Contents

Chapter *1*

Project Report

1.1 Abstract

We are presently in the twenty-first century. A Bluetooth phone is now a need in our day-to-day lives. Bluetooth devices that run Android applications get more substantial and come with more robot-friendly accessories every time. This project explains Bluetooth communication, some Bluetooth technology features, the parts of the mobile and the robot, and how to control a robot using a mobile device. We present a review of mobile phone-controlled robots by navigating the robot forward, backward, left, and right using an Android application that uses Arduino and Bluetooth. Bluetooth has transformed conventional wired digital devices into wireless ones, changing how people use digital devices at home or work. Here, we're using an Android application, a microcontroller interface, and Bluetooth communication. The Bluetooth module is connected to the microcontroller using Arduino software. The robot's movement can be managed using commands from android.
We deduced straightforward solutions to develop a framework for manufacturing robots with low prices but substantial processing and sensing capabilities made possible by the Bluetooth phone employed as a control device. I used Arduino to build a system for this project. In this project, we use Bluetooth wireless technology, a very straightforward communication system, to control our robot car. The remote is an Android device with built-in Bluetooth functionality in this project. In addition to turning on Bluetooth in the phone, the user must install an application.

1.2 Introduction

An open-source electronics platform called Arduino is built on simple hardware and software. A motor can be started, an LED can be turned on, and something can be published online using an Arduino board to read inputs like light on a sensor, a finger on a button, or a tweet. Sending instructions to the board's microcontroller will instruct your board on what to do. You do this using the Arduino Software (IDE), which is based on Processing, and the Wiring-based Arduino Programming Language.

Figure 1.1 Application

At the Ivrea Interaction Design Institute, Arduino was created as a simple tool for quick prototyping geared toward students with no prior experience in electronics or programming. The Arduino board started evolving as soon as it gained a larger audience, differentiating its offering from basic 8-bit boards to items for Internet of Things (IoT) applications, wearable technology, 3D printing, and embedded environments. All Arduino boards are fully open-source, enabling users to construct them independently and eventually customize them to suit their unique needs. The software is also open-source, and users from all over the world are contributing to its growth.
This represents an android application-based Bluetooth-controlled robotic car. Here the main motto of our project is to control the vehicle with an android application. Here we use mainly Arduino UNO (ATMEGA 328P) and Bluetooth module (HC-05).

1.3 Components Used

1.3.1 Arduino UNO

A microcontroller board called Arduino Uno is based on the ATmega328P. (datasheet). It has a 16 MHz ceramic resonator (CSTCE16M0V53-R0), six analog inputs, 14 digital input/output pins (of which six can be used as PWM outputs), a USB port, a power jack, an ICSP header, and a reset button.

It comes with everything needed to support the microcontroller; just plug in a USB cable, an AC-to-DC adapter, or a battery to get started.

