companies have, however, also considered the potential for IP-based inventory management.

2.3.2 AUTOMATION

To grasp the potential of home automation, we can think of countless practical and original ways to improve your life. Is the light coming in from that side too much? So Our motorised blinds should be plugged into a "smart" socket, and you should set it to close every day at noon. Do you have a dog walker who comes by every day at the same time? You may set up your home automation system so that when they arrive, the front door will be unlocked and locked once again.

2.3.3 REMOTE CONTROL

The second important aspect of contemporary home automation is remote monitoring and access. While certain forms of one-way remote monitoring have been available for some time, the development of smartphones and tablets has made it possible for us to really be connected

to home networks when we are outside. If you have the home automation, Internet-connected device may be used to see & mange the system(fig 2.1).

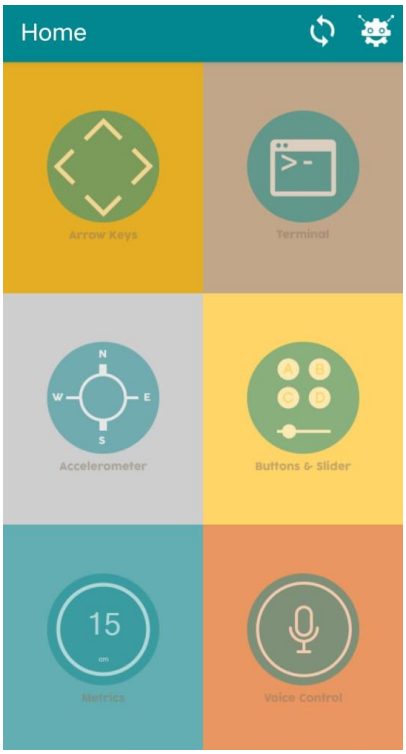


Figure 2.1 - Remote control app used for controlling [3]

2.4 HOME AUTOMATION IMPLEMENTATION PLATFORMS

Several systems, including Powerline, serial communication of RS232, Ethernet, Bluetooth, Infrared, and GSM, can be used to execute home automation. a single platform has its unique characteristic and field of use.

2.4.1 Powerline communication

A method known as powerline communication transmits data through a wire that is also used to transport electrical power. Even when electricity is delivered by medium-voltage lines, transferred on high-voltage lines, and at low voltages within buildings.

To power all powerline communication devices, a carrier signal is imprinted on the wire network. Different powerline communications require various frequency bands having capabilities of power cable being used. Main function of the power wiring system was to transmit alternating current (AC) electricity, higher frequency signals can only be partially carried by the power wire circuits when utilised normally. The propagation problem imposes restrictions on all powerline communication types.

2.4.2 RS232

The suggested standard number 232 is abbreviated as RS232. A portion of the RS232 standard is used by the serial ports on most computers. The 25-pin "D" connection called for by the entire RS232 standard only has 22 pins that are actually utilised. The majority of these pins are not required for typical PC connections, and in fact, the majority of PCs have male connectors with 9 pins.

The DTE is an end device that uses the male connection to transform user data into signals or reconvert incoming signals. The DTE is a data station's functional unit that performs the control of data communication and acts as a data source or sink. While the DCE is a device for controlling a communication link that employs the female connector and delivers the clock signal. While the DCE offers a conduit for communication, the DTE closes the line of communication. A direct pin-to-pin connection is used to link a DTE device to a DCE(fig 2.2). However, the transmit and receive lines need to be bridged in order to link two DCEs or DTEs.

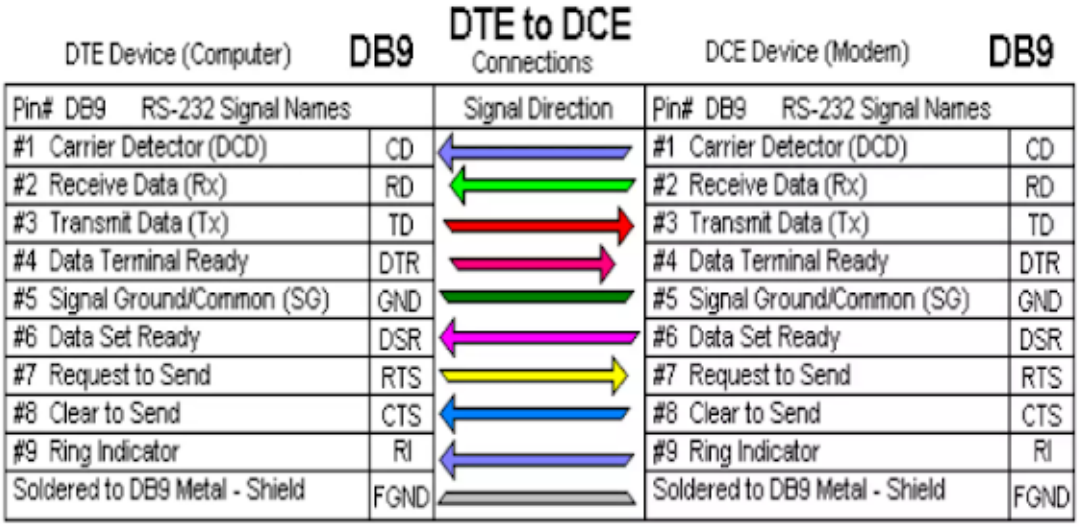


Figure 2.2 - Connection of RS232 DB9 DTE with RS232 DB9 DCE [4]

2.4.3 Ethernet

The physical connecting of two or more devices together is facilitated by the use of a variety of wire and signalling standards defined by Ethernet. Ethernet's foundational principle was that computers would communicate over a common coaxial wire that served as a broadcast transmission channel. While there are basic differences between the methods utilised and radio systems, certain commonalities may be seen between them.

From this simple, early concept, Ethernet evolved into the complex networking technology that currently underpins local networks. Coaxial cables were changed by lines that is used to connect from Ethernet hubs / switches. This reduces installation costs as well as increases reliability, to get point-to-point control and troubleshoot problems. StarLAN marked the beginning of Ethernet's transformation. Twisted-pair cable's debut considerably decreased installation costs as compared to competing technologies, such as the longer-standing Ethernet networks.

Ethernet stations communicate with one another over the physical link by transmitting and receiving discrete units of data called data packets. With the exception of early experimental versions, all generations of Ethernet have compatible frame formats, making them simple to connect. These frame formats also serve as the interface for higher layers. This is true despite

the fact that Ethernet has experienced substantial modifications, moving from those lines and upwards to a thick coaxial cable bus operating at 10 Mbit/s.

2.4.4 Bluetooth

With the help of the open wireless technology Bluetooth, personal area networks may be built between fixed - mobile equipments to exchange data over short distances (PANs). It was once intended to be a wireless replacement for RS232 data wires. It can synchronise issues when connecting many devices. It is a communications protocol and a standard. based on inexpensive transceiver microchips in each device, with small range (dependent of power: 1 metre, 10 metres and 100 metres). When two devices are within Bluetooth's range, they can interact with one another. The gadgets don't need to be in line of sight with one another because they communicate via radio (broadcast).

