PROJECT REPORT

Submitted To

Name: Nawruz Imtiaz
Designation: Instructor
Department of Electrical Engineering
Daffodil Technical Institute

Submitted By

Name: Hasif Khan
Dep: Computer Science & Tech.
Sem: 6th
Roll: 463287
Daffodil Technical Institute

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Signature

Acknowledgment

This project would not have been possible without the valuable assistance of many people to whom we are indebted, in particular our project supervisor Nawruz Imtiaz of Daffodil Technical Institute.

Us thank also goes to all the teachers of Computer Science and Technology Department who helped us in many difficult situations regarding the project and provided with the necessary advice.

Abstract

Smart Wheel Chair is mechanically controlled devices designed to have self-mobility with the help of the user command. This reduces the user's human effort and force to drive the wheels for wheelchair. Furthermore, it also provides an opportunity for visually or physically impaired persons to move from one place to another. The

wheelchair is also provided with obstacle detection system which reduces the chance of collision while on the journey.

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CHAPTER 1

1.1 Tittle of the project

SMART WHEEL CHAIR

1.2 Background

Though the recent developments of science and technology has drastically changed the way a normal person lives his life, there are certain groups of people who have not been able to be benefit from this development. On particular handicapped people with have limited mobility are still living a miserable life.

A smart wheel chair aims to provide aid to those handicapped and physically challenged persons by providing them with some sort of mobility which would greatly help them. Smart wheel chair consists of a major controller unit which allows the user to provide the input in the form of joystick or accelerometer or a voice command. The controller unit then synthesizes the command and takes required action so as to move the wheelchair to the particular position.

1.3 Team members

For this project six of us have worked together. Followings are the names and board roll number of ours.

1) Sakib Hasan Chowdhury (463236)
2) Al-Kaosar (463246)
3) Mustafizur Rahman (463256)
4) Hasif Khan (463287)
5) Momen Uddin (463272)
6) Sayem Rahman (463289)

CHAPTER 2

Objective:

- To provide the facilities for disabled people and elderly people who cannot move properly
- To develop a wheelchair which can be controlled by voice and Bluetooth.
- To reduce the burden of the people who push the wheelchair.
- To improve the balance and posture stability of old age people.

CHAPTER 3

3.1 Theory

Smart Wheel Chairs are mechanically driven vehicles that can move on their own at the user's command. As a result, using a wheelchair requires less force and human effort from the user. Additionally, it gives those who are physically or visually challenged the chance to transfer from one location to another. A system for detecting obstacles is also included with the wheelchair, lowering the possibility of an accident while traveling. Although modern advances in science and technology have fundamentally altered how the average individual lives his life, some groups of people have not been able to profit from these advancements. People with disabilities, in especially those with restricted mobility, continue to lead terrible lives. A smart wheel chair tries to help those who are physically disabled and handicapped by giving them some form of mobility that would be very beneficial to them. A key controller component of a smart wheelchair enables the user to input data using a joystick, an accelerometer, or voice commands. The controller unit then interprets the instruction and executes the necessary maneuvers to transfer the wheelchair to the designated location.

