**EEE342-Microprocessor systems and interface**

**Lab Project**



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| Name | **HASEEB ASLAM** |
| Registration Number | **FA19-BEE-077** |
| Class/Section | **BEE 5-D** |
| Instructor’s Name |  |

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| **Lab Assessment** | | |
| **Pre Lab** | **/1** | **/10** |
| **In Lab** | **/5** |
| **Critical Analysis** | **/4** |

# **“Smart Wheelchair”**

**Introduction**

The wheelchair is multi functioned. One can use this wheelchair for various purposes. This chair can be used as panic alarm. If the person needs instant help, he/she can hit the panic alarm button so that someone can help him/her immediately. This wheelchair also has a led light. So, anyone can roam here and there when the surroundings havet enough light. Last but not the least this wheelchair is also automatically control by the Bluetooth.

**Objective**

The objective of this project is to help physically challenged people. It will basically very helpful for those who cannot be able to walk.

***Required components***

* Arduino UNO
* Motor Driver (Model: L298N)
* Bluetooth Module (Model: HC-05)
* DC Motor
* Rechargeable Battery
* Vero board
* LED
* Switch (ON/OFF)
* Buzzer
* Jumper Wire (Male to Male | Male to Female | Female to Female)

**Arduino UNO:**

he **Arduino Uno** is an [open-source](https://en.wikipedia.org/wiki/Open-source) [microcontroller board](https://en.wikipedia.org/wiki/Microcontroller_board) based on the [Microchip](https://en.wikipedia.org/wiki/Microchip_Technology) [ATmega328P](https://en.wikipedia.org/wiki/ATmega328P). The board is equipped with sets of digital and analog (I/O) pins that may be interfaced to various [expansion boards](https://en.wikipedia.org/wiki/Expansion_board) and other circuits. The board has 14 digital I/O pins (six capable of [PWM](https://en.wikipedia.org/wiki/Pulse-width_modulation) output), 6 analog I/O pins. It can be powered by the USB cable or by an external [9-volt battery](https://en.wikipedia.org/wiki/9-volt_battery), though it accepts voltages between 7 and 20 volts.

**Motor Driver (Model: L298N)**

This **L298N Motor Driver Module** is a high-power motor driver module for driving DC and Stepper Motors. This module consists of an L298 motor driver IC and a 78M05 5V regulator. **L298N Module** can control up to 4 DC motors, or 2 DC motors with directional and speed control.

**Bluetooth Module (Model: HC-05)**

The **HC-05** is a popular Bluetooth module which can add two-way (full-duplex) wireless functionality to your projects.

**DC MOTOR:**

A **DC motor** is any of a class of rotary [**electrical motors**](https://en.wikipedia.org/wiki/Electrical_motor) that converts direct current electrical energy into mechanical energy.

**Rechargeable batteries**

A rechargeable battery, storage battery, or secondary cell, (or archaically accumulator) is a type of electrical battery which can be charged, discharged into a load, and recharged many times

**Buzzer:**

An audio signal device like a beeper or buzzer may be electromechanical or mechanical type. The main function of this is to convert the signal from audio to sound. Generally, it is powered through DC voltage and used in timers, alarm devices, printers, alarms, computers, etc.

**Connections**

**A) Motor Driver to Arduino**

* IN1 to Digital Pin 6
* IN2 to Digital Pin 7
* IN3 to Digital Pin 8
* IN4 to Digital Pin 9
* +5V to VIN (Arduino)

B) Bluetooth Module to Arduino

* +5V (Arduino) to +5V (Bluetooth)
* GND (Arduino) to GND (Bluetooth)
* RX (Arduino) to TX (Bluetooth)
* TX (Arduino) to RX (Bluetooth)

D) Other Connections

* Led Light (Anode) to Digital Pin 5 (Arduino)
* Buzzer (Positive Lead) to Digital Pin 4 (Arduino)

**Working:**

• We used an Arduino as the microprocessor of our project, and we programmed it according to the outputs we required of it. Arduino is also transmitting and receiving signals from the Bluetooth module and L298N and BT Module are connected to the Arduino using jumper wires. L298N is provided by an external Battery source which further powers the Arduino and BT Module. 4 DC Gear motors are attached to the L298N Driver. The Bluetooth is connected to any smartphone which sends the commands to the circuit than Arduino works on that command and perform it respectively making the wheelchair to move in the ordered way.