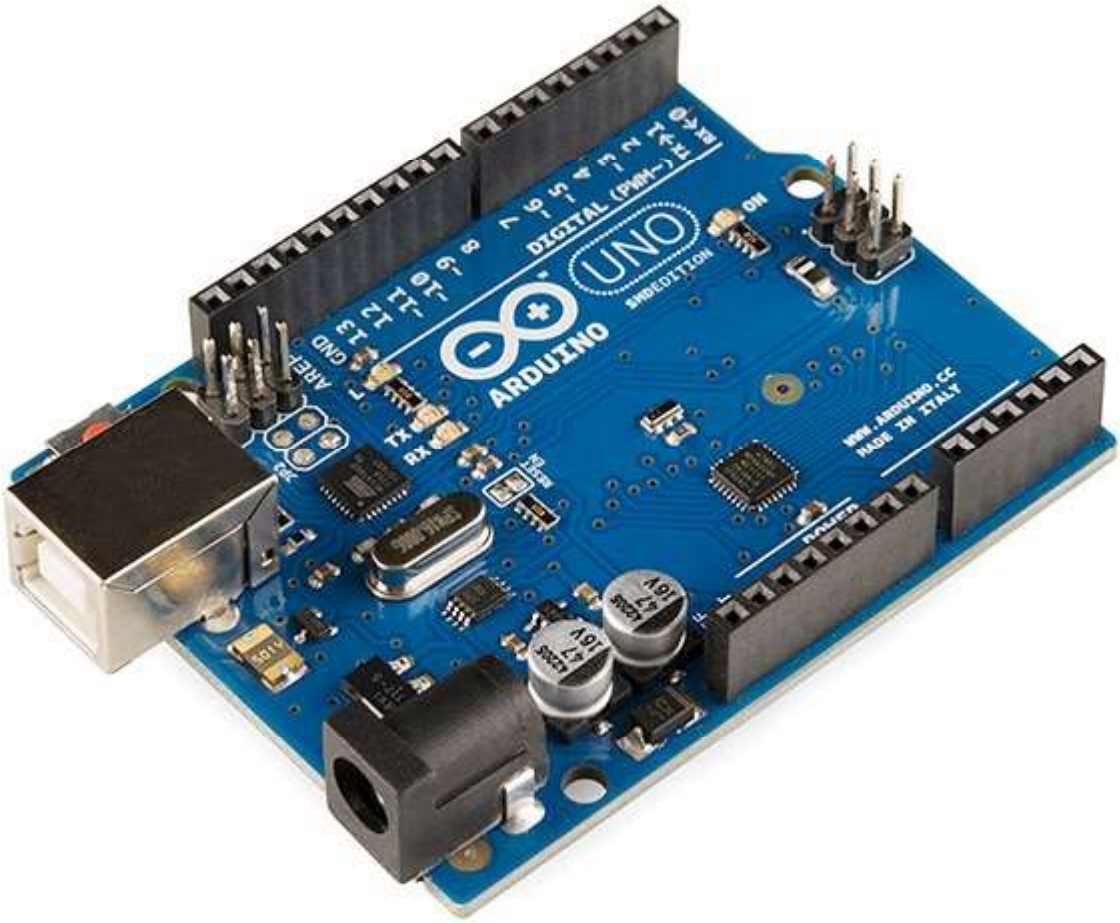

Figure 1.2 Arduino UNO

1.3.2 L298 Motor Driver

The dual H-Bridge motor driver L298N enables simultaneous speed and direction control of two DC motors. The module can run DC motors with peak currents up to 2A and voltages between 5 and 35V.

