ROBOT GIVING THE DISABLED INDEPENDENCE (USING IoT)

Project report submitted in partial fulfillment of the requirement for the degree of

BACHELOR OF TECHNOLOGY
IN
ELECTRONICS AND COMMUNICATION ENGINEERING

Under the supervision
of

Dr. Neeru Sharma

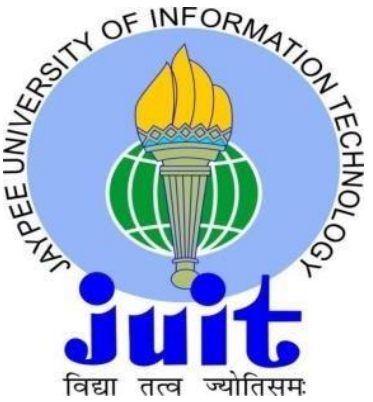
Assistant Professor (Senior Grade)

By

Smriti Shukla (141020)

Vanshika Sharma (141091)

Yashvi Khandelwal (141104)



JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY

WAKNAGHAT, SOLAN – 173234

HIMACHAL PRADESH, INDIA

DECLARATION BY THE SCHOLAR

We hereby state that the work presented in this report entitled **"Robot Giving The Disabled Independence (using IoT)"** submitted at **Jaypee University of Information Technology, Waknaghat, India,** is an authentic record of our work carried out under the supervision of **Dr. Neeru Sharma (Assistant Professor, Electronics and Communication)**. We have not presented or submitted this work elsewhere for any other degree or diploma.

Smriti Shukla	Vanshika Sharma	Yashvi Khandelwal
(141020)	(141091)	(141104)

Department of Electronics and Communication Engineering
Jaypee University of Information Technology, Waknaghat, India

Dated :

SUPERVISOR'S CERTIFICATE

This is to certify that the work reported in the B-Tech report entitled **"Robot Giving The Disabled Independence (using IoT)"**, submitted by Yashvi Khandelwal, Vanshika Sharma and Smriti Shukla at Jaypee University of Information Technology, Waknaghat, India, is a bonafide record of their original work carried out under my supervision. This work has not been submitted elsewhere for any other degree or diploma.

Dr. Neeru Sharma
Affiliation :
Date :

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Thanks and Regards

141020 Smriti Shukla
141091 Vanshika Sharma
141104 Yashvi Khandelwal

(Department of Electronics and Communication Engineering)

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ABSTRACT

Robotics is an emerging field in the present world. It is growing exponentially, with new innovations being introduced regularly. The field in study encapsulates colossal possibilities in almost every domain. Healthcare, automobile sector, home automation, public sector, industries and many more are booming because of integration of robotics with these sectors. The report scrutinizes the application of robotics in healthcare in the present day. We, therefore, have tried our level best to delve deep into this stream in order to understand the potential. Challenges related with our idea are also studied and overcome to enhance its practicality in real world. Our project offers to augment the mobility of disabled people for a greater independence. We plan to develop a robotic arm which will be controlled by an Arduino based application. The robotic arm will be capable of assisting a person with special needs. Picking up objects of daily use, switching the electronics, pulling out drawers etc. will be done by the robotic arm. A panic button, to inform the near and dear ones in case of an emergency will also be integrated with the arm. Besides these, regular reminders, medical schedule will be made available to the patient. Our report outlines the basic development of the robotic system in progress and execution of the same. We believe that our project has enough potential to aid the needy people thereby improving the quality of life.

CHAPTER 1

INTRODUCTION

1.1 PROJECT MOTIVATION

Human care and administration requests an inventive mechanical answer to make the usual mundane tasks of elderly and crippled individuals in home and working environment situations less demanding. Today, the interest for benefit robots is expanding step by step.

Right now around 10%-15% of the populace comprises of individuals with unique needs, who are being served by ever less physically fit individuals. Advancement of serving the already unanswered requirements of a prohibited populace, and engaging them to take an interest effectively in their own particular help. For these extreme physically crippled individuals, there are mechanisms that are working through control by voice, some by brain waves and head tilt and so forth. The disservice of such mechanisms and frameworks are their terminals, which may come out as awkward for a few clients, and the preparation work of such frameworks is a long process and often complex. Besides, the greater parts of these frameworks have a PC associating the client and the gadget to be controlled. The client focused plan approach recognizes that accommodating the client's needs includes going past the specialized necessities.
It built up that appearance and client comfort were similarly vital. Thus, it set up the estimation of an automated guide which could be utilized to mitigate weariness, engage, and create certainty and resolve by keeping up the client's appearance.

This not just satisfies their want for freedom and self-sufficiency, and in addition lessening the request on cares it likewise maintains a strategic distance from the very high expenses in the individual and single treatment in the nursing and healthcare homes that may some way or another be vital. A significant part of the accomplishment of the framework can be credited to its convenience and since it requires just a meager touch from the user to work such a framework.

1.2 PROBLEM STATEMENT

Many elderly people with some unending ailment surrender autonomous living on account of trouble in moving their body to take something. Usage of human-help automated framework empowers elderly or handicapped individuals in requirement for help and care and to live freely in their acclimated home conditions for as long as they wish to.

Mechanical frameworks that empower customary individuals at home or any other location to remotely works by controlling the vision of the robot utilizing an application. However, we are taking a shot at a robot arms which works with the assistance of an Arduino based application. Innovation is proposed as it is flexible, quite cheap and simple for usage in the down to earth condition and when the working environment of versatile robot is modified or changed out to different fields. Execution of our created framework empowers elderly or crippled individuals in requirement for help and care

A portable robot coordinating with an efficient robot arm could enable the matured or incapacitated to defeat these obstructions and fulfill those vital day by day benefits [2]. The robotic arm can control the activities with appropriate adroitness to allow sensitive and exact activities. Few cameras were installed on the earth in the whereabouts of the robotic arm keeping in mind the end goal to perceive the items.

The correspondence between the controller which controls the robot arm and robotic arm itself is through Android. To control articles with exactness and security and to keep the robot from mishandling or breaking the objects it handles, constrain sensors can be mounted to the fingers of the robot. We planned the servo driving part of the circuit to handle the control motion of the fingers.

1.3 SYSTEM OBJECTIVE

There are some system objectives which have to be taken into account in aspect to the design. The system must have generic objectives that are followed everywhere in similar systems:

• **Functionality:**

The system must be advantageous for the targeted group i.e. the disabled people and it should help them to perform tasks and jobs that they are not able to do self-sufficiently.

• **Usability:**

The system operation should have its usability easy and it must be simple to learn.

• **Comfort:**

To ensure that the user stays with the product, the system should be comfortable to operate and use.

• **Portability:**

The higher the portability of the system, easier it is to use it and has an added advantage if the system runs on independent operation.

• **Economy:**

The end product should have an appropriate and suitable cost that so that the product can be readily used by anyone who may want it or need it.

• **User satisfaction:**

Apart from the above mentioned generic objectives, some specific objectives must also be associated with the system. Establishing a system which fulfills the interaction and exploration needs of the disabled people with the environment is the end purpose.

To fully capacitate the project and find out the best and optimum possible method to design the system, various scholarly journals and research papers have been studied and thorough investigation is undertaken.

CHAPTER 2

INTERNET OF THINGS (IoT)

2.1 WHAT IS IoT?

The broad sense of Internet of Things (IoT) says that it is a network or an ecosystem which encapsulates physical objects connected to each other and are operational through the Internet. The term ‘thing’ in IoT can relate to a person who has a heart monitor to record health or it can be an automobile which is mounted with built in sensors. It constitutes the objects which have been monogrammed with an IP address and they have the sufficient ability to communicate data i.e. receive and transfer information across a network without human intervention or manual assistance. The so far reached embedded technology that is present in the objects enables them to communicate and interact with the external environment and the internal states of the things which henceforth affects the output or the decision taken by the object.

Fig. 2.1 Internet of Things-Connectting the world

2.2 IoT IN ROBOTICS

The robot has an intelligent sense in the way that it uses embedded capabilities of sensing and simultaneously retrieves sensor data from its sources that is amalgamated together for the purpose of operation of the device. The second intelligent component of the device is that it can process and analyze the information it collects from the numerous events it undertakes and monitors and then has access to the analyzed data. Lastly, both the prior intelligent parts result in the third intelligent component which comprises of having the automatic determination of the actions to be taken and also take the action. The action performed can have any form- it can be the control of any physical object in the environment. Also, if the robot has been designed to do it and has its underlying purpose to do so, it can locomote in the physical environment and world.

CHAPTER 3

LITERATURE REVIEW

In this paper [4], authors have discussed the development of a network distributed Human-Assistance Robotic System in order to improve care cost and the QoL (Quality of Life) of the aged people. They created multi-practical automated framework and actualized a few CORBA application servers to give some essential administrations to help the matured or handicapped.