Mobile phones, landlines, laptops, PCs, printers etc. connects to a secure global network using Bluetooth to share data.
2.4 GHz ISM. The Bluetooth SIG is made up of businesses from the telecommunications, computer, networking, and consumer electronics sectors.

2.4.5 Infrared

IR is a kind of radiation that has a wavelength longer than visible light and it is shorter than microwave radiation. IR has wavelength range of around 750 nm to 100 m and it is used for communication in short-range between gadgets following the guidelines established. A plastic lens is used to focus the infrared radiation produced by infrared light-emitting diodes (LEDs) in remote controllers and IrDA devices into a tight beam. Inside infrared communications are useful in densely populated areas. The equipment in neighbouring rooms is not hampered by infrared radiation since it cannot go through walls. Infrared is mostly used technology for remote controlled systems.

2.4.6 GSM

The most widely used standard for mobile phone communication worldwide is GSM. Voice calls & short messages are essentially provided through GSM (SMS). Mobile phones connect to it as a cellular network by looking for nearby cells in an attempt to find a connection. Gaussian minimum-shift keying (GMSK), a kind of continuous-phase frequency shift keying, is the modulation used in GSM. Prior to being sent to a frequency modulator in GMSK, the signal that will be smoothed down with a Gaussian low-pass filter before being modulated into the carrier, considerably reducing interference to nearby channels (adjacent channel interference). Except for a few nations like the USA and Canada, where the 850 and 1900 MHz bands are utilised since the 900 and 1800 MHz bands were already in use, GSM networks run in the 900 MHz or 1800 MHz frequency bands in the majority of countries throughout the world allocated. Up to eight users can connect to each carrier using the time division multiplexed 200 Khz radio frequency channels used by the GSM technology.

2.4.7 Microcontroller

Affordable computer having single chip is a microcontroller. When a computer is single-chip, it indicates that the integrated circuit chip alone houses the whole computer system (Byte, 2002). The microcontroller on the silicon chip covered in silver has capabilities resembling those of a typical personal computer. It is incredibly adaptable and can simulate complex logic and electronic circuits thanks to its capacity for storing and running original programmes as well as its ability to carry out mathematical and logical operations.

2.4.7.1 Von-Neumann architecture

In single shared memory, this architecture stores data and programme instructions. One data bus serves as the source for both data and instructions.These additional tasks must be completed before it can retrieve and decode the next programming instruction. This design has the advantages of being straightforward and affordable. Various Von Neumann computers may have their CPU registers, including the programme counter, read from and written to by the software.

2.4.7.2 Harvard architecture

The implementation of this concept includes separate memory portions for programme instructions and data. For simultaneous access to data and instructions, internal data buses that support two or more are necessary. Due to the trade-off between quicker execution speeds and increasing device complexity. Almost all modern microcontrollers use Harvard architecture.

2.5 CHALLENGES

Inefficient dial-up connections, manual thermostats, and the time it takes to open a single email. Smart homes are now simpler to construct because to the accessibility of dependable internet connections, WiFi-connected devices, and smartphones that come preloaded with all the necessary apps to operate virtually any equipment. You may use this technology from anywhere in the globe to switch on or off your home's lights and close the garage door. All you have to do is launch an app on your smartphone and make a few button clicks.

Aside from their many advantages, smart houses also come with some drawbacks. You must have a very dependable internet connection for them to work well. They may be seated on the front yard for a considerable amount of time if, for instance, your WiFi is out and you need to let your kids in while you are at work but you need to open the door for them. Additionally, these systems may be quite pricey.

CHAPTER 3

METHODOLOGY

This chapter gives the overall methodology of this project.

3.1 PRELIMINARY CONSIDERATIONS

Prior to beginning the project's real design phase, detailed, considered decisions about the choice of suitable implementation platforms and hardware components were taken. In making these decisions, emphasis was placed on cheap cost, availability, dependability, adaptability, and simplicity.

3.1.1 Selection of implementation platform

A home automation system may be built on a variety of platforms, as was already mentioned in the previous chapter. Due to their low cost, wide availability, dependability, Its ease of use when used to a personal home automation on which our project is focused, RS232, GSM, and Microcontroller were found to be the most suitable. Here, we decide that Bluetooth is the best solution.

3.2 SYSTEM DESIGN

The hardware components needed for this project consists of mainly three components that are:

1. Bluetooth module- To transfer the commands from user to the system.
2. Arduino - This carries forward the commands from the user received via bluetooth to the motor driver.
3. Motor driver- This is used to give the motion to the motors which accordingly moves the blinds.

List of requirements :

- Arduino Nano
- L293D Dual H-Bridge Motor Driver
- Hc - 06 Bluetooth module
- DC Motor
- Resistors
- Battery and Connector
- Push buttons
- Breadboard
- Connecting wires

Fig. 3.1 - Components used in the project

Along with these, following things are also needed for setting up the circuit :

- 1. Cardboard
- Wires

- soldering iron piece
- Glue gun
- Cutter for box

3.3 DESCRIPTION

The components used in the circuit designing have their own usage and importance in the implementation of the project, however some can be replaced by some options according to availability and need.

3.3.1 ARDUINO NANO

The tiny, comprehensive, and breadboard-friendly Arduino Nano board is based on the ATmega328 (Arduino Nano 3.x).

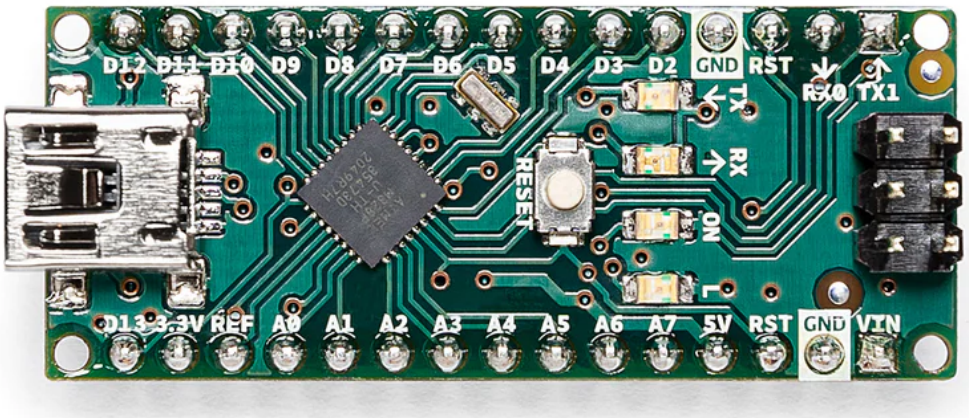


Fig. 3.2 - Arduino nano [5]

Nano has same connectors & characteristics as Uno board but has is more portable. Arduino Nano (as seen in fig. 3.2) is programmed with the help of Arduino IDE, this is accessible online as well as offline and can be shared by all Arduino boards. The Arduino Nano contains 30 male I/O headers that are organised in a DIP-30-like arrangement. A 9 V battery or a type-B mini-USB connector may power the board.

