Ahsanullah University Of Science & Technology

Project Report

Department of Electrical and Electronic Engineering

Project Name: Gyro Controlled Wheelchair

Submitted by:

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Introduction:

In this project we will be controlling a DC motor by using Arduino UNO & Motor Driver Shield. We also use Gyro MPU-6050 for balancing the motor, define the accelerometer axis, Gyro axis. Again in this project we see the clock & anti clock wise rotation of the motor. We use motor driver shield to supply the output power of the motor.

The robot uses feedback from a single-axis gyro sensor to maintain vertical balance. The robot's controller handles both driving and vertical balance.

In this project, we will first verify the robot's controller by running it in simulation. In simulation, we will use simulated hardware to confirm the controller correct operation. Then, we will validate the controller by running it on actual hardware.
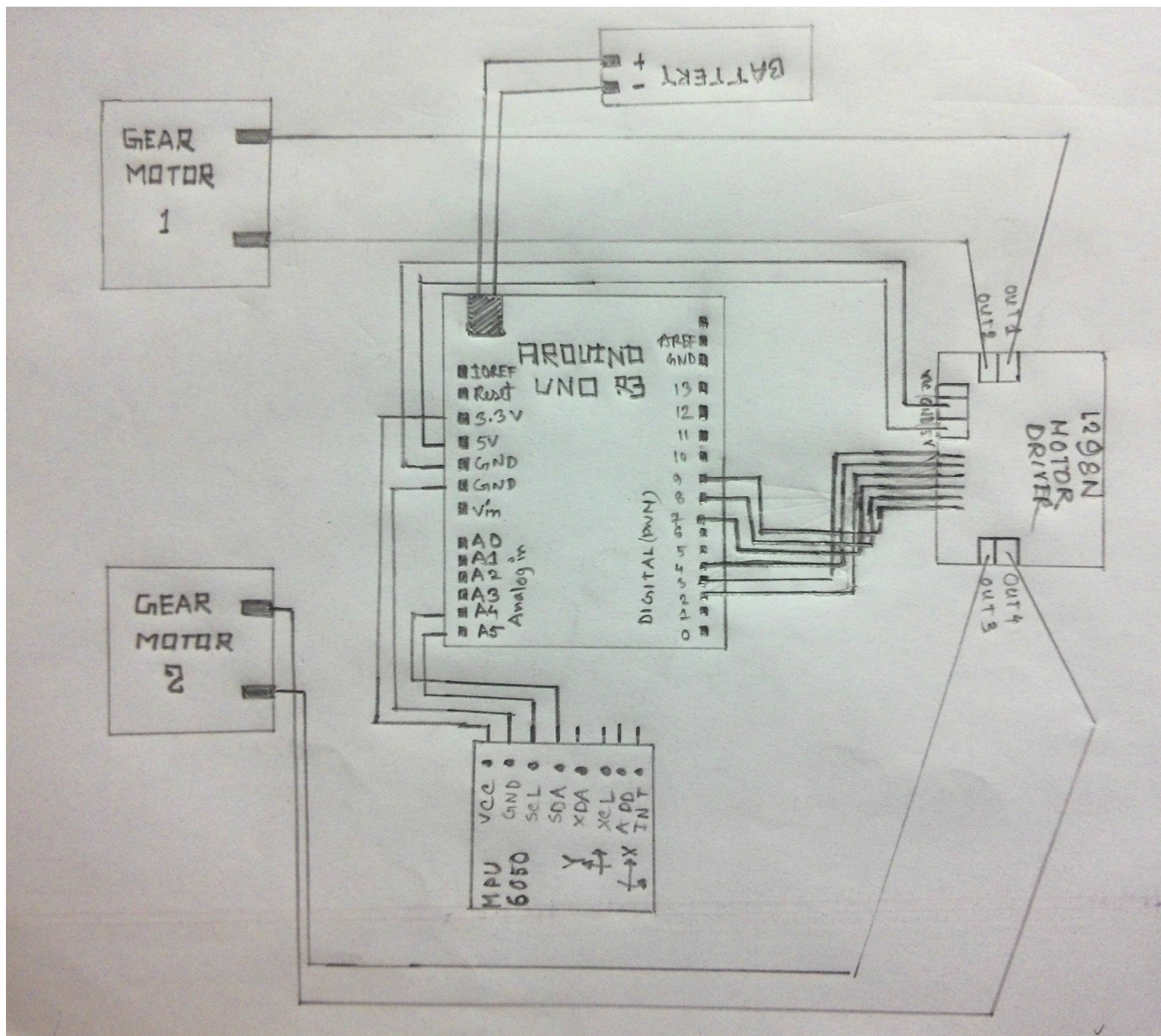
Equipments:

Mechanical Parts:
1 × Acrylic Board
6 × Brass Stud M4x16
2 × Gear Motor
2 × Motor Brackets
2 × Wheel
Screw M3
Nut M3
Bread Board

