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WIRELESS CONTROL WHEELCHAIR

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DEDICATION

This project is dedicated to my family, friends and the citizens of the Polytechnic Sultan Salahuddin Abdul Aziz Shah with their assistant, guidance, advised and giving fully support at my industry training session about knowledge of maintenance and servicing and more understand about situation working place during my industrial training. It is also for the people that involved in this project directly and indirectly. Thank you for all support.

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ABSTRACT

Nowadays, the number of elderly people has increased. Some of them live with their children, some live-in parents' homes and some live alone. Problems arise when older people lose the ability to move. Not everyone can be by their side all the time to help them. The project is designed to help those who have trouble using their feet to walk like disabled adults or those who have been paralyzed by accidents. The purpose of the project was to develop a Wheelchair System and Control using a wireless Android consisting of an Android smartphone and a control box that can control the movement of the wheelchair using a motor. The source code is written in C++ software. Arduino Nano and 5V 4 channel relay module is the main controller that controls the motor, sends signals to the Bluetooth HC-05 signal receiver and receives serial data from the android smartphone. Bluetooth communication protocol is used to communicate between android smartphones and controller boxes.

The direction and speed of the motor are controlled using the L298N motor driver. The way to control wheelchair movement is by using smartphone software and manually pushing the wheelchair. The four movement options are forward, backward, left and right. The system also has the ability to control the movement of electricity by laying down and sitting using Bluetooth as wireless communication. Electrical equipment can be switched on and off wirelessly using the use of android smartphone software that sends alerts to recipients of electrical equipment. In conclusion, this product not only allows people with disabilities to control their own wheelchair without the help of others, but also allows others to use android smartphones to control wheelchairs and electrical.

CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

In this project we are using Android Application and bluetooth System. But many of individuals with disabilities who need wheelchairs are satisfied with it, few members of the disabled community find it is difficult or impossible for operating a standard power wheelchair. This project is included in assistive technology. For handicapped and depended disable it is more independent, productive and enjoyable living.

To perform functions a handicapped person with locomotive disabilities needs a wheelchair that require him or her to move around. He/she can do so manually by pushing the wheelchair with his/her hands. However, many of us have weak upper limbs or find the manual mode of operating too tiring. Therefore, it is desirable to provide them with a motorized wheelchair which is controlled by moving a smartphone command. Since motorized wheelchair is important that it be able to avoid obstacles automatically in real time, it can move at a fair speed. Cost of this motorized wheelchair is affordable for many handicapped people as possible, as well as for organizations that support it. With these requirements in mind we propose an automated wheelchair with real-time Herald avoidance capability. The power wheelchair control interfaces currently still not enough to provide mobility for substantial number of persons with disabilities. Through research and design wise, the wheelchair to control development along safe and effective use of the provision independence and self-use mobility. This project will provide disability weight innovative solutions to handle the wheel chairs to use voice interface.

This project describes a wheelchair which can be controlled only by using the android application and user's smartphone also. The main aim of this project is to facilitate the movement of the disabled people and elderly people who cannot move properly so with this we can enable them to lead better lives without any problem. Speech recognition is a key technology which can provide human interaction with machines

for controlling a wheelchair. This project includes two parts which is software and hardware. It is realized that for input of Bluetooth we are using Android phone as an intermediary. In this project, Arduino Nano is used as controller to control the movement of wheelchair based on the bluetooth as an input.

There are seven basic movements of a wheelchair to be applied by the user. The seven operations perform by the wheelchair are described as following:

i. Moving forward
ii. Moving backward
iii. Turning to the right
iv. Turning to the left
v. Stop condition
vi. Leaning down
vii. Sitting

1.2 PROMBLEM STATEMENT

Nowadays, the number or elderly people has increased. Some live with their children, some live in adult foster home and some even live by themselves. The problem arises when the elderly people lose their ability to move around. Not everyone can be present to help them at all time. Patients involved in physical injuries and disabilities with good mental strength struggle to get through places using the conventional hand powered wheelchair. A wheelchair is a chair with wheels, designed to be a replacement for walking. A wheelchair is a device used for mobility by people for whom walking is difficult or impossible, due to illness or disability. To face this problem, an android device that can control DC motor will be developed.