In it a very different strategy for limitation of versatile robot with a camera and RFID (Radio Frequency Identification) innovation was proposed since it is economical, adaptable and simple to use in commonsense condition. A video/sound gathering framework was likewise created to enhance the collaboration amongst the clients, switch robot controlling benefit with the assistance of a centralized user management server, and empower a web client to show signs of improvement comprehension of what is happening in the neighborhood condition.

Considering multi compose client of the so developed system, they have executed numerous HRIs (Human Robot Interfaces) that empower distinctive client to curb robot frameworks effortlessly. In this paper [5] creators have examined that how the Handy 1 was produced in 1987 by Mike Topping to help a 11 year old kid with cerebral paralysis to eat unaided. The framework is the best ease, economically accessible mechanical framework on the planet today fit for helping the most seriously incapacitated with a few regular capacities, for example, eating, drinking, washing, teeth cleaning, shaving and cosmetics application.
The paper has charted the development of the entire framework and has given an overview of some individual Handy 1. The client’s focused plan approach recognized that accommodating the client's needs, included going past the specialized necessities.

Likewise the estimation of an automated guide which could be utilized to lighten fatigue, engage, create certainty and confidence by keeping up their appearance through

washing and restorative application and additionally diminishing the request on careers. A significant part of the accomplishment of the framework can be ascribed to its convenience, requiring just a slight touch from the client with a specific end goal to work the framework.

This paper [6] summarizes the facts that state clear that the Disabled people already profit from a lot of technical assistance that improves their quality of life. This article presents a system which allows interaction between a physically paraplegic person and his environment. This system is controlled by voluntary muscular movements, particularly those of face muscles. These developments will be converted into machine-reasonable directions, and they will be sent by methods for a remote connect to a versatile robot that will execute them. Robot incorporates a camcorder, so as to demonstrate the client the earth of the course that the robot takes after. This framework gives a more prominent individual self-rule to individuals with decreased versatility.

This paper proposes the outline and usage of a help model framework for incapacitated individuals. This framework will support individuals with lessened versatility. It tries to advance and exploit developments that the patient preserves, keeping in mind the end goal to execute those assignments that he can't do independently. The framework tries to expand control and impact of these patients over their typical condition; this gives them more noteworthy self-governance and personal satisfaction.

Created framework comprises of a robot whose developments are controlled by some deliberate activity that the debilitated individual can execute. The framework is extremely adaptable and is incorporated into unavoidable processing because of the utilization of remote connections and to its secluded structure. This way, the planned model will be fitted to incorporate more gadgets that would make human-condition association less demanding, for example, a mechanical arm or a wheelchair.

This paper [7] deals with general human care and administration requests which is an innovative idea for making the mundane tasks of the elderly or aged people much more easier by making it less demanding independently. The EU venture MATS has built up another idea of a robot on ramp for such service applications. Keeping this demand in view and thus working on the same grounds the University Carlos of Madrid has

developed a robot which is a 5 DOF self-containing controller, which can incorporate on-board all the control framework.
The fundamental preferred standpoint is that this robot is light weight, i.e. nearly around 11 kg for a 1.3 m reach. The robot is a symmetrical arm which is able to move between various focuses (Docking Stations) of the rooms and is also able to "bounce" to (or from) the environment to the wheelchair. Along these lines the MATS robot surely become a home companion and is of greater help for various people.

This paper [8] manages the Robots which have a high level of autarchy and have high summons in robotics research and its further more coming applications. Given that most industrial robotics applications are relatively simple, the trend has become such that each cell consists of a programmable machine which includes robot and operates more independently on human interaction or super - vision than before. This, further together with market demand on increased flexibility on products, has put pressure on flexibility in the production line which ultimately will advance robotics technology. This trend as a combination of demand and need shall further be seen as a new robotic application, especially as those which relate to the field of "service robotics". One of these areas includes health care and assisting robotics for disabled and elderly people.

CHAPTER 4
PROPOSED MODEL OF MOBILE ROBOT

4.1 GENERAL STRUCTURE OF MOBILE ROBOT

In a designed framework, the omnidirectional versatile robots are used in different fields or articles in present scenario. Another important point is to bring down expenses or cost and reduction in the quantity of engines with the aim that the attached battery to the robot can make it run for a longer time and supplies sufficient power for it to work. The robot should be cost-efficient. The model of the front two wheels was changed with a lever which is used to adjust the robot and make it work smoothly to influence portable robot to move it easily in any direction.

Here we need to specify the orientation and the position of the mobile robot. This method is inexpensive, provides flexibility and is simple to use in the practical environment. The hardware is mounted on the top of mobile robot structure which is as shown in the fig. 4.1.

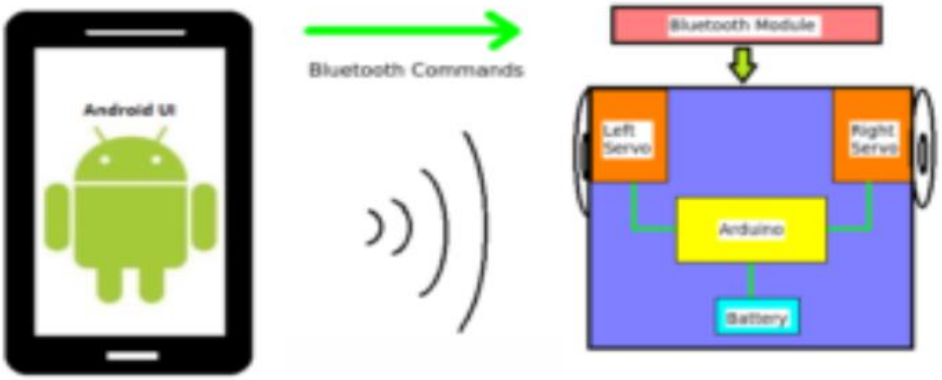


Fig.4.1 Android controlled robot

4.2 BLOCK DIAGRAM

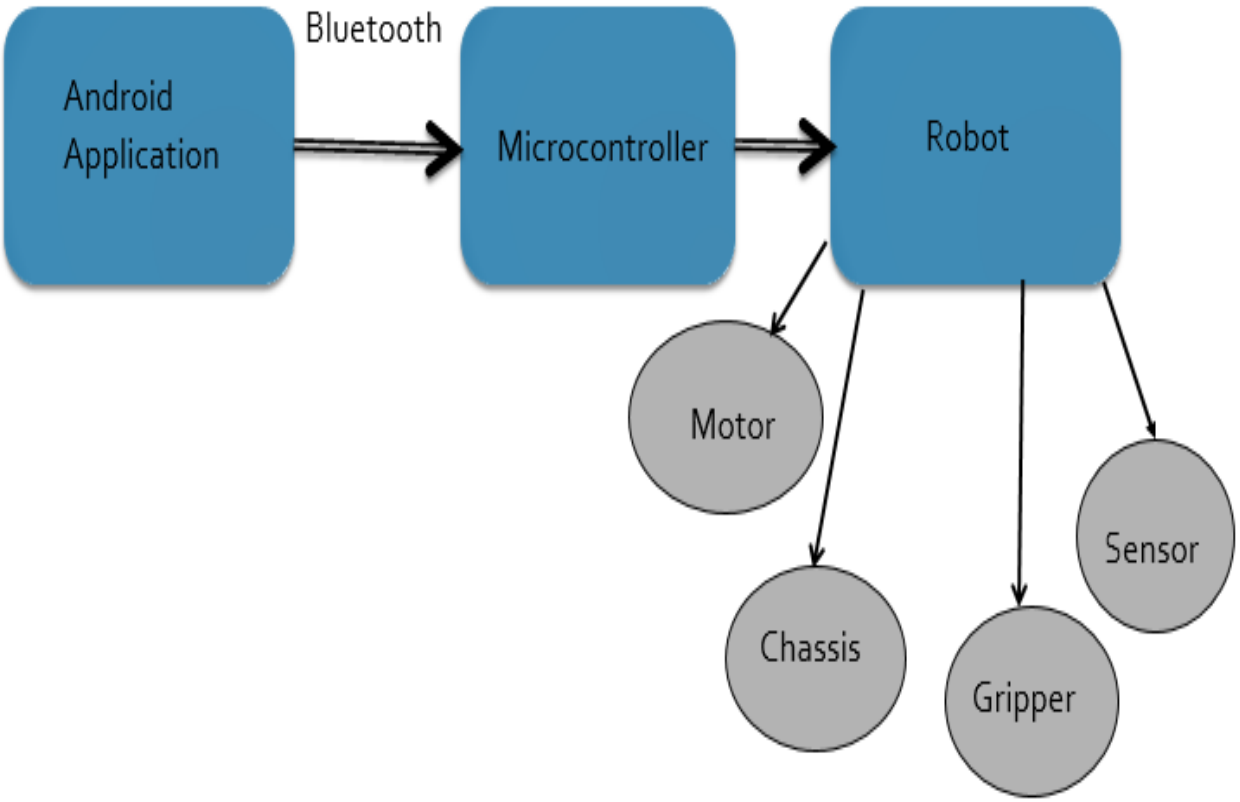


Fig. 4.2 Block Diagram of Model

4.3 ROBOT ARM CONTROL

The robotic arm control facilitates the user to use a remote in order to control the remote robotic arm to perform tasks. The underlying sequence is that it receives the information about the task from the client and then goes on to perfrom the various kinds of processing according to specific task. When a user operating the remote pushes the command button, the robot manipulator automatically handles the object which is mounted or placed on a platform. For a single task to undergo using the task level robotic arm control server, it processes majorly three portions- (i) information part, (ii) implementation part, (iii) communication part. The information part is the source of information for the system. The information part is implemented by using programming which is in accordance to the information supplied autonomously. The implementation part executes motion scheduling generated.