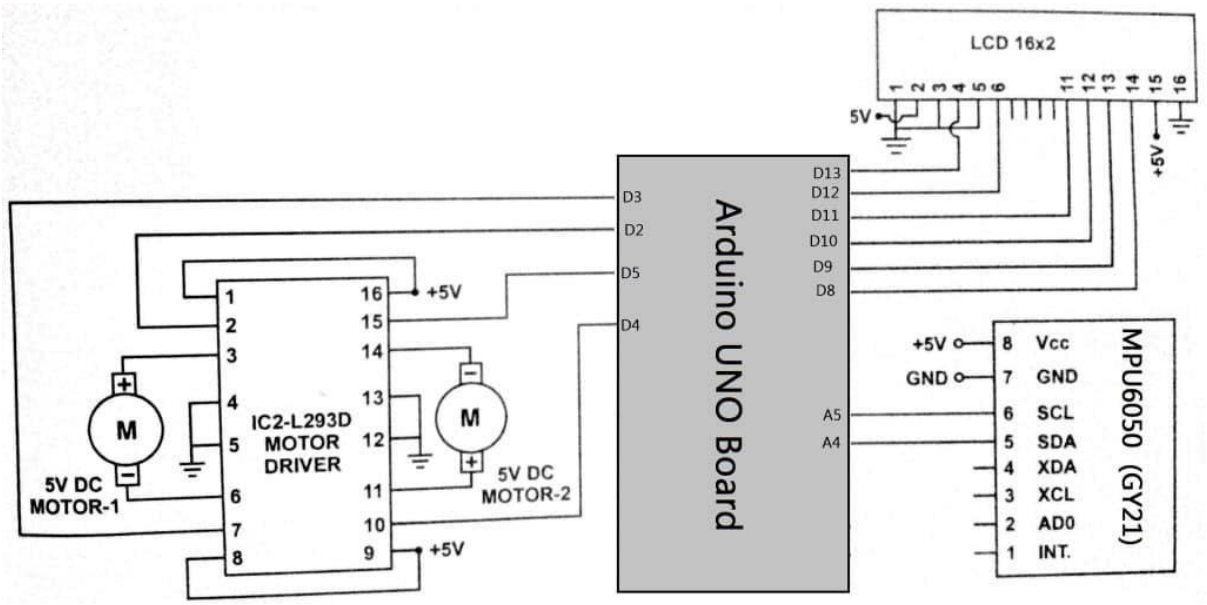
3.2 Review of literature

Before making the final decision regarding the choice of the project, brief research was conducted to find out the projects done previously on the related topic. There were only few previous projects that dealt with speech synthesis processing we could find out.

After our project proposal was accepted, much effort was made to find the necessary resources. We had to search the topics on numerous website and books.

CHAPTER 4

4.1 Block diagram



4.2 Code

```
#include <Wire.h>
#define DEVICE (0x53)    //ADXL345 device address
#define TO_READ (6)        //num of bytes we are going to read each time
(two bytes for each axis)

byte buff[TO_READ] ;    //6 bytes buffer for saving data read from the
device
char str[512];                    //string buffer to transform data before sending
it to the serial port int pos = 0; int anglex; int angley; int m1=11; int
m2=10;
```

```
int m3=13; int
m4=12; void
setup()
{

  Wire.begin();        // join i2c bus
pinMode(m1,OUTPUT); pinMode(m2,OUTPUT);
pinMode(m3,OUTPUT); pinMode(m4,OUTPUT);

  digitalWrite(m1, 0);
digitalWrite(m2, 0);
digitalWrite(m3, 0);
digitalWrite(m4, 0);
//Turning on the ADXL345
writeTo(DEVICE, 0x2D, 0);
writeTo(DEVICE, 0x2D, 16);
  writeTo(DEVICE, 0x2D, 8);

}

void loop()
{
  int regAddress = 0x32;    //first axis-acceleration-data register on the
ADXL345
  int x, y, z;

  readFrom(DEVICE, regAddress, TO_READ, buff); //read the
acceleration data from the ADXL345

   //each axis reading comes in 10 bit resolution, ie 2 bytes.  Least
Significat Byte first!!
   //thus we are converting both bytes in to one int
  x = (((int)buff[1]) << 8) | buff[0];
y = (((int)buff[3])<< 8) | buff[2];
z = (((int)buff[5]) << 8) | buff[4];
anglex = x;
  anglex = constrain(anglex, -260, 260);
angley = y;
  angley = constrain(angley, -260, 260);
```

```
 anglex = map(anglex, -260, 260, 0, 100);
anglex =(anglex/2);
 angley = map(angley, -260, 260, 0,
100);
  Serial.print(anglex);
    Serial.print(" ");
   Serial.println(angley);
  //we send the x y z values as a string to the serial port
 // sprintf(str, "%d %d", x, y);

  //Serial.print(str);
  //Serial.write(10);

  //It appears that delay is needed in order not to clog the port
delay(200);
if(anglex >15 && anglex <39 && angley >35 && angley <70 )
{      digitalWrite(m1,  0);
digitalWrite(m2,  0);   //S
digitalWrite(m3,          0);
digitalWrite(m4, 0);
}

if(anglex <15  )
{   digitalWrite(m1, 1);
digitalWrite(m2, 0);   //R
digitalWrite(m3, 0);
digitalWrite(m4, 0);
}

if(anglex >39 )
{      digitalWrite(m1,  0);
digitalWrite(m2,  0);   //L
digitalWrite(m3,          0);
digitalWrite(m4, 1);
}
if( angley <35 )
{      digitalWrite(m1,  1);
digitalWrite(m2,  0);   //F
```

```
digitalWrite(m3,        0);
digitalWrite(m4, 1);
}

if(angley >70 )
{     digitalWrite(m1,  0);
digitalWrite(m2,  1);   //B
digitalWrite(m3,        1);
digitalWrite(m4, 0);
}
}
//---------------- Functions
//Writes val to address register on device void
writeTo(int device, byte address, byte val) {
   Wire.beginTransmission(device); //start transmission to device
   Wire.write(address);       // send register address
   Wire.write(val);       // send value to write
   Wire.endTransmission(); //end transmission
}

//reads num bytes starting from address register on device in to buff array
void readFrom(int device, byte address, int num, byte buff[]) {
Wire.beginTransmission(device); //start transmission to device
  Wire.write(address);       //sends address to read from
  Wire.endTransmission(); //end transmission

  Wire.beginTransmission(device); //start transmission to device
  Wire.requestFrom(device, num);    // request 6 bytes from device

  int i = 0;
  while(Wire.available())    //device may send less than requested
(abnormal)
  {
    buff[i] = Wire.read(); // receive a byte
i++;
  }
  Wire.endTransmission(); //end transmission
}
```