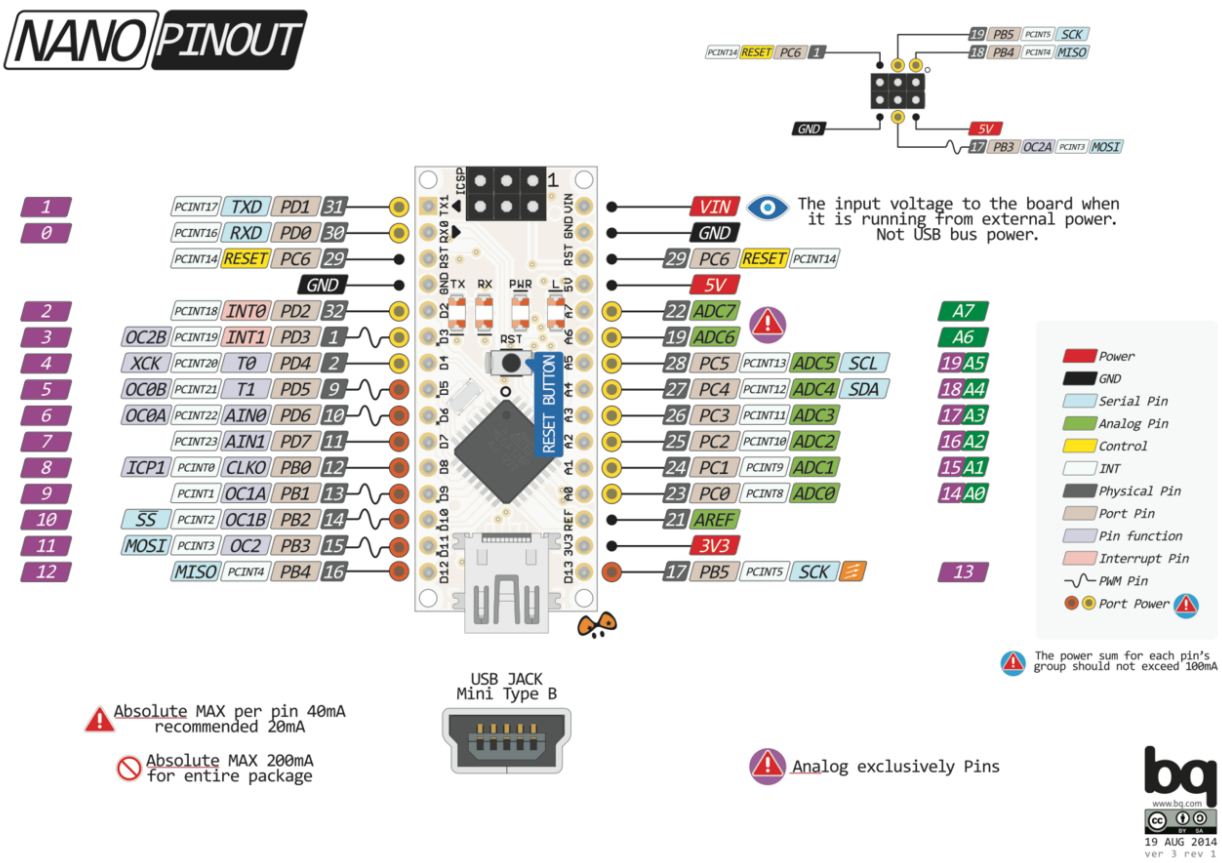


Fig. 3.3 - pin diagram of arduino nano [6]

History

The Arduino Nano became released in 2008. In 2019, Arduino released the Arduino Nano Every, a pin-equivalent version of the Nano. It has an ATmega4809 CPU that is more powerful and twice as much RAM.

Technical specifications

- Microcontroller: Microchip ATmega328P
- Operating voltage: 5 volts
- Input voltage: 5 to 20 volts
- Digital I/O pins: 14 (6 PWM outputs which are optional)
- Analog input pins: 8
- DC per I/O pin: 40 mA

- DC for 3.3 V pin: 50 mA
- Flash memory: 32 KB, out of which 2 KB is used by bootloader
- SRAM: 2 KB
- EEPROM: 1 KB
- Clock speed: 16 MHz
- Length: 45 mm
- Width: 18 mm
- Mass: 7 g
- USB: Mini-USB Type-B
- ICSP Header: Yes
- DC Power Jack: No
- Power consumption is 19 mA
- Size of the printed circuit board : 18 X 45mm
- Supports three communications : SPI, IIC, & UART

The Arduino Nano has several communication options that may be used to interact with a computer, another Arduino, or other microcontrollers. The ATmega328 supports UART TTL (5V) serial communication on digital pins 0 (RX) and 1. (TX).
In many aspects, it functions similarly to the Arduino UNO but is smaller in size. The main changes from the UNO are the no DC power connector, a Mini USB port is used rather than a USB B port

Automatic (software) reset:

The Arduino Nano is designed in a way that allows software running on a connected computer to reset it without actually needing to press the reset button before uploading. When this line is asserted (taken low), the reset line drops for a sufficient amount of time to reset the chip.

There are further implications of this arrangement. The Nano resets each time a connection is established to it by software when it is connected to a computer running Mac OS X or Linux (via USB). For the next half a second or so, the Nano's bootloader is running. Although it is set up to

ignore incorrect data, so few bytes of data gets delivered to the board and after that a link is established will be intercepted.

ARDUINO NANO PIN DIAGRAM:

Power Pin (Vin, 3.3V, 5V, GND): The power pins in arduino nano are:

Vin - When an external power source is utilised, the board's input voltage, which ranges from 7V to 12V, is utilised.
The 5V regulated power supply voltage used by the nano board is used to power both the board and its constituent parts.
The board's voltage regulator outputs a minimum of 3.3V.
The board's ground pin is labelled GND.

RST Pin(Reset): The microcontroller may be reset using this pin.

Analog Pins (A0-A7): To determine the analog voltage of board, which ranges from 0V to 5V.

Digital pins D0 through D13 are known as I/O pins and are utilised as i/p or o/p pins. 0V & 5V

TTL serial data is sent and received via the serial pins (Tx, Rx).

These pins are used to activate external interrupts (2 and 3).

PWM (3, 5, 6, 9, and 11): These ports are used to output PWM data in an 8-bit format.

SPI: These pins (10, 11, 12, & 13) are utilised to facilitate SPI communication.

Built-in LED (13): The LED is turned on using this pin.

These pins, designated IIC (A4, A5), are utilised to support TWI communication.

AREF: This pin gives the reference voltage to the input voltage.