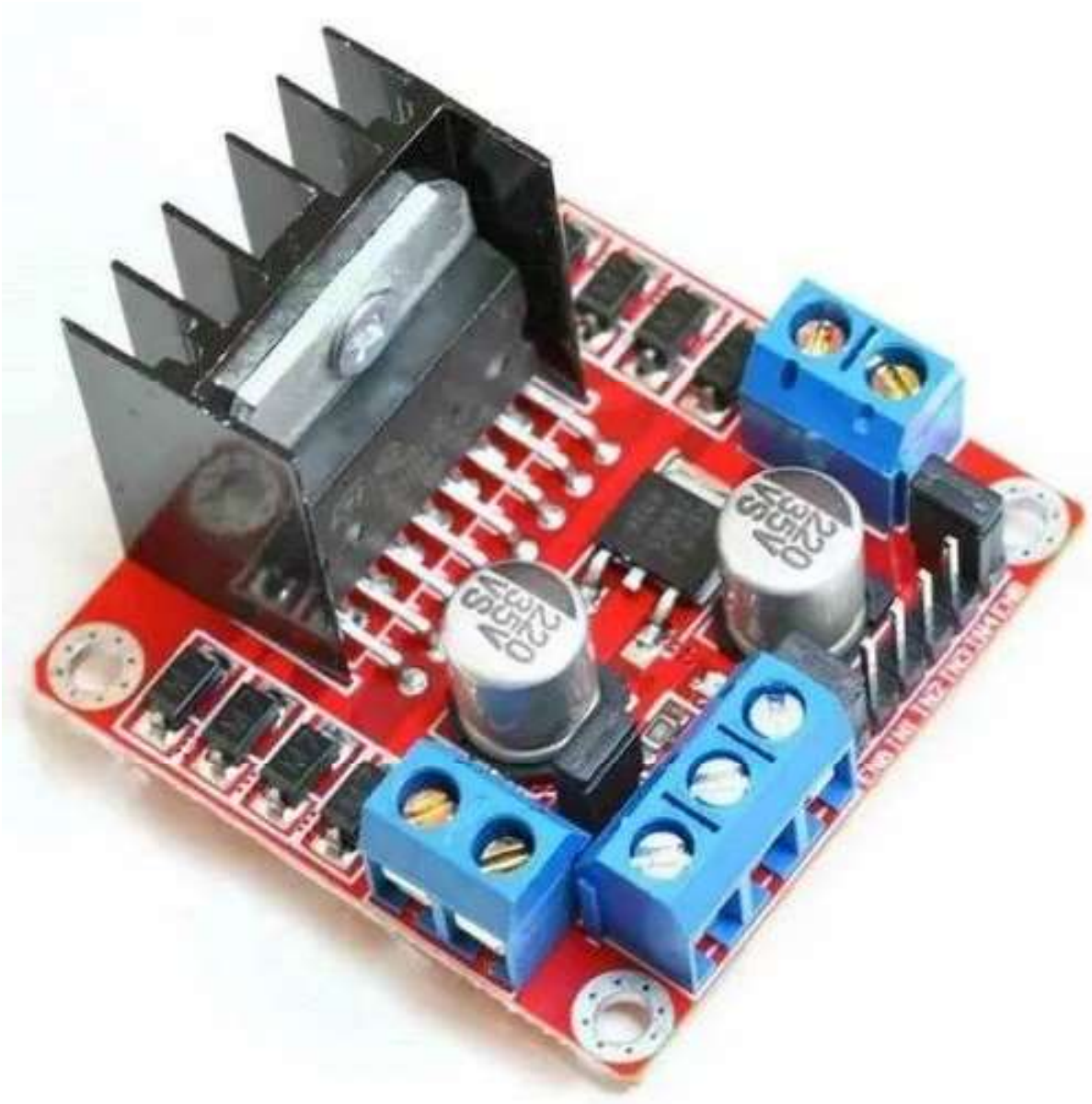

Figure 1.3 L298 Motor Driver

µC Output	L293D input	Forward	Reverse	Left	Right	Axis1	Axis2
12	2	LOW	HIGH	LOW	LOW	HIGH	LOW
11	7	HIGH	LOW	LOW	HIGH	LOW	HIGH
9	15	LOW	HIGH	LOW	LOW	LOW	HIGH
10	10	HIGH	LOW	HIGH	LOW	HIGH	LOW

Figure 1.4

1.3.3 HC-05 Bluetooth Module

A replacement for cable connections, the electronics are communicated with by HC-05 using serial communication. Short-range wireless links are typically used to exchange files between small devices like mobile phones. It operates in the 2.45GHz range.