4.3 Connections

4.31. Connection Between Arduino, Motor & L293D

– Pin No. 1, 8, 9, 16 of L293D IC is connected to 5V
– Pin No's 4, 5, 12, and 13 are the ground pins; connect these to GND (Arduino GND pin).
– Pin No. 2 of L293D IC is connected to Pin No. D2 of Arduino.
– Pin No. 7 of L293D IC is connected to Pin No. D3 of Arduino.
– Pin No. 10 of L293D IC is connected to Pin No. D4 of Arduino.
– Pin No. 15 of L293D IC is connected to Pin No. D5 of Arduino.
– Pin No. 3, 5 of the L293D IC is connected to 2 terminals of motor M1.
– Pin No. 11, 14 of the L293D IC is connected to 2 terminals of motor M2.

4.3.2 Connection Between Arduino & MPU6050

– Connect VCC pin of MPU6050 to the 5V pin of Arduino
– Connect GND pin of MPU6050 to the GND of Arduino
– Connect SCL pin of MPU6050 to the A5 of Arduino
– Connect SDA pin of MPU6050 to the A4 of Arduino

CHAPTER 5

5.1 Working principle

The input sensor for the smart wheel chair is an Accelerometer, Joystick, Ultrasonic Sensor, speech synthesizer and gyroscope. After taking input and processing the input at the speed of 12 MIPS (Million Instructions per Second) process selects the corresponding motor driver and sends the signal which then drives the required part.

There are two wipers motors for the movement of the smart wheel chair. The output of the motor driver is fed to the relay switch, the output of relay switches are connected to motors.

5.2 Scope and application

Smart Wheel Chair has a wide range of application and scope in following areas:

- Physically Challenged People

Physically Disabled People can use it as per their purposes. People who are able to use their hand can use Joystick; People suffering from certain paralysis can use either voice or head movement as per requirement.

- Patients in the Hospitals

People suffering from certain paralysis can use either voice or head movement as per requirement.

- Old Age Homes

People at old age homes can use this chair as per their requirement

5.3 Further enhancement

Alternate power source:
Solar panel roof can be used as alternative power source and also it can be a protective layer from rain and sun.

Artificial intelligence and image processing:
Artificial intelligence (AI) is technology and a branch of computer science that studies and develops intelligent machines and software. Major AI researchers and textbooks define the field as "the study and design of intelligent agents" where an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success.

GPS navigation:
Navigating the actual position of wheel chair.

CHAPTER 6 6.1 Project interface

6.2 Demo Link

1:https://drive.google.com/file/d/12vkjDC2CUGcUWzIcAeOwZSeW9KHlLN4K/view

2: shorturl.at/nqtwD

CHAPTER 7

Conclusion

Smart Wheel Chair was chosen to be done as it incorporated designing an embedded system that was real time and also due to the sensor that was to be used in it. Most modern day technologies use sensors. Completion of this project needed sheer determination as there were many things that could go wrong. Though some difficulties aroused and many remodeling was needed and the chair had some limitations which we learned while building it, at last the Smart Wheel Chair created very close to the adapted design philosophy.

THE END