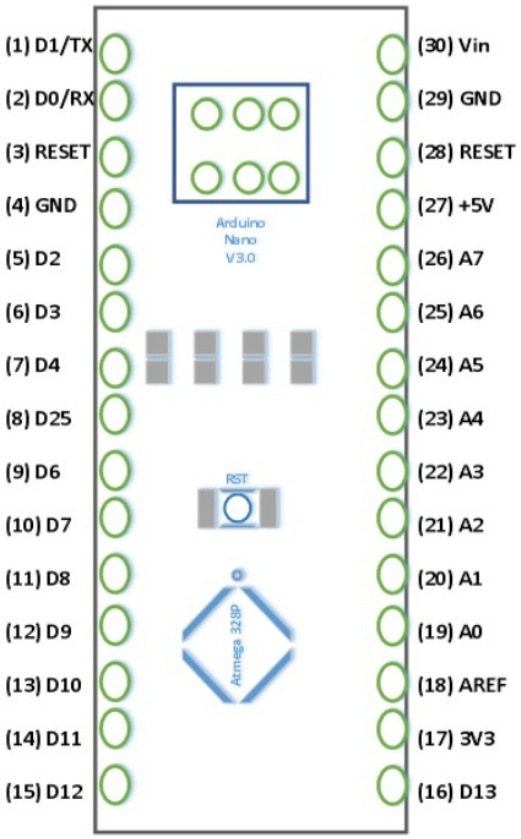


Fig 3.4 - arduino nano pins [7]

Arduino NANO vs Arduino UNO:

Arduino Nano has a microcontroller called Atmega328p found in the Arduino UNO board. They are able to utilise the identical application as a consequence. The main point is size, due to the Uno is larger than nano board size. Therefore, Uno boards occupy more system space. Nano requires a small USB connection for programming, whereas UNO utilises a USB cable. The following table lists the primary distinctions between these two.

Specifications	Arduino Uno	Arduino Nano
Processor	ATmega328P	ATmega328P
Input Voltage	5V / 7-12V	5V / 7-12V
Speed of CPU	16 MHz	16 MHz
Analog I/O	6 / 0	8 / 0
Digital IO/PWM	14 / 6	14 / 6
EEPROM / SRAM [kB]	1 / 2	1 / 2
Flash	32	32
USB	Regular	Mini
USART	1	1

Arduino Nano Communication:

To connect with an Arduino Nano board, among other sources, you can utilise an additional Arduino board, a computer, or microcontrollers. Serial communication is supported by the ATmega328 microprocessor on the Nano board (UART TTL). This may be accessed at digital pins like TX and RX. The Arduino software includes a serial monitor to make it simple to send and receive text from the gadget.

The leds of TX & RX of Nano board start to blink each time data go to the computer through the FTDI or USBB interface.

Arduino Nano Programming:

Fresh code may be uploaded without a third-party hardware programmer with the use of this boot loader. You may talk to this using the STK500 protocol. Here, the boot loader may also be ignored, and the in-circuit serial programming (ICSP) header and an Arduino ISP can be used to run the microcontroller software.

Applications of Arduino Nano

A few of the uses for these boards are given below. These boards creates projects by receiving input from sensors, buttons, or users' fingers and then turning on a motor or an LED.

Examples of electronic systems & products:

- Automation
- Some DIY projects
- Control Systems
- Embedded Systems
- Robotics
- Instrumentation

ARDUINO SOFTWARE PART:

ARDUINO IDE:

For the support of the languages C and C++, the Arduino IDE offers particular standards for code organisation. Arduino IDE converts the executable code into a hexadecimal-encoded text file, which is subsequently loaded into the Arduino board by a loader programme in the firmware.

SKETCH: A sketch is a programme created using the Arduino IDE. Pre-1.0 versions of the Arduino Software (IDE) saved sketches under the extension.pde. On the development machine, sketches are stored as text files with the.ino extension.

Two functions are all that a simple Arduino C/C++ application needs to do:

1. setup()
2. loop()

3.3.2 HC-06 BLUETOOTH MODULE

To facilitate wireless data transfer over short distances between two microcontrollers or systems, the HC-06 Bluetooth module (fig. 3.5) was developed.

The HC-06 is a Bluetooth class 2 slave module enabling transparent wireless serial connection. Once it has been connected to a master Bluetooth device, such as a computer, smartphone, or tablet, the user may immediately understand how it functions. Every bit of data received is rapidly sent via the serial input.

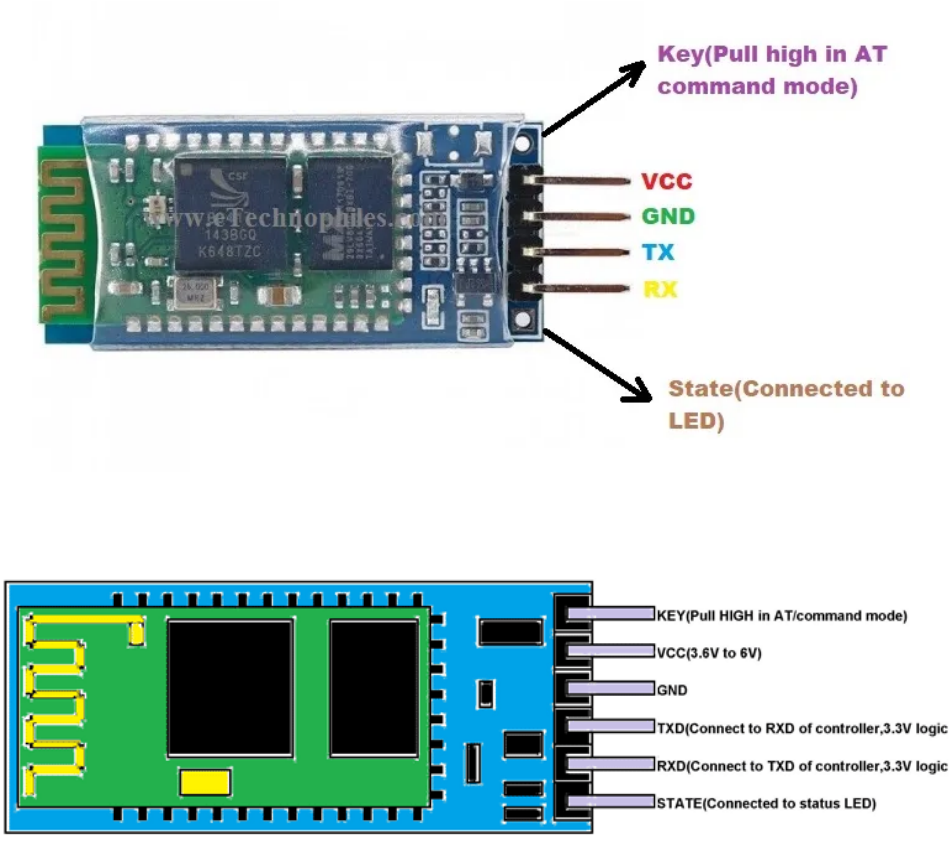


Fig 3.5 - bluetooth module [8]

Pin configuration:

1. Key - The module's ability to operate in AT command mode or standard mode depends on the pin condition. [High] is the AT command reception mode (command response mode), while [Low] or [NC] is the Bluetooth module's default operating mode.
2. Vcc - This pin requires a +5V positive supply to power the module.
3. Gnd- Connect to ground
4. TXD- Through this pin, the module transmits serial data (by default at 9600 bps), 3.3 volts of logic.
5. RXD- Through this pin, the module receives serial data (by default at 9600 bps), and 3.3 volts of logic.
6. State- The pin is joined to the board's LED so that it may show the status of the module.