4.4 REAL-TIME MOBILE ROBOT POSITIONING

It gives the continuous orientation and position of the versatile robot as for the environment facilitated framework, that’s why the client could show signs of improvement comprehension of what the versatile robot is doing. Robot frameworks ought to have the capacity to collaborate with nearby client normally to comprehend the condition where the particular robotic applications are working unmistakably and effortlessly. We built up an application for a remote client. A regular method for giving the data for the mechanical framework working, the earth of robot Framework and the condition crippled, it was additionally given so as to empower the remote client to show signs of improvement comprehension of circumstance.

So the framework could be effectively conveyed and could be connected to innumerable everyday life gadgets. This report proposes the plan and execution of a help model framework for handicapped individuals. This framework will support individuals with decreased versatility. It tries to explore the advanced developments of that patient, in order to express those undertakings that he can't bear on independent from anyone else.

The framework is exceptionally adaptable and is incorporated into inescapable processing on account of the utilization of remote connections.

Like this application, the above planned model can be fitted into any area incorporate more gadgets that could make human-condition connection less demanding.

CHAPTER 5

HARDWARE REQUIREMENT

5.1 AVR ATMEGA328 MICROCONTROLLER

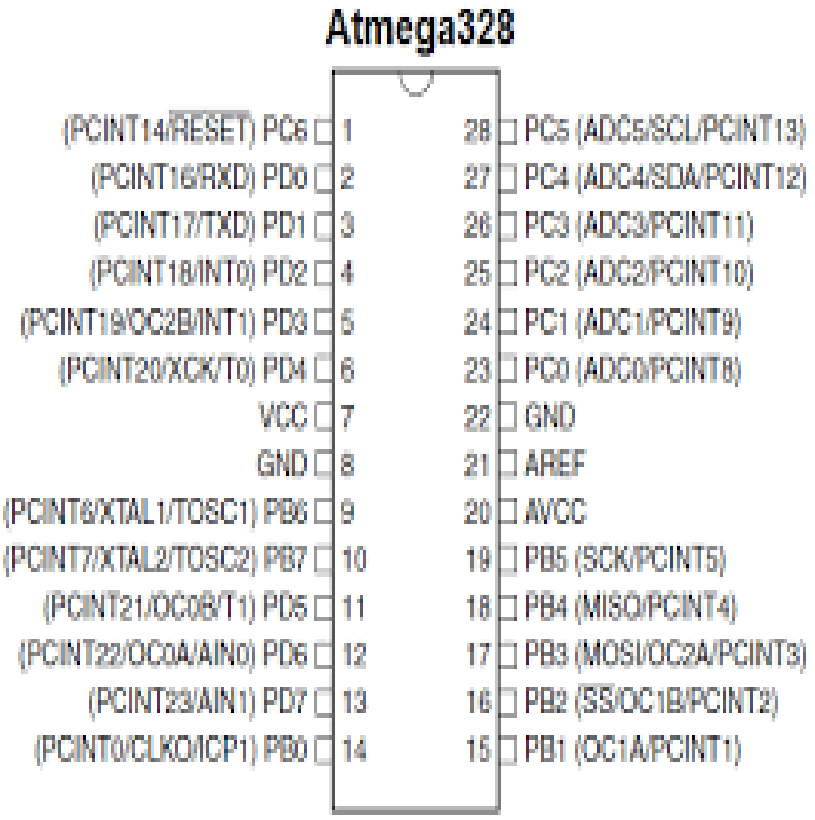


Fig. 5.1 Pinout of Atmega328

The Atmega328 is a very popular microcontroller chip produced by Atmel. It is an 8-bit microcontroller that has 32K of flash memory, 1K of EEPROM, and 2K of internal SRAM.

The Atmega328 is one of the microcontroller chips that are used with the popular Arduino boards. The Arduino board comes with either 1 of 2 microcontroller chips, the

Atmega168 or the Atmega328. Of these 2, the Atmega328 is the upgraded, more advanced chip. Unlike the Atmega168 which has 16K of flash program memory and 512 bytes of internal SRAM, the Atmega328 has 32K of flash program memory and 2K of Internal SRAM.

The Atmega328 has 28 pins. It has 14 digital I/O pins, of which 6 can be used as PWM outputs and 6 analog input pins. These I/O pins account for 20 of the pins. 20 of the pins function as I/O ports. This means they can function as an input to the circuit or as output. Whether they are input or output is set in the software. 14 of the pins are digital pins, of which 6 can function to give PWM output. 6 of the pins are for analog input/output.

2 of the pins are for the crystal oscillator. This is to provide a clock pulse for the Atmega chip. A clock pulse is needed for synchronization so that communication can occur in synchrony between the Atmega chip and a device that it is connected to.

The chip needs power so 2 of the pins, Vcc and GND, provide it power so that it can operate. The Atmega328 is a low-power chip, so it only needs between 1.8-5.5V of power to operate.

5.2 HC-05-BLUETOOTH TO SERIAL PORT MODULE

Bluetooth is an innovation utilized for short separations for remote correspondence what's more, exchange of information (it uses short-wavelength of ultra-high frequency radio waves and also transmitted data ranging from 2.4 to 2.485 GHz) its application are present in cell phones and building individual region systems (PANs). The Bluetooth module which we are using is ranging approximately around 10 Meters (i.e.30 feet). This chip has a complex structure and uses an external flash memory of 8 bits. These Bluetooth sub-modules work well with Arduino and other similar microcomputers and are low in cost. Some important characteristics are:

- HC-05 can work in Master as well as Slave mode.
- These small (3 cm long) modules have a power requirement of 3.3V. They are soldered usually to a larger board as they have no pins.

Fig. 5.2 HC-05 Bluetooth Module

5.3 DC MOTOR

The basic working principle of a DC motor illustrates that when a current carrying conductor is subjected to an attractive magnetic field, the conductor experiences a mechanical power. The different types of DC motors work on this principle. Therefore, to establish a DC engine it is necessary to set up a magnetic field. To set up a magnetic field, it is clear magnets are used. There are two kinds of magnets used: electromagnet or a lasting magnet. Any one of them can be used. A permanent magnet is used to drive the DC motor when there is less requirement of the control of speed of the motor.

5.3.1 DC GEAR MOTOR

DC equip engine can be characterized as an augmentation of DC engine. A furnished DC Motor has an apparatus annexed to the DC motor. The motor speed is recorded as the rotations of the shaft per minute which is called as RPM (rotations per minute). The device structure is furnished in such a way so as to increase the torque and deteriorate the speed. Making the use of the right combination of riggings, the speed of the motor can be decreased as required. The concept in which the gears are used to lower the speed and increment the torque is termed as apparatus lessening.

The external structure of the outfitted DC engine seems as a linear extension of the basic DC engines. The parallel demonstration of the motor shows the apparatus head's external projections. A bolt nut is attached at the end of the pole to help in attaching the engine to other parts of the gathering.

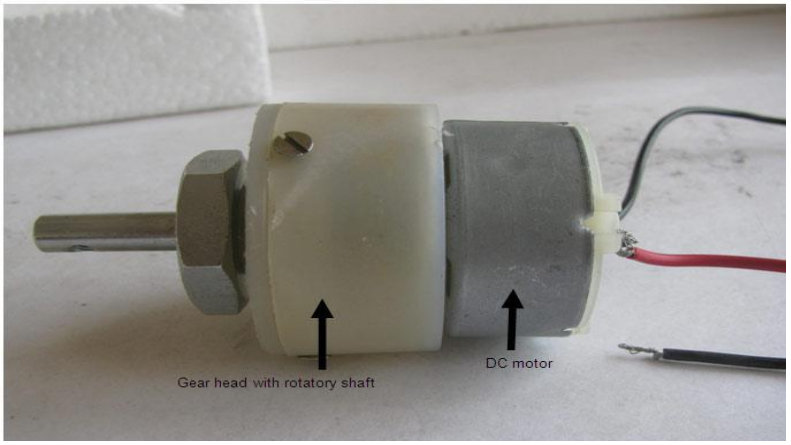


Fig. 5.3 DC Gear Motor

In our project we have used 4 DC Gear Motors of 200 RPM. The motor has a sturdy and robust construction and has large gears. The gear box is constructed in a manner to complement the torque that is delivered by the engine. With the help of the metal hedges the drive shaft is mounted from the two sides of the motor. The engine works easily between 4V to 12V and delivers an rpm of 200 at 12V. The engine uses a drive shaft with D shape for coupling.