Electronic Modules:
1 × Arduino UNO R3
1 × Motor Driver L298N
1 × MPU6050

Circuit Diagram:

Codes:

```
#include <Wire.h>
#include<I2Cdev.h>
#include<MPU6050.h>

MPU6050 mpu;

int16_t ax, ay, az;
int16_t gx, gy, gz;

#define pin1 3
#define pin2 9

void setup()
{
 Serial.begin(9600);
 Serial.println("Initialize MPU");
 mpu.initialize();

 //Serial.println(mpu.testConnection() ? "Connected" : "Connection failed");

 pinMode(pin1,OUTPUT);
 pinMode(pin1,OUTPUT);
 pinMode(7,OUTPUT);
 pinMode(8,OUTPUT);
 pinMode(pin2,OUTPUT);
 pinMode(4,OUTPUT);
 pinMode(2,OUTPUT);
}

void loop()
{
 mpu.getMotion6(&ax, &ay, &az, &gx, &gy, &gz);
 ax = map(ax, -17000, 17000, -1500, 1500);

 //Serial.println(ax);

 if(ax > 0)
```

```
{
  if(ax<200)
{
  Serial.println(ax);
  analogWrite(pin1,ax);
  digitalWrite(4,HIGH);
  analogWrite(3,240);
 }
 Else
{
  Serial.println("+200");
  analogWrite(pin2,200);
  digitalWrite(8,LOW);
  analogWrite(9,240);
 }

 }
 if(ax<0)
{
  if(ax>-200)
{
  Serial.println(ax);
  analogWrite(pin2, ax);
   digitalWrite(8,HIGH);
  analogWrite(9,240);
 }
 Else
{
  Serial.println("-200");
  analogWrite(pin1, 200);
  digitalWrite(4,LOW);
  analogWrite(3,240);
 }
 }
 delay(1000);
}
```
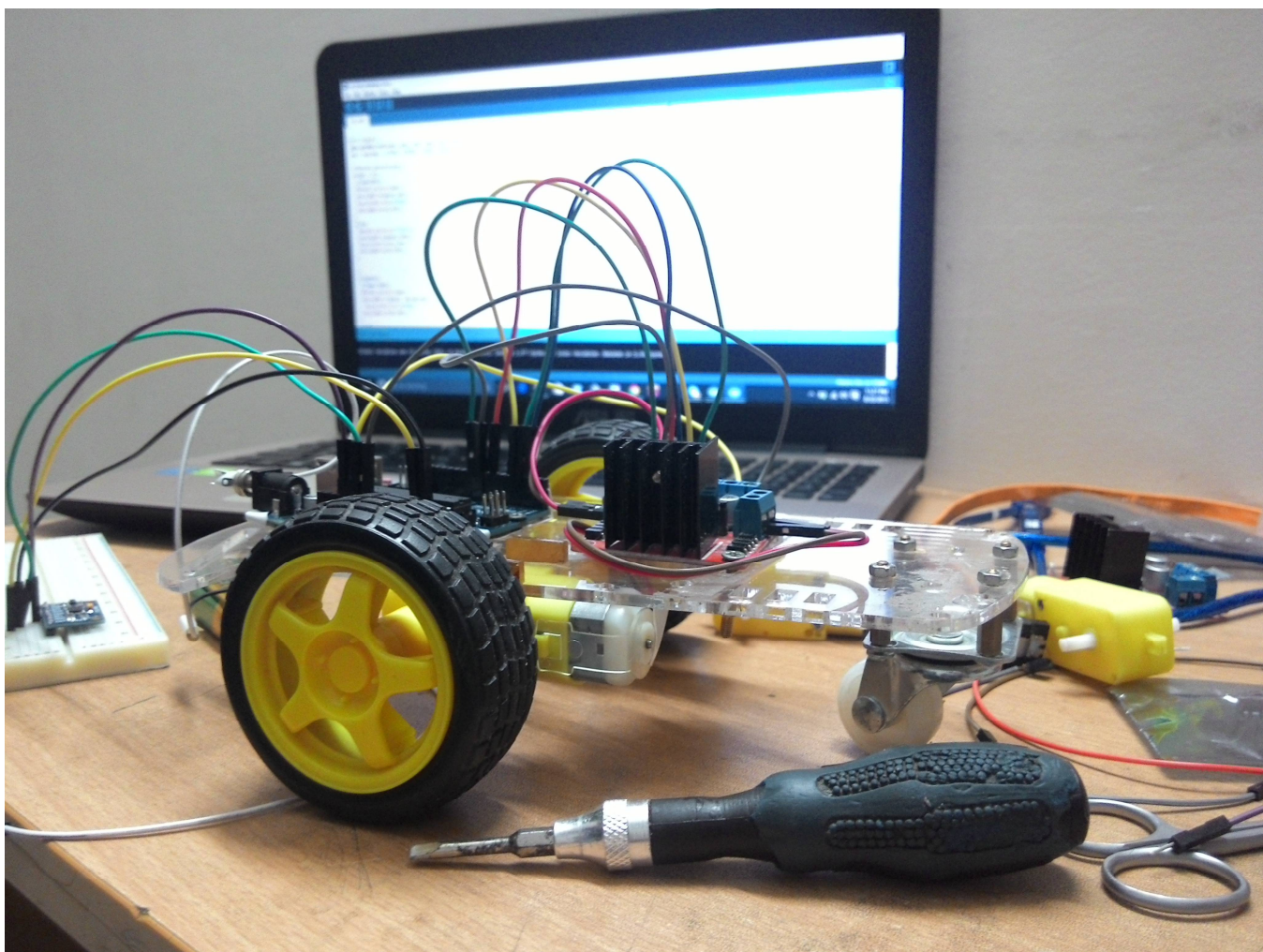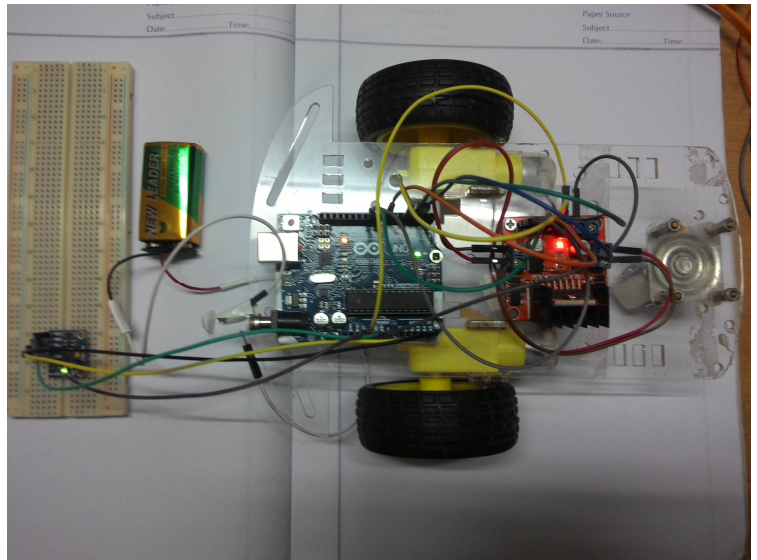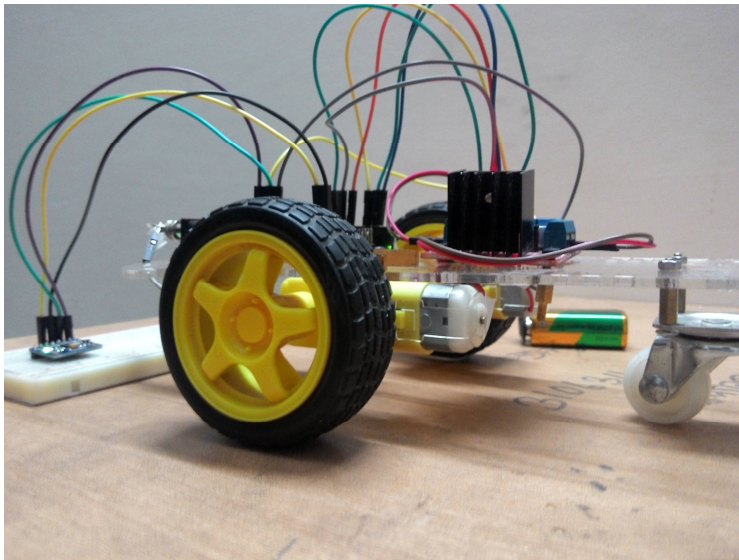
Troubleshooting:

1. Arduino pin number 9, 10 didn't work when we connected it with motor driver pin ENB and ENA.
2. We face some problems with MPU-6050. The response of the Gyro is little bit time consuming.

Project Images:

Applications:

1. If we can upgrade this robot, in future we can use it for paralyzed people for their movement from one place to another.
2. With more modifications or more adapters like Bluetooth, Wi-Fi, and RC Receiver, we can control the robot in different ways.

Discussion:

In this project, we have implemented a feedback control dc motor. When speed changes, sensor output changes. From this changing Arduino detects change of speed and try to minimize it by increasing the duty cycle. Again this project is very useful lame duck people. This type of people can use their hand for changing the speed & rotation of the wheel of their wheelchair. For this we can use a sensor in hand, this sensor is controlling the wheel. Here we can see the response of Gyro by changing the rotation of motor.

References:

1. http://www.circuitmagic.com/arduino/dc-motor-control-with-gy-521-gyroaccelerometer-module-mpu-6050-and-l329d-arduino-driver-shield/

2. http://playground.arduino.cc/Main/MPU-6050

3. https://www.youtube.com/watch?v=kLd_JyvKV4Y

4. https://www.youtube.com/watch?v=D5HY_tjW1Ic

5. https://www.arduino.cc/en/Main/arduinoBoardUno