HC-06 Features and Electrical characteristics

- Bluetooth protocol: Specification for Bluetooth V2.0
- Class 2 (+6 dBm) power level
- ISM Band, 2.40GHz–2.48GHz
- -85dBm Receiver Sensitivity
- USB v1.1/2.0 protocol Modulation mode: the Gauss frequency Shift Keying
- Feature of safety: encryption and identification
- operating voltage: 3.3 to 6 volts
- -20°C to +55°C is the operating temperature range.
- 40 mA operating current

HC-06 Bluetooth Module Advantages

- When wireless communication over short distances is required, the HC-06 is the ideal choice. Less than 100 metre wireless communications are possible with the module.
- The interface and communication with the module are quite simple.
- The module is one of the market's most cost-effective solutions for wireless communication.
- The module may be utilised with mobile systems that run on batteries and requires very little electricity to operate.

- The module utilises a UART interface, it may be connected to nearly any controller or processor.

3.3.3 L293d motor driver

Based on the L293 IC, the L293D shield is a driver board that can simultaneously operate two stepper or servo motors and four DC motors. This module's maximum current per channel is 1.2A, and it is inoperable at voltages of more than 25 volts or less than 4.5 volts.

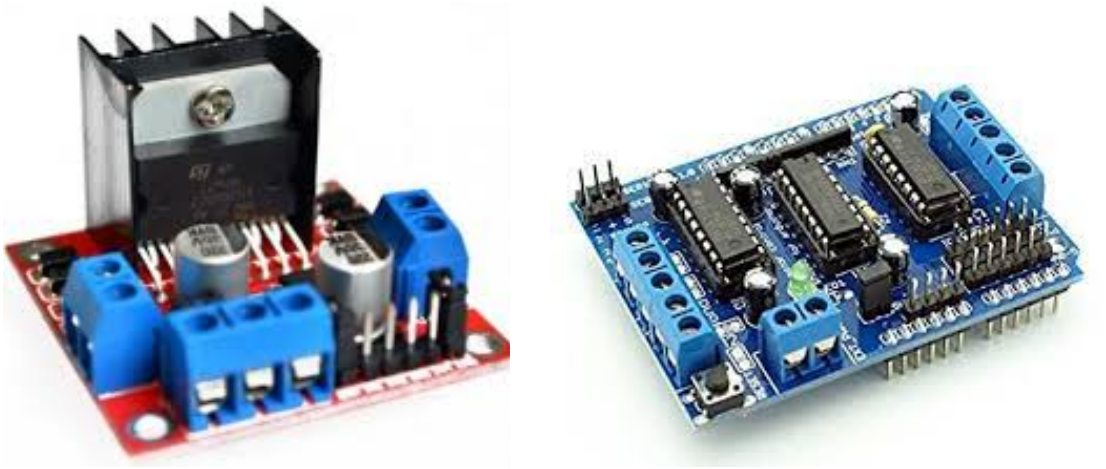
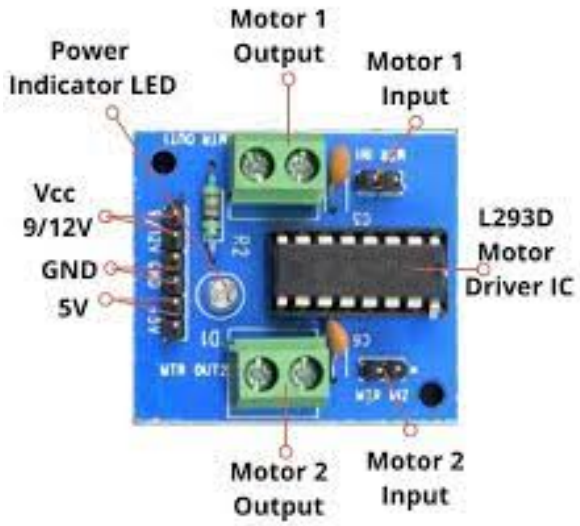


Fig 3.6 - L293d motor driver [9]



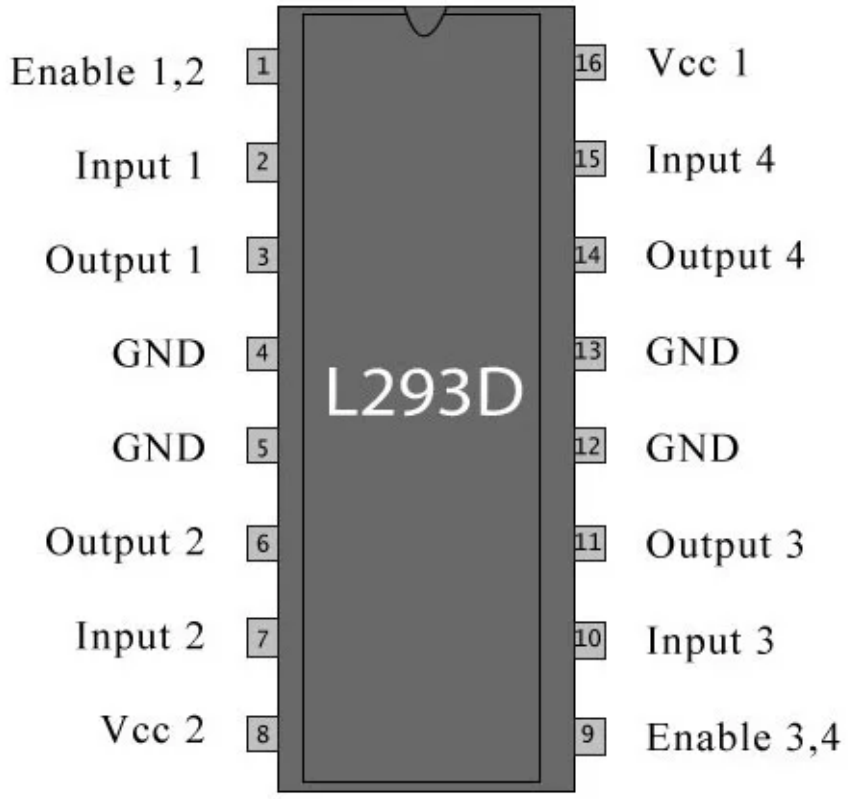


Fig 3.7 - L293D motor driver pin diagram [10]

8 pins are located on either side on L293D's 16 pin IC. Two inputs and 2 outputs, and single enable pin make up the total of four pins on each motor.

Pin Characteristics

1 - Enable 1-2, if this is HIGH, the left portion of the IC will operate, and if it is LOW, the left part will not operate.

2 - INPUT 1, when this pin is HIGH the current will flow though output 1

3 - OUTPUT 1, this pin should be connected to one of the terminal of motor

4,5 - Ground pins, or GND.

6 - OUTPUT 2, which has to be linked to a motor terminal.

7 - INPUT 2, when this pin is HIGH the current will flow though output 2

8 - VCC2, this is the voltage which will be supplied to the motor.