The specifications of the motor are:

- RPM: 200 at 12V
- Voltage: 4V to 12V
- Stall torque: 50 Kg-cm at stall current of 10.6 Amp.
- Shaft diameter: 8mm
- Shaft length: 25 to 30mm
- Brush type: Carbon
- Motor weight: 370gms

Fig. 5.4 Specifications of DC Gear Motor

5.4 MOTOR DRIVER

A motor driver is a high current, high voltage device with a full-bridge dual driver which is designed in a way that it accepts standard TTL logic levels and is used to drive loads, basically inductive loads such as solenoids, DC motors, stepper motors and relays. The driver uses two enable input pins which provide the functionality of enabling or disabling the device irrespective of the input signal. The lower transistors have emitters in each bridge and these emitters are connected together. The external terminal of the driver is used to connect an external sensing resistor. In addition to it, to make the logic work at a lower voltage level an input supple is provided.

The popular and widely used L293 Dual H-Bridge Motor Driver IC is shown in fig. 5.4. The below module is used to independently control two motors with a current rating of 2A each in both the directions.

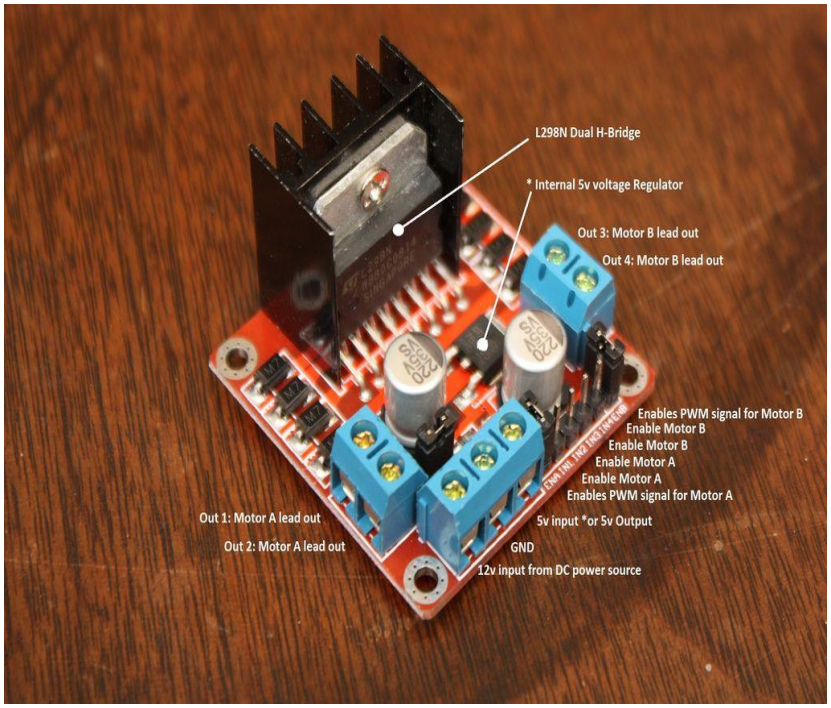


Fig. 5.5 L293 Motor Driver

Pin 1, 15	Sense A, Sense B	Sense resistor in between ground and this pin to control load current
Pin 2, 3	Out 1, Out 2	Bridge A outputs. Current flowing through load connected between these pins is monitored at pin 1
Pin 13, 14	Out 3, Out 4	Bridge B outputs. Current flowing through load connected between these pins is monitored at pin 15
Pin 5, 7	Input 1, Input 2	Inputs of Bridge A
Pin 10, 12	Input 3, Input 4	Inputs of Bridge B
Pin 4	Vs	Supply voltage for power output stages. Capacitor of 100nF must be connected between this pin and ground
Pin 6, 11	Enable A, Enable B	To enable/disable bridge A or bridge B
Pin 8	GND	Ground
Pin 9	VSS	Supply Voltage for the Logic Blocks. Capacitor of 100nF must be connected between this pin and ground

Fig. 5.6 L293 Motor PIN Description

5.4.1 INTERNAL CIRCUIT OF L293 MOTOR DRIVER

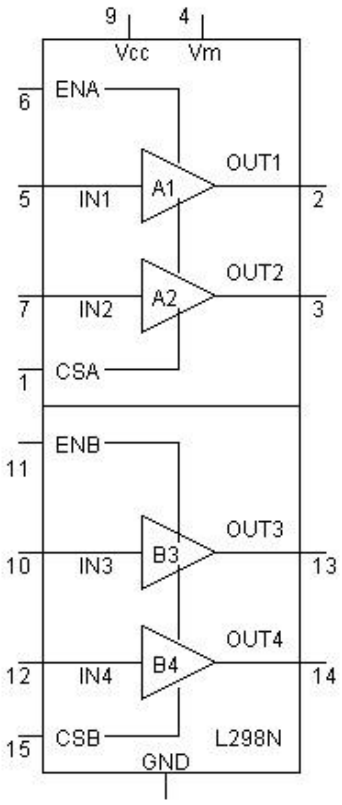


Fig. 5.7 Internal circuit of L293

The L293 motor driver model has a configuration which comprises of four power amplifiers independent of each other. Out of the four, two power amplifiers form a H-bridge A and the other two power amplifiers form a H-bridge B. A single H-bridge performs the function of polarity switching of the direction of the motors. As a pair, the H-bridges can control and coordinate a bipolar stepper motor.

- Amp A1 and A2 → H Bridge A
- Amp B3 and B4 → H Bridge B

L293 is used to drive inductive or magnetic loads. Current sense pins can be attached to ground yet we can likewise embed low resistor and its voltage perusing is relative to

current. All the four inputs and Enable pins work on 5v TTL logic which makes the connection easy with microcontrollers.

- ENA=5V, High logic (Amplifier A1 and A2 on)
- ENA=0V, Low logic (Amplifier A1 and A2 off)
- ENB=5V, High logic (Amplifier B1 and B2 on)
- ENB=0V, Low logic (Amplifier B1 and B2 off)

5.4.2 Working of DC Motors

In our project, we are using 4 DC motors. Out of these 4 motors, 2 are working in the same direction and other two are working in the reverse direction. Controlling one or two motors comes very handy. First connection at each motor A and B on the L293 module have to be made. If two motors for a robot are being used then it is to be ensured that the polarity of the motors is same on both inputs. If this condition is not fulfilled then the user may need to swap them over when he sets both motors to forward and rest backwards.

The H-Bridges are commonly utilized as a part of controlling engines speed and course, yet can be utilized for different undertakings e.g. powerful LED clusters. A H-Bridge is a circuit that can drive a current in either extremity and be controlled by Pulse Width Modulation (PWM).

5.4.3 Software Details :

(i) Speed control

The speed of the motor can be balanced by interfacing PWM yields from the robot's microcontroller to the ENA and ENB input sticks on the engine driver board. The ENA stick controls Motor An and the ENB stick controls Motor B. At the point when these pins are HIGH, control is yield to the engine. By utilizing PWM, the power turns on and off rapidly to change the speed of the engine. The more drawn out the PWM obligation

cycle is, the speedier the engine will turn. It is prescribed to dependably utilize a PWM obligation cycle of 90% or less.

(ii) Direction control

The bearing in which the engines turn is controlled utilizing the IN1, IN2, IN3 and IN4 input sticks on the engine driver board. These pins are then associated with advanced yields on the robot's microcontroller. To make Motor A go ahead IN1is set to HIGH and IN2 to LOW. To influence MotorA to move in reverse IN1 is set to LOW and IN2 to HIGH. A similar strategy is utilized to control Motor B. For this, IN3 is set to HIGH and IN4 to LOW to push ahead and IN3 is set to LOW and IN4 to HIGH to go in reverse. It is to be noticed that "forward" and "in reverse" allude to the heading of the engines themselves.

(iii) Stopping

On the off chance that the power from the engines must be expelled, at that point all things considered ENA is set to LOW for Motor An and ENB to LOW for Motor B. This will bring about the engines preventing gradually and normally from rubbing. To play out a brisk braking task, ENA , IN1, IN2 are set LOW for Motor An and ENB, IN3,IN4 are set LOW for Motor B. With this the engines will arrive at a moment stop.