• The L298N Motor Driver receives the signals from the Arduino for any motors to start, stop and to rotate in the given direction. And both sides of the motors of the Wheelchair are separately controlled which helps in the smooth turning and movement of the wheelchair

**MAIN CODE:**

int motorLpin1=6;

int motorLpin2=7;

int motorRpin1=9;

int motorRpin2=8;

int motorLpwm=10;

int motorRpwm=11;

int motorSpeed=40;

int turn=15;

int buzzer = 4;

int light = 5;

void setup() {

Serial.begin(9600);

pinMode(motorLpin1,OUTPUT);

pinMode(motorLpin2,OUTPUT);

pinMode(motorRpin1,OUTPUT);

pinMode(motorRpin2,OUTPUT);

pinMode(motorLpwm,OUTPUT);

pinMode(motorRpwm,OUTPUT);

pinMode(light, OUTPUT);

pinMode(buzzer, OUTPUT);

}

void loop() {

String input="";

while(Serial.available()){

input+=(char)Serial.read();

//delay(5);

}

if(input=="S"){

stp();

}

else if(input=="F"){

fwd();

}

else if(input=="B"){

rev();

}

else if(input=="L"){

lft();

}

else if(input=="R"){

rght();

}

else if(input=="Q"){

lightOn();

}

else if(input=="q"){

lightOff();

}

else if(input=="P"){

buzzerOn();

}

else if(input=="p"){

buzzerOff();

}

else if(input=="W"){

rotation();}

else if(input!=""){

motorSpeed=(input.toInt()\*25);

Serial.println(motorSpeed);

delay(1000);

}}

void lft(){

analogWrite(motorLpwm,40);

analogWrite(motorRpwm,40);

digitalWrite(motorLpin1,1);

digitalWrite(motorLpin2,0);

digitalWrite(motorRpin1,1);

digitalWrite(motorRpin2,0);

Serial.println("left");

}

void rght(){

analogWrite(motorLpwm,40);

analogWrite(motorRpwm,40);

digitalWrite(motorLpin1,0);

digitalWrite(motorLpin2,1);

digitalWrite(motorRpin1,0);

digitalWrite(motorRpin2,1);

Serial.println("rev");

}

void rev(){

analogWrite(motorLpwm,40);

analogWrite(motorRpwm,40);

digitalWrite(motorLpin1,0);

digitalWrite(motorLpin2,1);

digitalWrite(motorRpin1,1);

digitalWrite(motorRpin2,0);

Serial.println("rev");

}

void fwd(){

analogWrite(motorLpwm,40);

analogWrite(motorRpwm,40);

digitalWrite(motorLpin1,1);

digitalWrite(motorLpin2,0);

digitalWrite(motorRpin1,0);

digitalWrite(motorRpin2,1);

Serial.println("for");

}

void stp(){

analogWrite(motorLpwm,0);

analogWrite(motorRpwm,0);

digitalWrite(motorLpin1,0);

digitalWrite(motorLpin2,0);

digitalWrite(motorRpin1,0);

digitalWrite(motorRpin2,0);

Serial.println("stop");

}

void rotation(){

analogWrite(motorLpwm,40);

analogWrite(motorRpwm,40);

digitalWrite(motorLpin1,1);

digitalWrite(motorLpin2,0);

digitalWrite(motorRpin1,1);

digitalWrite(motorRpin2,0);

Serial.println("360rotation");

}

void buzzerOn() {

digitalWrite(buzzer, HIGH);

}

void lightOn() {

digitalWrite(light, HIGH);

}

void buzzerOff() {

digitalWrite(buzzer, LOW);

}

void lightOff() {

digitalWrite(light, LOW);

}

**PROTEUS**

A screenshot of a computer

Description automatically generated with medium confidence

**HARDWARE**

**Market Value:**

When we were searching in the market for the components of our project we were encountered by a same project. That project was a bit bigger than ours and respectively were the components like motors and tires. After the best of negotiation, the shopkeeper was locked at around 3000 Pkr. But we have managed to make our project costing around 7000 Pkr. So, keeping the market in view we are very hopeful that with a little bit of effort and the selling trick we’ll manage to sell our project for at least 10000 Pkr.