1.3 OBJECTIVE

The project is implemented in order to achieve the following objectives which are:

i. To develop a system that can control the movement of a wheelchair by using android.
ii. To design android system that can control electrical appliances.

1.4 SCOPE OF PROJECT

The scope of this project is to study the basic of android from several published papers and books as well as to study the code used to control the movement of the Android-based wheelchair controller. This project focuses mainly on how to apply what that have been learned about the android application. The parameters for this project can be divided into several parts which are:

1.4.1 The basic concept of android application

In this project, android application is used to control the movement of the wheelchair. Android is a software bunch comprising not only operating system but also middleware and key applications. Android applications can control two electrical appliances and dc motor.

1.4.2 The basic movement of the wheelchair

The movement of the wheelchair is controlled by the android application. The wheelchair can move to the right and to the left as well as move forward and backward. All of these movements can be controlled by using android application.

CHAPTER 2
LITERATURE REVIEW

In this chapter, we have researched from several magazines, journals, newspapers and some websites on things and projects that have been produced related to our project. Various studies have been conducted to produce a prototype of the wireless control wheelchair. The study was performed on the sensitivity of the controller, wheelchair's movement, method and issues.

2.1 SMART WHEELCHAIRS BY RICHARD C. SIMPSON

Several studies have shown that both children and adults benefit substantially from access to a means of independent mobility, including power wheelchairs, manual wheelchairs, scooters, and walkers. Independent mobility increases vocational and educational opportunities, reduces dependence on caregivers and family members, and promotes feelings of self-reliance. For young children, independent mobility serves as the foundation for much early learning. No ambulatory children lack access to the wealth of stimuli afforded self-ambulating children. This lack of exploration and control often produces a cycle of deprivation and reduce motivation that leads to learned helplessness. The author compares the smart accessible factor that ever produced Smart wheelchairs that navigate autonomously to a destination often do so with an internal map, commercialisation and future plan to upgrade smart accessible Smart wheelchairs have been used to explore a variety of alternatives to the more "traditional" input methods associated with power wheelchairs (e.g., joysticks, pneumatic switches). Voice recognition has often been used for smart wheelchairs (e.g., Nav Chair, SENARIO, Tetanuran because of the low cost and widespread availability of commercial voice recognition hardware and software. Authors identify the problems faced by smart wheelchairs i.e. technical weakness, high cost, cumbersome and lack of standard communication protocol

2.2 APPARATUS FOR WIRELESS POWER TRANSMISSION

Disclosed is an apparatus for wireless power transmission between an external power source and an electric mobility vehicle. The present invention allows a user with limited physical mobility to electrically connect the present invention to an electric mobility vehicle so that the portable power source of the electric mobility vehicle can be recharged. The present invention includes a power charger, which can be connected to the charging section of a device such as an electric wheelchair. It is to be understood that many other possible modifications and variations can be made without departing from the spirit and scope of the invention as hereinafter claimed.

2.3 HUMAN-MACHINE INTERFACE FOR A SMART WHEELCHAIR

Defining the control protocols between the human and the robot technology. There are different types of wheelchairs including basic, lightweight, folding, multi-function, powered, fully/partially autonomous and so on. The main focus of the article demonstrates the design and performance of the interface between sensory feedback and the computer-controlled system. The real time data processing is addressed here for a smart wheelchair that functions as a low speed autonomous vehicle. The focus is on the implementation of mobile high-performance computing (HPC) cluster comprised of a multi-computer system connected over a local area network (LAN). Parallel processing capabilities of LabVIEW and the eight processing threads on the Intel I7 hyper-threading CPU, the task parallelism for the vision system can improve the CPU usage up to 80%. A dedicated computer is utilized for the LRF data processing cluster configuration that can be optimized. Advances are made on the technology of smart wheelchairs with sensors and driven by intelligent control algorithms to minimize the level of human intervention. The presented vision-based control interface allows the user to adapt and command the system at various levels of abstraction.