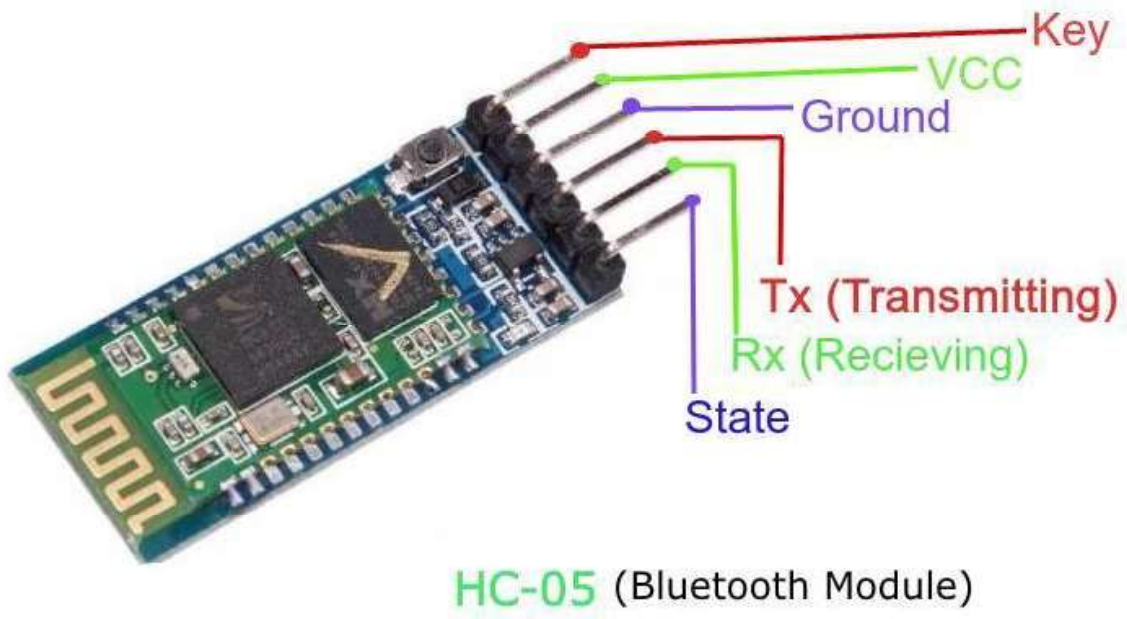

Figure 1.5 HC-05 Bluetooth Module

1.4 Working Principle

The block diagram below makes it simple to understand how our remote-controlled car functions. The four main blocks here are the Bluetooth block, microcontroller block, motor driver block, and overall system block.

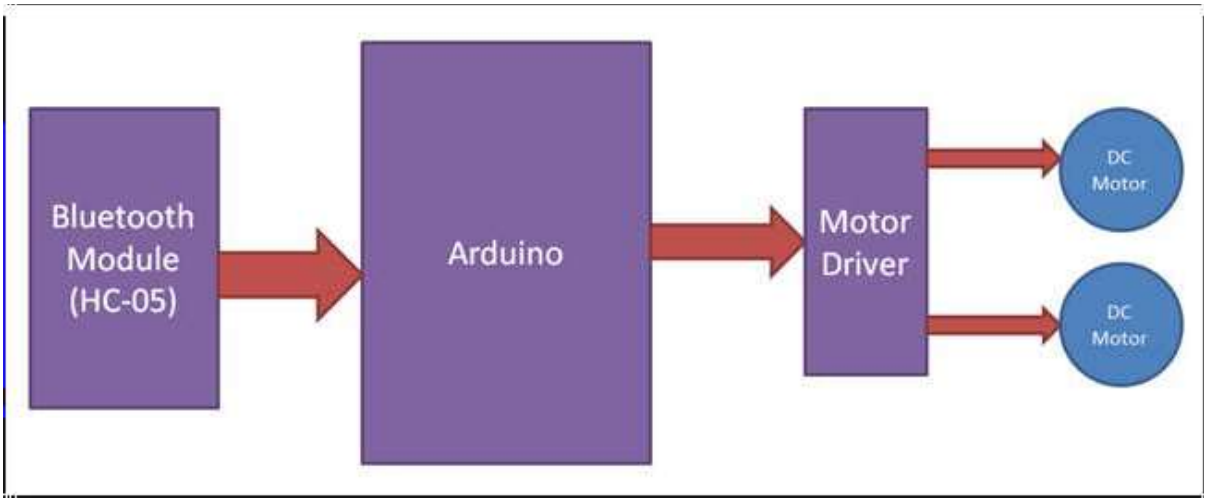

Figure 1.6 Block diagram of Bluetooth controlled robot car.

The Bluetooth block comprises the Bluetooth modules found in the phone and the robot car that is being used. An app on the mobile phone gives us a way to send ASCII characters over Bluetooth, which are then picked up by the robot car's Bluetooth module.
After receiving the data from the Bluetooth module, the microcontroller manipulates it into a series of digital outputs that power the motor driver section. The communication's data rate is set at 9600 bauds per second. Two BO motors spin at 60 RPM.