16 - VCC1, this is the power source to the IC. So, this pin should be supplied with 5 V

15 - INPUT 4, when this pin is HIGH the current will flow though output 4

14 - OUTPUT 4, this pin should be connected to one of the terminal of motor

13,12 - GND, ground pins

11 - OUTPUT 3, this pin should be connected to one of the terminal of motor

10 - INPUT 3, the electricity will flow via the output when this pin is HIGH.

9 - Enable 3-4, when this is HIGH the right part of the IC will work and when it is low the right part won't work.

3.4 CIRCUIT DIAGRAM

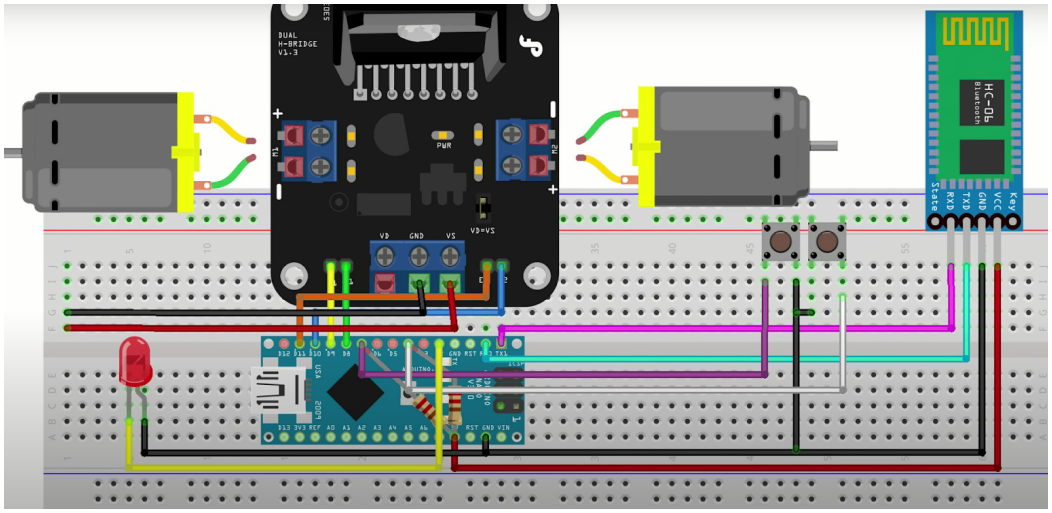


Fig 3.8 - circuit diagram

3.5 STEPS TO CONNECT THE CIRCUIT:

Step 1: Let's begin by attaching the Arduino to the motor controller:

M1 is linked to the motor controller's pin 8.

E1 is linked to the motor controller's pin 9.

M2 is linked to the motor controller's pin 10.

E2 is linked to the motor controller's pin 11.

Step 2: Now join the Arduino and Bluetooth module:

The VCC is connected to the 5 Volt Pin of the Bluetooth module. The Ground Pin on the Bluetooth module is connected to Ground.

Step 3: Upload the code and then connect
The Arduino's Tx links to the Bluetooth module's Rx, and vice versa.

Step 4: Connect the push buttons
A resistor should be connected from Arduino Pin 7 to 5 volts. A resistor should be connected from Arduino Pin 4 to 5 Volts. Connect the button's legs by attaching one to Pin 7 and the other to ground. The following button's legs should be connected to ground and Pin 4 respectively.

Step 5: In order to demonstrate that the component is powered, we will now connect an LED to pin 4: Ground connects to the anode, whereas Pin 4 connects to the cathode (long LED leg) (Short leg of LED)

Step 6:Finally, we will screw the motors into the screw terminal to link them to the motor controller. To give These motors will require at least a 9 Volt 1 Amp wall socket power source to be able to turn the relatively stiff blind mechanism. Once you've located a power source, we'll want to connect it to the Motor Controller and our Arduino.

This is how it attaches to the Arduino:
Positive (+) should be connected to the Arduino's VIN Pin.
The Ground Pin of the Arduino is connected to Ground (-).

The following is how it attaches to the motor controller:
On the motor controller, positive (+) is connected to VS.
The motor controller's GND and Ground (-) connections

The motor controller may now be connected and tested; if everything works as expected, proceed on to the next stage.

Fig 3.9 - motors attached to blinds

We will need to break the hook off the stick (as shown in fig 3.9) and to secure the motors to our blinds, utilize the hook that is generally used to raise the blinds. Then, we'll use adhesive to attach that to the motor shaft and wire it up to the system for operating the blinds.
We will need to attach the motor to the wall because we can no longer leave it hanging there.

CHAPTER 4

WORKING AND IMPLEMENTATION

4.1 BLOCK DIAGRAM OF TRANSMITTER SIDE

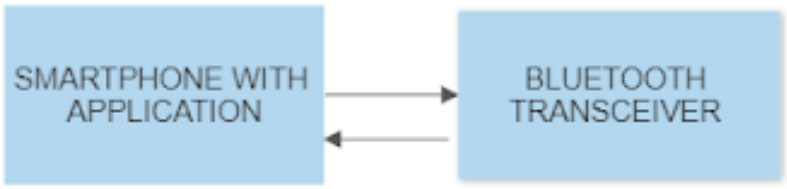


Fig 4.1 - transmitter side block diagram

On the transmitter side, voice commands are given by the user via the microphone of the smartphone. This app connects the android bluetooth with the bluetooth module HC05 of the circuit.

4.2 BLOCK DIAGRAM OF RECEIVER SIDE

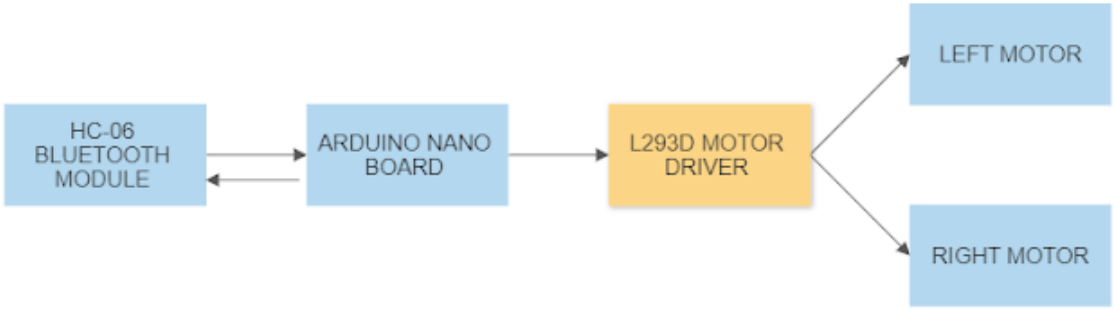


Fig 4.2- Receiver side block diagram

On the receiver's side, the voice commands are received to the hc-06 bluetooth module and then those are transferred to the arduino nano board. Arduino will test the commands and respond to the command as per the code instructions accordingly. Arduino sends the signal then

to the L293D motor driver which then brings motion to the desired motor or motors. This helps in the overall motion of blinds.