5.5 CHASSIS

A chassis is the basic physical structure or framework of any multi component device like an automobile, an airplane, a desktop computer, etc. The basic form of robotic chassis is shown in fig. 5.7.

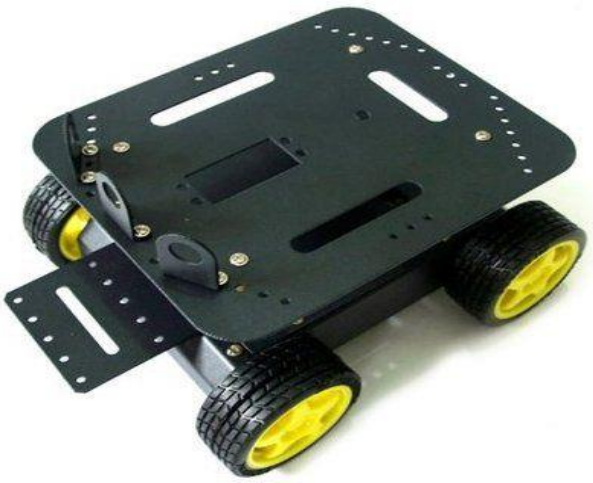


Fig. 5.8 Chassis

This chassis is an integral part because the internal shape of the robot changes with every locomotion which involves the entire body and the robot's pose at any given time cannot be represented by a single point.

To conquer this issue, we devise a strategy which characterizes the body facilitate outlines of the robot as opposed to the common tradition of characterizing the directions by settling a inflexible edge to the connection of a robot. We rather characterize the directions of the body outline by averaging every one of the places of the connections of the robot. This arrived at the midpoint of casing has the essential administration of a virtual case that disengages the adjustments in the robot's shapes due to inner movement from that of the outside movement which emerge because of the association of the robot with its environment and condition.

Because of this partition of movement, less difficult robot models can be made, for example, those in view of wheeled vehicles which can be utilized for precise estimate of the movement of the robot as it moves.

5.6 GRIPPER

The robot grippers act as the physical interface between a robotic arm and the work environment. The robotic arm is also referred to as the end-of-arm-tooling (EOAT) and

it is taken as the most used and important portion of the robotic arm. A gripper is the portion which is related specifically with taking care of your protest or item subsequently it is imperative to pick the proper gripper. There are four types of automated grippers:

1. Vacuum grippers

2. Pneumatic grippers

3. Pressure driven grippers

4. Servo-electric grippers.

These are picked in view of the dealing with application and the kind of material utilized.

Fig. 5.9 Two finger gripper

5.6.1 Vacuum Grippers

This sort of automated gripper makes utilization of an elastic or polyurethane suction container which is utilized to get things. Some vacuum grippers too utilize a shut cell froth elastic layer, instead of suction mugs, to finish the applications.

5.6.2 Pneumatic Grippers

Because of the minimal size and light weight of the pneumatic gripper it is very mainstream. It can be effortlessly fused into little and tight spaces, which is very supportive in the assembling business. Pneumatic robot grippers can play out the task of both shutting and opening, which earned them the epithet "blast" actuators, due to the commotion made when the metal-on-metal gripper works.

5.6.3 Hydraulic Grippers

The water powered gripper gives the most quality and is regularly utilized for applications that require huge measures of power. These automated grippers create their quality from pumps that can give up to 2000psi. In spite of the fact that they are solid, water driven grippers are messier than different grippers because of the oil utilized as a part of the pumps. They additionally may require more support due the gripper being harmed in view of the completely utilized amid the application.

5.6.4 Servo-Electric Grippers

The servo-electric gripper seems to come up increasingly in modern settings, because of the way that it is anything but never that difficult to optimize. The development of gripper jaws is controlled by Electronic engines. These grippers are exceptionally adaptable which take into consideration distinctive material resistances when taking care of parts. Servo-electric grippers are additionally practical on the grounds that they are perfect and have no aircrafts.

CHAPTER 6

ROBOTIC SYSTEM

6.1 MOTOR DRIVER SEMANTICS

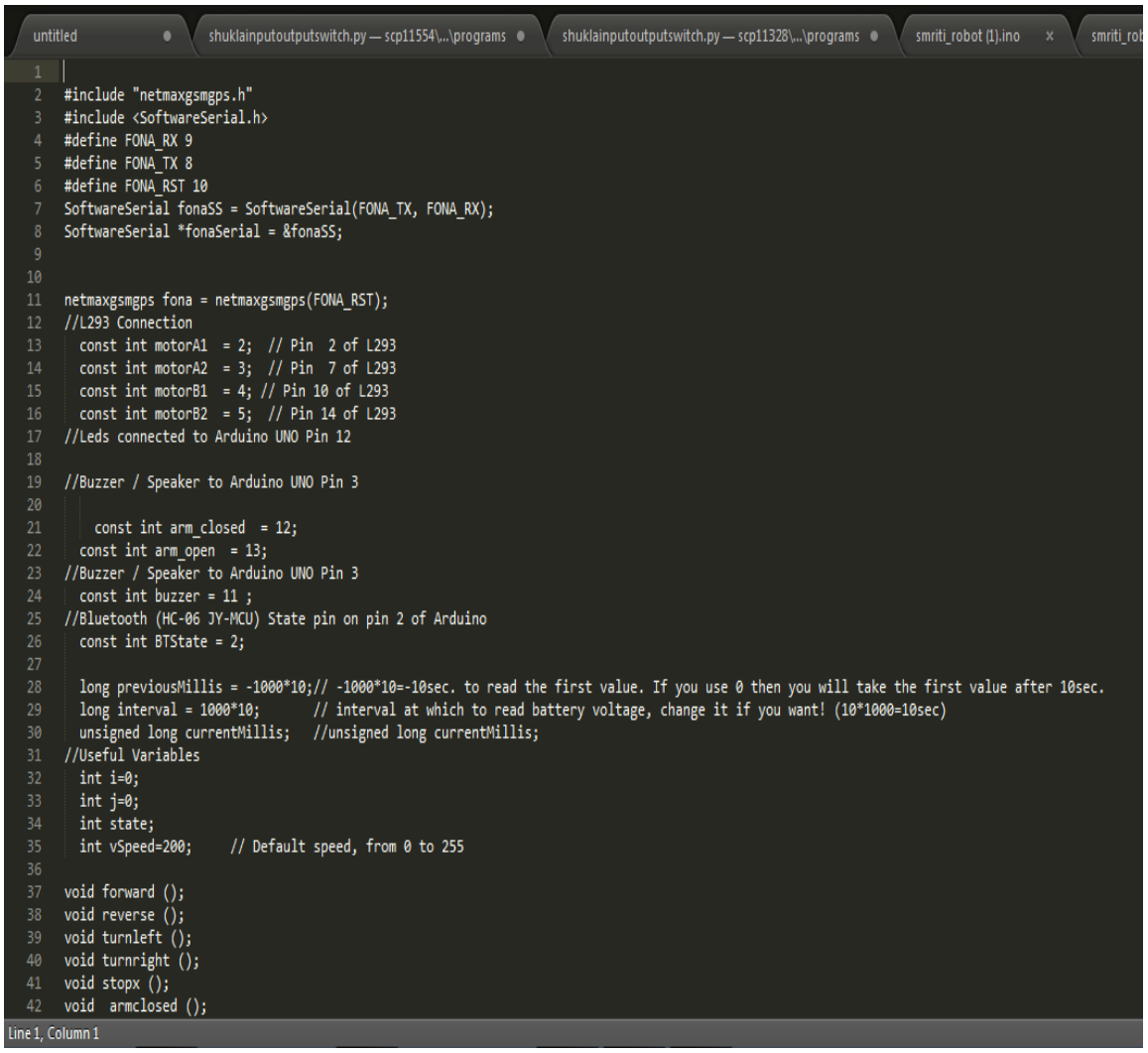
Table 6.1 Motor A Truth Table

ENA	IN1	IN2	Description
0	N/A	N/A	Motor A is off
1	0	0	Motor A is stopped (brakes)
1	0	1	Motor A is on and turning backwards
1	1	0	Motor A is on and turning forwards
1	1	1	Motor A is stopped (brakes)

Table 6.2 Motor B Truth Table

ENB	IN3	IN4	Description
0	N/A	N/A	Motor B is off
1	0	0	Motor B is stopped (brakes)
1	0	1	Motor B is on and turning backwards
1	1	0	Motor B is on and turning forwards
1	1	1	Motor B is stopped (brakes)