1.5 Circuit Diagram

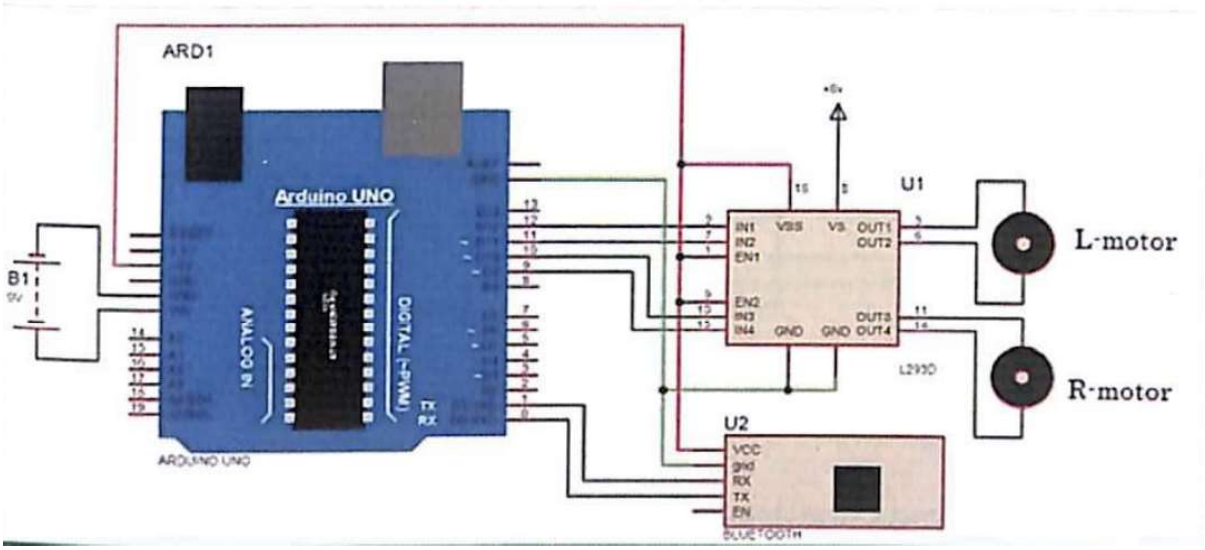

Figure 1.7 Circuit of the robot

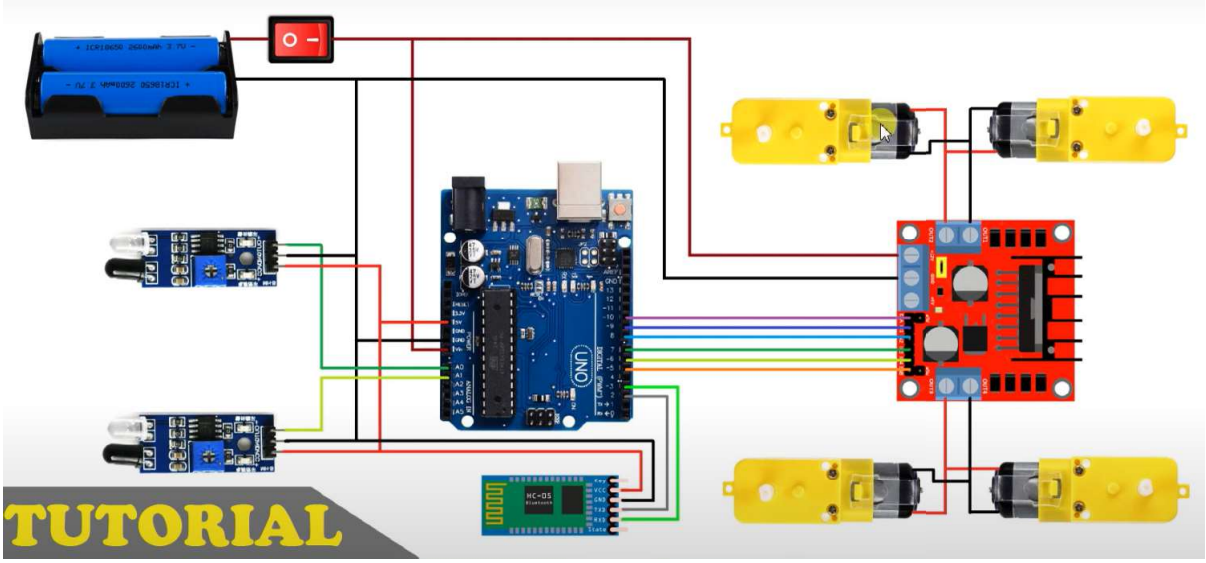

Figure 1.8 Robot diagram

1.6 Pseudo Code Flowchart

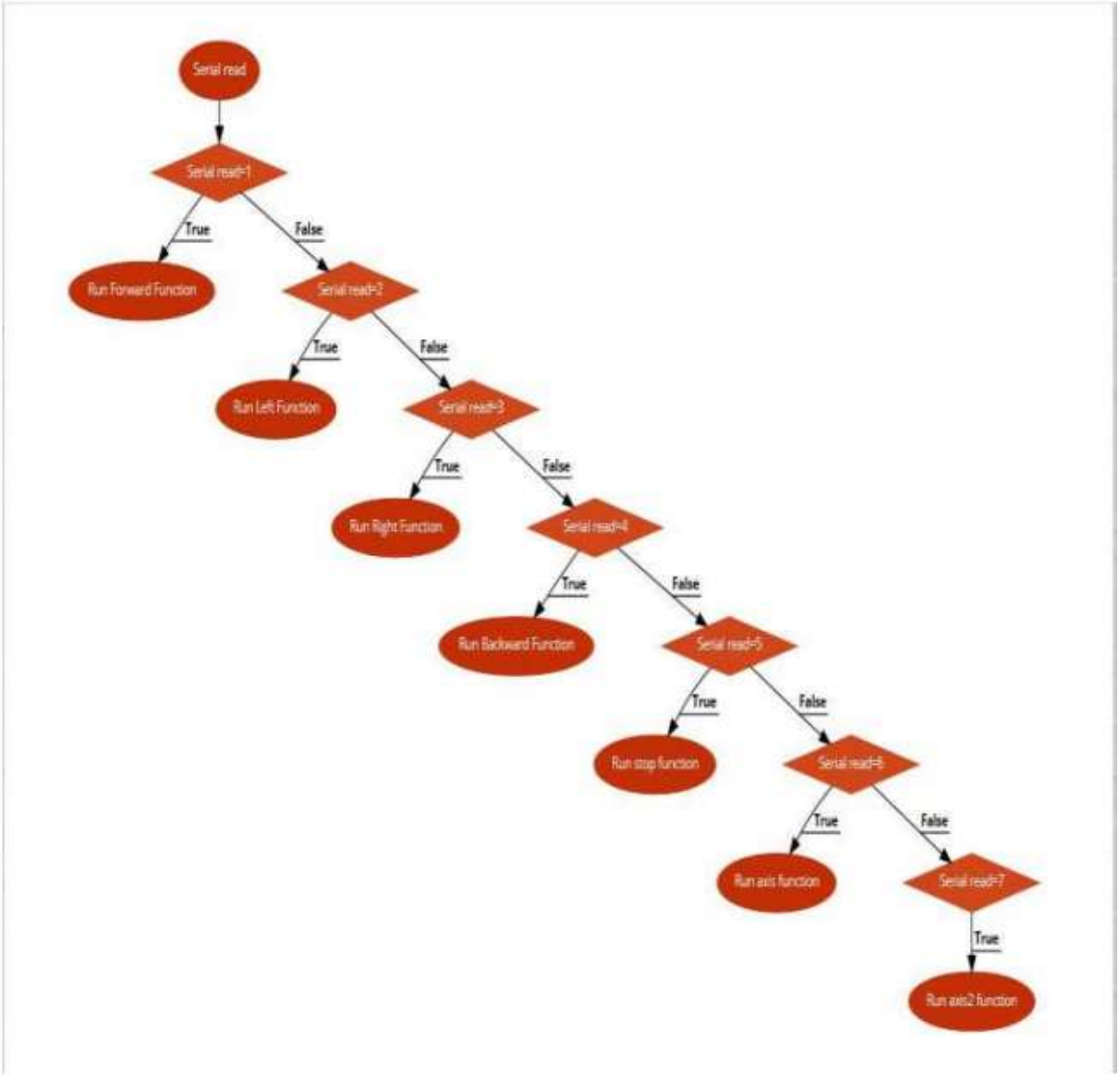

Figure 1.9 Flowchart

1.7 Conclusion

Open-source hardware called Arduino has served as the brains behind several initiatives. The Arduino incorporates an internal converter, i/o pins, and other features the user may need. Using an Arduino board and a Bluetooth shield, we can use our smartphones to control various devices, including the air conditioner, lights in our homes, and more. The Smart Home system can benefit significantly

from the Arduino as well. We learned a lot about Arduino and how it has facilitated the conversion of digital impulses into physical motions by working on this project. Another benefit of Arduino is that once a program is burned, as long as it is not RESET, we don't have to worry about it getting erased. Due to its effectiveness and user-friendly features, Arduino also has an advantage over all other microcontrollers.