4.3 WORKING STEPS

- The phone processes voice commands, and the app uses Google's speech recognition technology to convert spoken words into text.
- Then, text is Bluetooth-sent to the receiving end.
- The Arduino board receives text through Bluetooth and transmits it via the UART serial communication mechanism.
- The received text is verified using Arduino code.
- The blinds' motions are managed by Arduino whenever the text contains a matched string.

4.3.1 APP USED

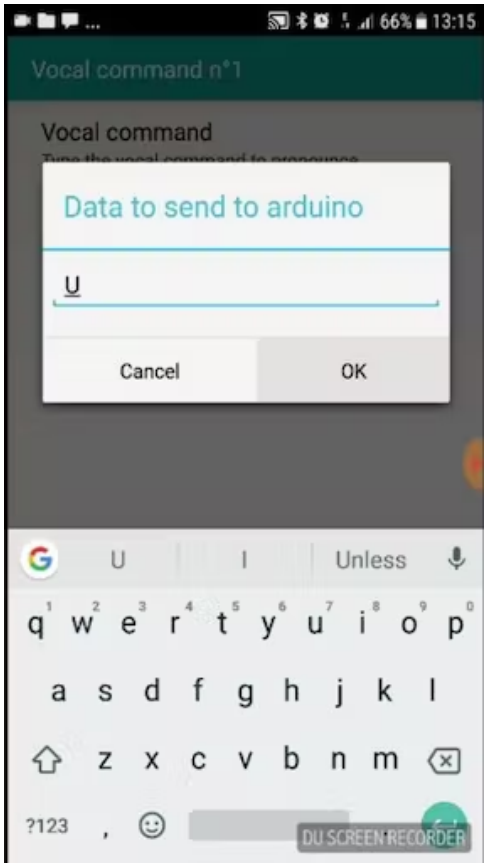


Fig 4.3- "Arduino Bluetooth Control" by Broxcode

The android app we will use is "Arduino Bluetooth Control" by Broxcode, and the reason we decided to use it is because it includes both a terminal function and a feature that lets us instruct the Arduino to do anything when a specific phrase is stated.

To configure it, we will first link our Bluetooth device with our smartphone and then transmit the commands U and D, which should cause the motors to rotate in a clockwise and anticlockwise direction, respectively.

4.3.2 Commands given to the app :

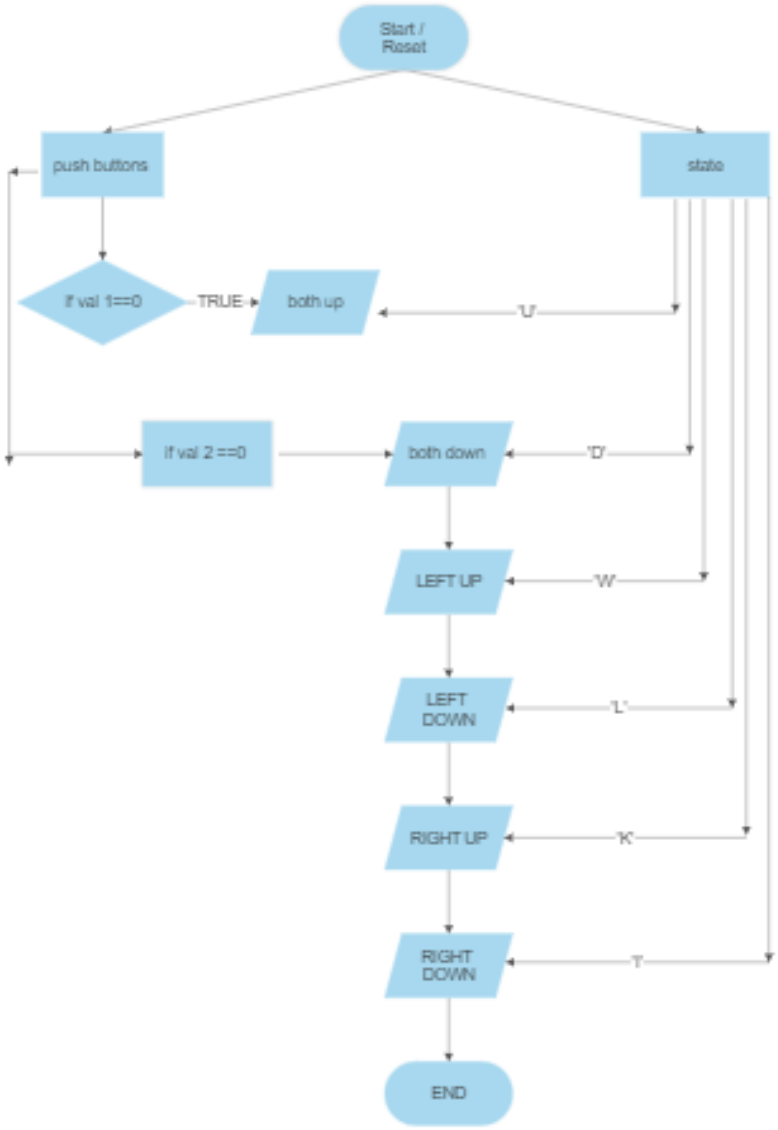
- Pushing the top button or saying "Let there be light in the app" will open both blinds. Pushing the bottom button or telling the app to turn off the light will close both blinds.
- If we just want one of the two blinds open at a time, we may send the command "K" to open the left blind in the app's terminal portion.
- Likewise, "W" opens the right blind, "L" closes it, and "I" closes the left blind.

4.3.3 USE OF PUSH BUTTONS

Fig 4.4- push buttons[11]

One of the issues that bluetooth based projects faces is that the phone battery dies so we will not be able to use the device after that.
To solve this issue, push buttons (fig. 4.4) are installed so that we can open the blinds by pressing these buttons.In order to control the motion of the blinds, two push buttons are used, one for the forward motion of motors and the other for the reverse motion.

4.4 FLOWCHART FOR ARDUINO WORKING



4.5 ARDUINO WORKING ALGORITHM

Step 1: ON arduino reset

Step 2: Loop starts

Step 3: Push button 1 and push button 2 values are read and stored as val 1 and val 2.

Step 4: If serial data is available through bluetooth, set state= serial.read()

Step 5: If state = ‘U’ or val= LOW , turn both motors anticlockwise.

Or

If state = ‘D’ or val=LOW, turn both motors clockwise.

Or

If state=’W’, turn right motor clockwise.

Or

If state = ‘L’, turn right motor anticlockwise.

Or

If state = ‘K’, turn left motor anticlockwise.

Or

If state=’I’, turn left motor clockwise.