6.2 CODE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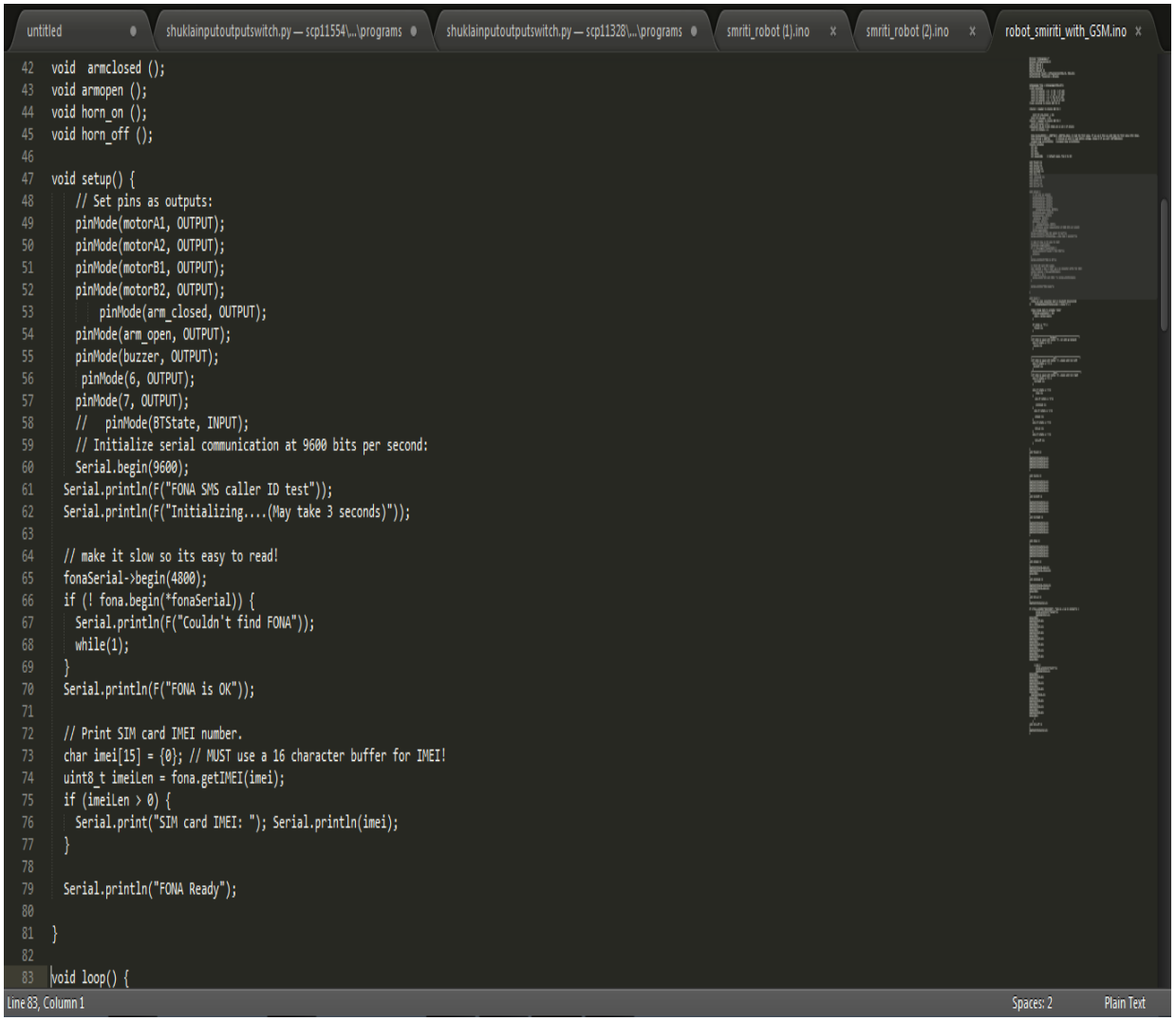
shuklainputoutputswitch.py — scp11328\...\programs
smriti_robot (1).ino
#include "netmaxgsmgps.h"
#include <SoftwareSerial.h>
#define FONA_RX 9
#define FONA_TX 8
#define FONA_RST 10
SoftwareSerial fonaSS = SoftwareSerial(FONA_TX, FONA_RX);
SoftwareSerial *fonaSerial = &fonaSS;
netmaxgsmgps fona = netmaxgsmgps(FONA_RST);
//L293 Connection
const int motorA1 = 2; // Pin 2 of L293
const int motorA2 = 3; // Pin 7 of L293
const int motorB1 = 4; // Pin 10 of L293
const int motorB2 = 5; // Pin 14 of L293
//Leds connected to Arduino UNO Pin 12
//Buzzer / Speaker to Arduino UNO Pin 3
const int arm_closed = 12;
const int arm_open = 13;
//Buzzer / Speaker to Arduino UNO Pin 3
const int buzzer = 11 ;
//Bluetooth (HC-06 JY-MCU) State pin on pin 2 of Arduino
const int BTState = 2;
long previousMillis = -1000*10;// -1000*10=-10sec. to read the first value. If you use 0 then you will take the first value after 10sec.
long interval = 1000*10; // interval at which to read battery voltage, change it if you want! (10*1000=10sec)
unsigned long currentMillis; //unsigned long currentMillis;
//Useful Variables
int i=0;
int j=0;
int state;
int vSpeed=200; // Default speed, from 0 to 255
void forward ();
void reverse ();
void turnleft ();
void turnright ();
void stopx ();
void armclosed ();
Line 1, Column 1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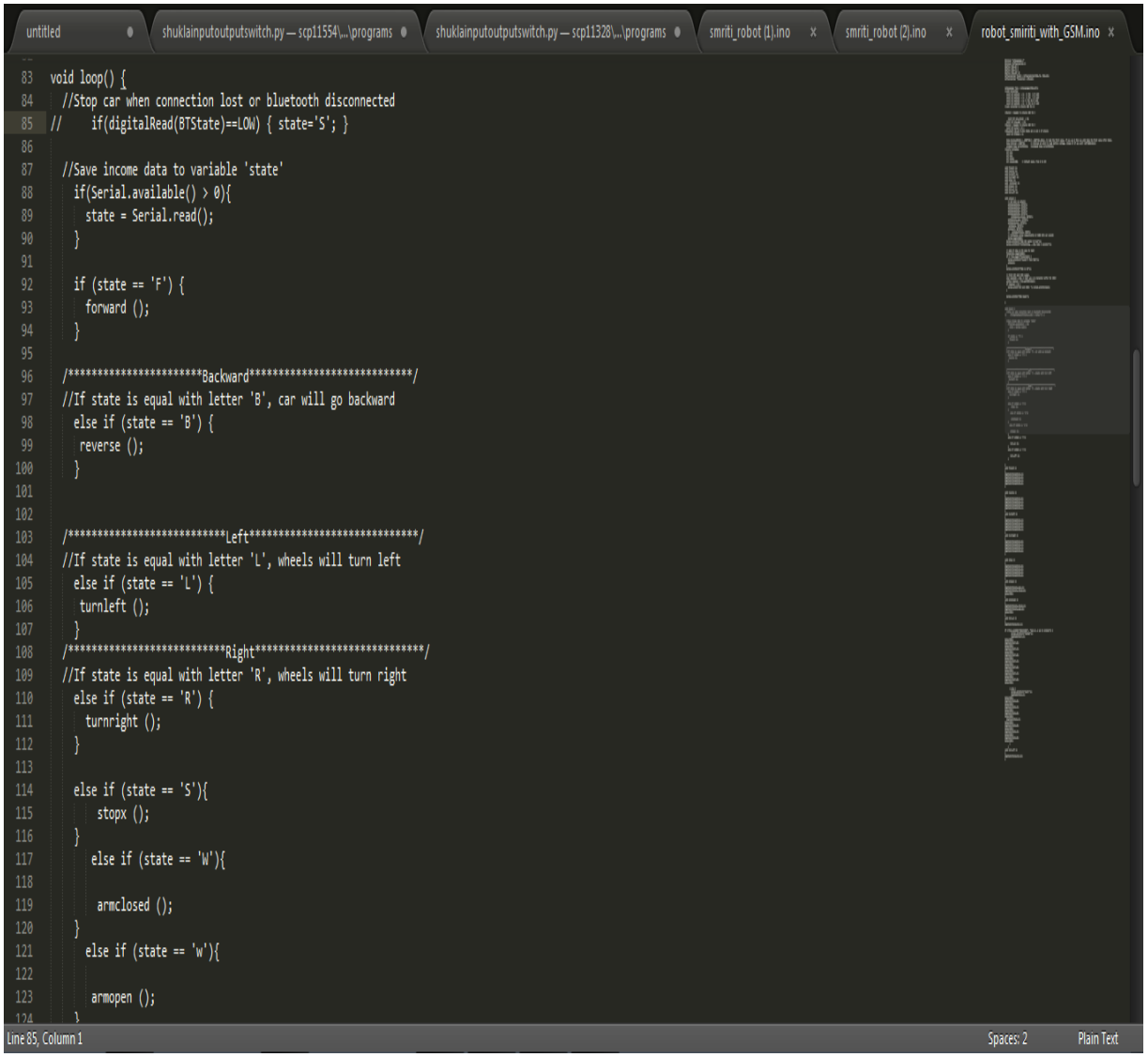
shuklainputoutputswitch.py — scp11328\...\programs
smriti_robot (1).ino
smriti_robot (2).ino
robot_smiriti_with_GSM.ino
void armclosed ();
void armopen ();
void horn_on ();
void horn_off ();
void setup() {
// Set pins as outputs:
pinMode(motorA1, OUTPUT);
pinMode(motorA2, OUTPUT);
pinMode(motorB1, OUTPUT);
pinMode(motorB2, OUTPUT);
pinMode(arm_closed, OUTPUT);
pinMode(arm_open, OUTPUT);
pinMode(buzzer, OUTPUT);
pinMode(6, OUTPUT);
pinMode(7, OUTPUT);
// pinMode(BTState, INPUT);
// Initialize serial communication at 9600 bits per second:
Serial.begin(9600);
Serial.println(F("FONA SMS caller ID test"));
Serial.println(F("Initializing....(May take 3 seconds)"));
// make it slow so its easy to read!
fonaSerial->begin(4800);
if (! fona.begin(*fonaSerial)) {
Serial.println(F("Couldn't find FONA"));
while(1);
}
Serial.println(F("FONA is OK"));
// Print SIM card IMEI number.
char imei[15] = {0}; // MUST use a 16 character buffer for IMEI!
uint8_t imeiLen = fona.getIMEI(imei);
if (imeiLen > 0) {
Serial.print("SIM card IMEI: "); Serial.println(imei);
}
Serial.println("FONA Ready");
}
void loop() {
Line 83, Column 1
Spaces: 2
Plain Text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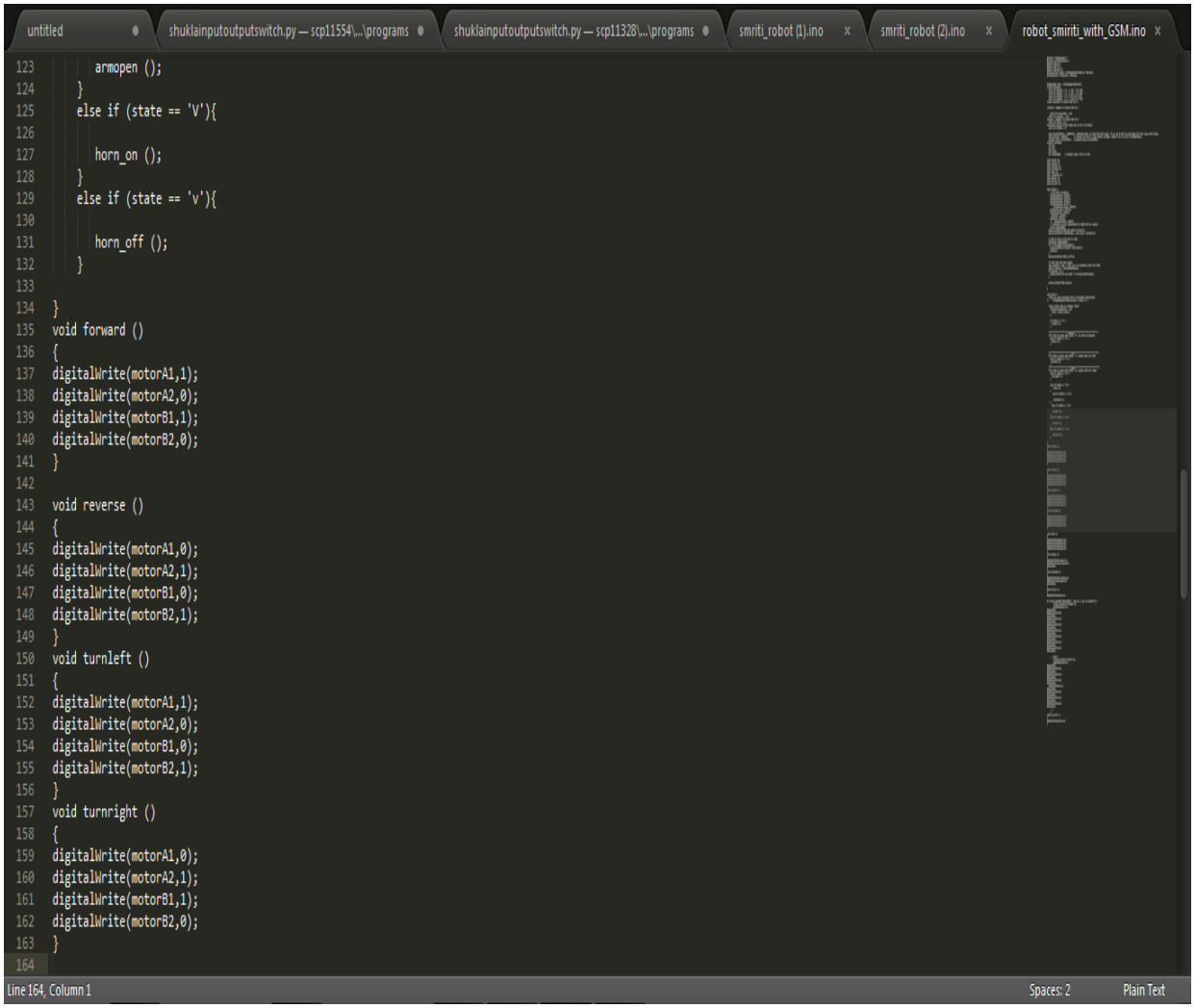
shuklainputoutputswitch.py — scp11328\...\programs
smriti_robot (1).ino
smriti_robot (2).ino
robot_smiriti_with_GSM.ino
void loop() {
//Stop car when connection lost or bluetooth disconnected
//   if(digitalRead(BTState)==LOW) { state='S'; }
//Save income data to variable 'state'
if(Serial.available() > 0){
state = Serial.read();
}
if (state == 'F') {
forward ();
}
/**********Backward**********/
//If state is equal with letter 'B', car will go backward
else if (state == 'B') {
reverse ();
}
/**********Left**********/
//If state is equal with letter 'L', wheels will turn left
else if (state == 'L') {
turnleft ();
}
/**********Right**********/
//If state is equal with letter 'R', wheels will turn right
else if (state == 'R') {
turnright ();
}
else if (state == 'S'){
stopx ();
}
else if (state == 'W'){
armclosed ();
}
else if (state == 'w'){
armopen ();
}
Line 85, Column 1
Spaces: 2
Plain Text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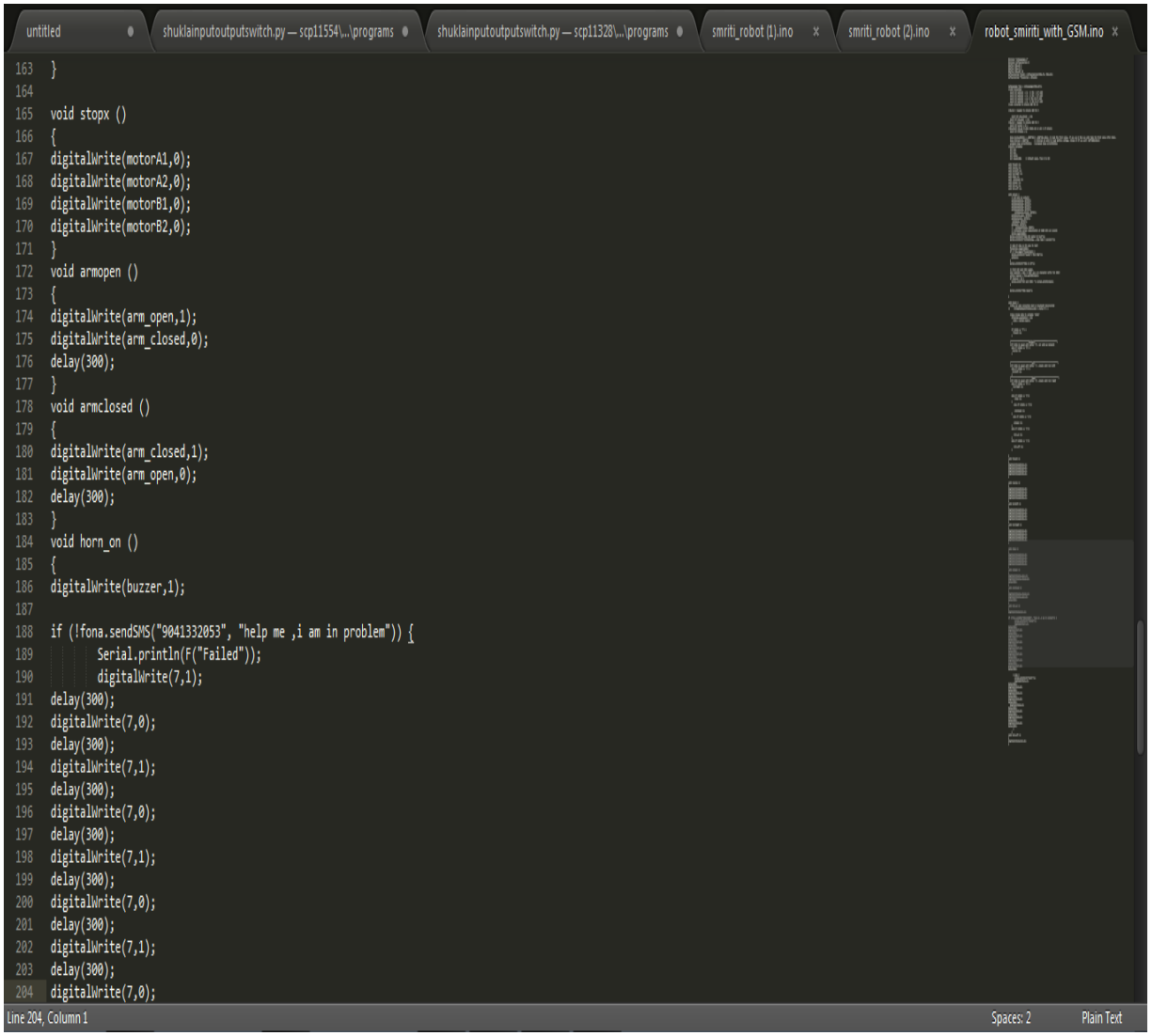
shuklainputoutputswitch.py — scp11328\...\programs
smriti_robot (1).ino
smriti_robot (2).ino
robot_smiriti_with_GSM.ino
armopen ();
}
else if (state == 'V'){
horn_on ();
}
else if (state == 'v'){
horn_off ();
}
}
void forward ()
{
digitalWrite(motorA1,1);
digitalWrite(motorA2,0);
digitalWrite(motorB1,1);
digitalWrite(motorB2,0);
}
void reverse ()
{
digitalWrite(motorA1,0);
digitalWrite(motorA2,1);
digitalWrite(motorB1,0);
digitalWrite(motorB2,1);
}
void turnleft ()
{
digitalWrite(motorA1,1);
digitalWrite(motorA2,0);
digitalWrite(motorB1,0);
digitalWrite(motorB2,1);
}
void turnright ()
{
digitalWrite(motorA1,0);
digitalWrite(motorA2,1);
digitalWrite(motorB1,1);
digitalWrite(motorB2,0);
}
Line 164, Column 1
Spaces: 2
Plain Text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shuklainputoutputswitch.py — scp11554\...\programs
shuklainputoutputswitch.py — scp11328\...\programs
smriti_robot (1).ino
smriti_robot (2).ino
robot_smiriti_with_GSM.ino
}
void stopx ()
{
digitalWrite(motorA1,0);
digitalWrite(motorA2,0);
digitalWrite(motorB1,0);
digitalWrite(motorB2,0);
}
void armopen ()
{
digitalWrite(arm_open,1);
digitalWrite(arm_closed,0);
delay(300);
}
void armclosed ()
{
digitalWrite(arm_closed,1);
digitalWrite(arm_open,0);
delay(300);
}
void horn_on ()
{
digitalWrite(buzzer,1);
if (!fona.sendSMS("9041332053", "help me ,i am in problem")) {
Serial.println(F("Failed"));
digitalWrite(7,1);
delay(300);
digitalWrite(7,0);
delay(300);
digitalWrite(7,1);
delay(300);
digitalWrite(7,0);
delay(300);
digitalWrite(7,1);
delay(300);
digitalWrite(7,0);
delay(300);
digitalWrite(7,1);
delay(300);
digitalWrite(7,0);
Line 204, Column 1
Spaces: 2
Plain Text