Step 6: Set state=0

Step 7: loop ends

4.6 ARDUINO IDE CODE

```
int brightness = 0;
int fadeAmount = 5;
int led = 3;
int inPin = 4;
int inPin2 = 7;
int val2 = 0;
int val = 0;
//const int ena = A0;
//const int enb = A1;
const int motorPin1  = 11;
const int motorPin2  = 10;
const int motorPin3  = 9;
const int motorPin4  = 8;
int state; int flag=0;
void setup()
{
 pinMode(motorPin1, OUTPUT);
  pinMode(motorPin2, OUTPUT);
    pinMode(motorPin3, OUTPUT);
    pinMode(motorPin4, OUTPUT);
//    pinMode(ena, OUTPUT);
```

```
//    pinMode(enb, OUTPUT);
  pinMode(inPin, INPUT);
    pinMode(inPin2, INPUT);
   pinMode(led, OUTPUT);
Serial.begin(9600);
delay(1000);
 }

void loop(){

//  analogWrite(led, brightness);
//   brightness = brightness + fadeAmount;
//
//   if (brightness <= 0 || brightness >= 255) {
//    fadeAmount = -fadeAmount;
//  }
//  delay(30);

val = digitalRead(inPin);
val2 = digitalRead(inPin2);

//analogWrite(ena, 500);
//analogWrite(enb, 500);

if(Serial.available() > 0)

{

state = Serial.read();


flag=0;

}

if(state == 'U' || val == LOW)
```

```
flag=0;

}

if(state == 'U' || val == LOW)

{

digitalWrite(motorPin1, HIGH);
digitalWrite(motorPin2, 0);
digitalWrite(motorPin3, HIGH);
digitalWrite(motorPin4, 0);
delay(2000);
digitalWrite(motorPin1, 0);
digitalWrite(motorPin2, 0);
digitalWrite(motorPin3, 0);
digitalWrite(motorPin4, 0);
Serial.println("Both Up");
state = 0;
}

if(state == 'D' || val2 == LOW)
{

digitalWrite(motorPin1, 0);
digitalWrite(motorPin2, HIGH);
digitalWrite(motorPin3, 0);
digitalWrite(motorPin4, HIGH);


  delay(2000);
  digitalWrite(motorPin1, 0);
  digitalWrite(motorPin2, 0);
  digitalWrite(motorPin3, 0);
  digitalWrite(motorPin4, 0);

  Serial.println("Both Down");
```

```
state = 0;
}
if (state == 'W')

{

digitalWrite(motorPin3, 0);
digitalWrite(motorPin4, HIGH);
delay(4000);
digitalWrite(motorPin3, 0);
digitalWrite(motorPin4, 0);
Serial.println("Right Up");
state = 0;
}

else if (state == 'L')
{

digitalWrite(motorPin3, HIGH);
digitalWrite(motorPin4, 0);
delay(4000);
digitalWrite(motorPin3, 0);
digitalWrite(motorPin4, 0);

Serial.println("Right Down");
state = 0;
}
if (state == 'K')



{
```

```
digitalWrite(motorPin1, HIGH);
digitalWrite(motorPin2, 0);
delay(4000);
digitalWrite(motorPin1, 0);
digitalWrite(motorPin2, 0);
Serial.println("Left Up");
state = 0;
}

else if (state == 'l')
{

digitalWrite(motorPin1, 0);
digitalWrite(motorPin2, HIGH);
delay(4000);
digitalWrite(motorPin1, 0);
digitalWrite(motorPin2, 0);

Serial.println("Left Down");
state = 0;
}
}
```

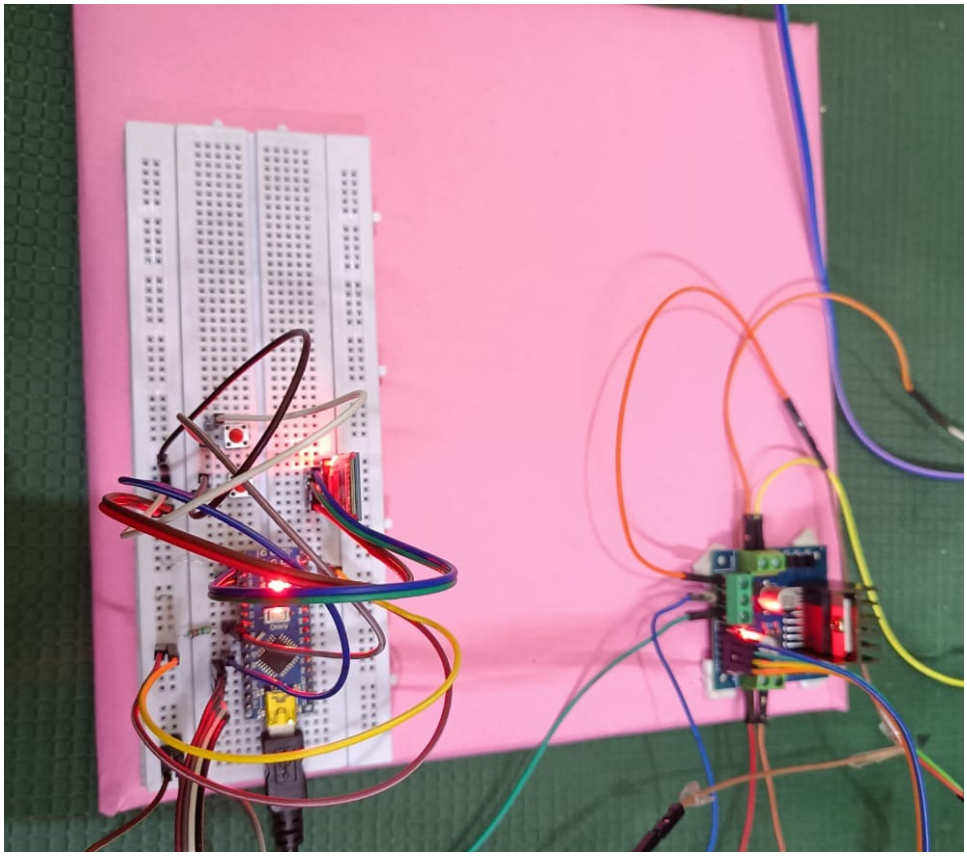


Fig 4.5 circuit

CHAPTER 5

CONCLUSION

5.1 DISCUSSION

The ultimate product of this project is an automation system in home that uses commands from an android application to control the motion of the blinds. The user's app for operating the blinds is on the front end, and the Arduino board, which has been programmed to control the action of the motors, is on the back end. We utilised two motors—one for each blind—because we wanted to use this gadget to control two blinds. The bluetooth device will spin both motors to the open position when the command "U" is delivered, and it will spin both motors to the closing position when the signal "D" is sent.

One problem with bluetooth-based projects is that users won't be able to utilise them if their phone dies before they go home. As a result, in this project, we included push buttons that, when activated, allow us to open the blinds.

5.2 CONCLUSION

The idea of creating a home automation system to offer autonomous motion in the window coverings has therefore finally been realised. One of the main advantages of these blinds is that they can be opened and closed using an app. We can open one door at a time with the use of this project's voice control and independent motor control features. The results of this research demonstrate that a home automation system for individual control can be built at a reasonable price using affordable local components, and can be used to run a variety of household appliances and goods, from the AC and fan switches to the door lock and window blinds. Even better, because there are so few and little parts required, they can all fit neatly into a little container. This system is flexible and scalable as a result.

CHAPTER 6

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