untitled | shuklainputoutputswitch.py — scp11554\...\programs | shuklainputoutputswitch.py — scp11328\...\programs | smriti_robot (1).ino | smriti_robot (2).ino | robot_smiriti_with_GSM.ino

```
192  digitalWrite(7,0);
193  delay(300);
194  digitalWrite(7,1);
195  delay(300);
196  digitalWrite(7,0);
197  delay(300);
198  digitalWrite(7,1);
199  delay(300);
200  digitalWrite(7,0);
201  delay(300);
202  digitalWrite(7,1);
203  delay(300);
204  digitalWrite(7,0);
205  delay(300);
206
207        } else {
208          Serial.println(F("Sent!"));
209          digitalWrite(6,1);
210  delay(100);
211  digitalWrite(6,0);
212  delay(100);
213  digitalWrite(6,1);
214  delay(100);
215  digitalWrite(6,0);
216  delay(100);
217    digitalWrite(6,1);
218  delay(100);
219  digitalWrite(6,0);
220  delay(100);
221  digitalWrite(6,1);
222  delay(100);
223  digitalWrite(6,0);
224  delay(100);
225        }
226      }
227  void horn_off ()
228  {
229  digitalWrite(buzzer,0);
230  }
231
232
233
```

Line 233, Column 1 | Spaces: 2 | Plain Text

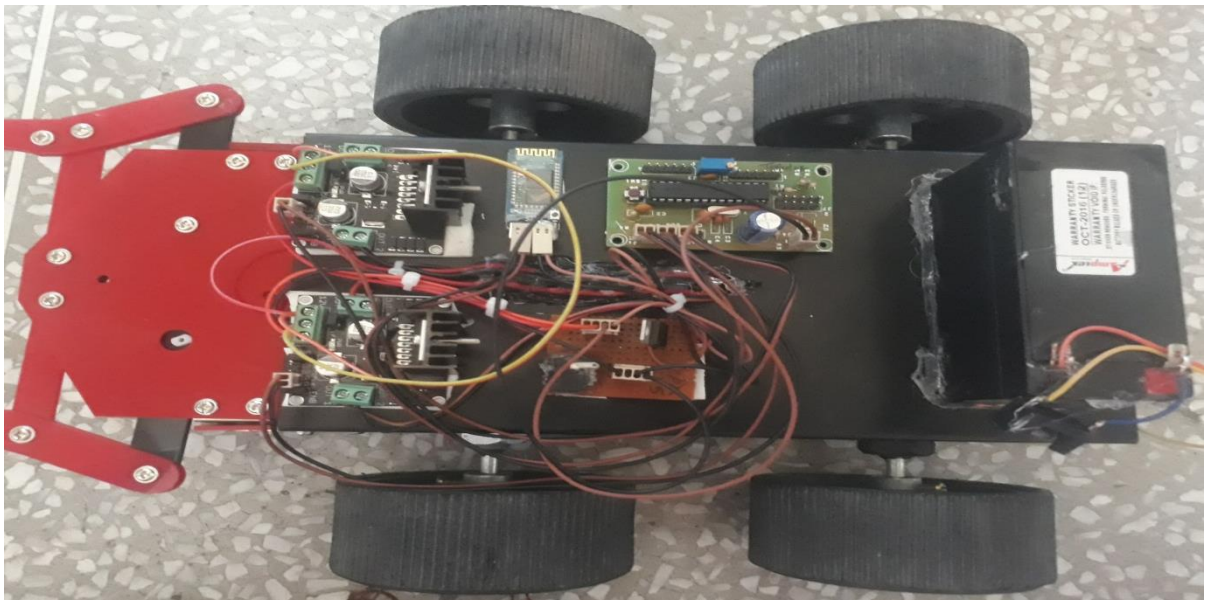

Fig 6.1 The Robot

CHAPTER 7

CONCLUSION

We have aimed at making the project the best suitable one among all the studies conducted and thorough in depth survey of the current scenario in the pertaining field. The system is designed in a manner to be cost effective and easy to use by the user.

This field of robotics can be exploited further by adding more details and increasing the spectrum of the tasks that can be performed by the robotic system. Considering the constraints faced in the making of the project, we have tried to the best of abilities in bringing out a framework which can prove out to be very effective in terms of carrying the regular mundane tasks which otherwise would have been an unwanted concern to work for.

Working on this project for a year and encountering live failures, success, progress, advancements and certain unavoidable hindrances, we still believe that our project would be able to live up to our expectations and would prove of some worth for the unprivileged and the aged people.

We also aspire to work more on the enhancements of the project and aim to embed more innovative ideas in it which currently are restrained due to certain ineluctable issues like time, cost, exposure and availability, so that it could be beneficial for greater challenges

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by F Pulvermüller - 2014 -

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Jan 8, 2013

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