2.4 SMART WHEELCHAIR USING ANDROID SMARTPHONE FOR PHYSICALLY DISABLED PEOPLE

The authors identify there are existing technologies which allow the users to use human gestures such as the movements of hands, movements of leg, tongue and head and synchronize them with the movements of the wheelchair for a better wheelchair controls for example smart wheelchair. A smart wheelchair is developed to help an elderly or physically disabled person (user) to move from one place to another independently. An android application is developed and installed in the android smartphone. The authors describe development of a smart wheelchair system with voice recognition and touch controlled using an embedded system. An android application is developed and installed on the android smartphone. The system is divided into two main modes: voice recognition mode and touch mode. For the voice recognition mode, elderlies or physically disabled people (users) can provide the voice input, for example, “go”, “reverse”, “turn to the left”, “turn to the right” and “stop”. The wheelchair will move according to the command given. For the touch mode, the user can select the specified direction displayed within the four quadrants on the screen of the android smartphone to control the wheelchair. An Arduino Uno is used to execute all commands. The MD30C motor driver and HC05 Bluetooth module are used in this system. This system is designed to save time and energy of the user. It consists of two controlled modes, the first mode is the touch mode and the second mode is the voice recognition mode [8]. In the first mode, the user can give the voice input using an android smartphone. The android smartphone will convert the voice commands into a string of data and this string of data will be sent to the Bluetooth module and lastly delivered to Arduino Uno. After that, Arduino will decodes and process it. The motor driver will direct the wheelchair according to the command given. For the second mode, the user can determine the wheelchair’s movement by selecting the desired direction on the android smartphone phone screen. The command given by the user will be forwarded to the Arduino Uno via Bluetooth. The main objectives were to design an android application that can direct the movement of a wheelchair, to develop the voice recognition mode and touch mode to help the elderlies and physically disabled people to move their wheelchairs independently and to provide the elderlies and physically disabled people with the

ability to control the movement of the wheelchairs by using android smartphones. The system designed has undergone a few tests and successfully completed the basic performance. The objectives were achieved as the software and hardware implementation work well as expected.

2.5 DEVELOPMENT OF WIRELESS CONTROL SYSTEM FOR CONTROLLING ELECTIC-POWERED ROBOTIC VEHICLE WHEELCHAIR PROTOYPE

The author a multiple control systems were developed using commonly used wireless communication protocols like Bluetooth, Xbee, and Wi-Fi. The author both Xbee and Wi-Fi technology based control systems were able to guide the robotic vehicle through the corridor. Wireless technology enables the devices to transfer/receive data from matched devices and the web without using any physical connection. It may be concluded that for short distance communication, the implementation of Bluetooth wireless technology is efficient and cost- effective where as for long distance communication wireless technology is economic.

CHAPTER 3
METHODOLOGY

3.1 INTRODUCTION

Methodology is the systematic, theoretical analysis of the methods applied to a field of study. It comprises the theoretical analysis of the body of methods and principles associated with a branch of knowledge. Typically, it encompasses concepts such as paradigm, theoretical model, phases and quantitative or qualitative techniques.

A methodology does not set out to provide solutions - it is, therefore, not the same as a method. Instead, a methodology offers the theoretical underpinning for understanding which method, set of methods, or so-called “best practices” can be applied to specific case.

Hardware product that we used. It consists of Arduino Nano microcontroller, Motor Driver, Relay, Motor, and Bluetooth device.

3.2 FLOW CHART OF PROJECT PROCESS

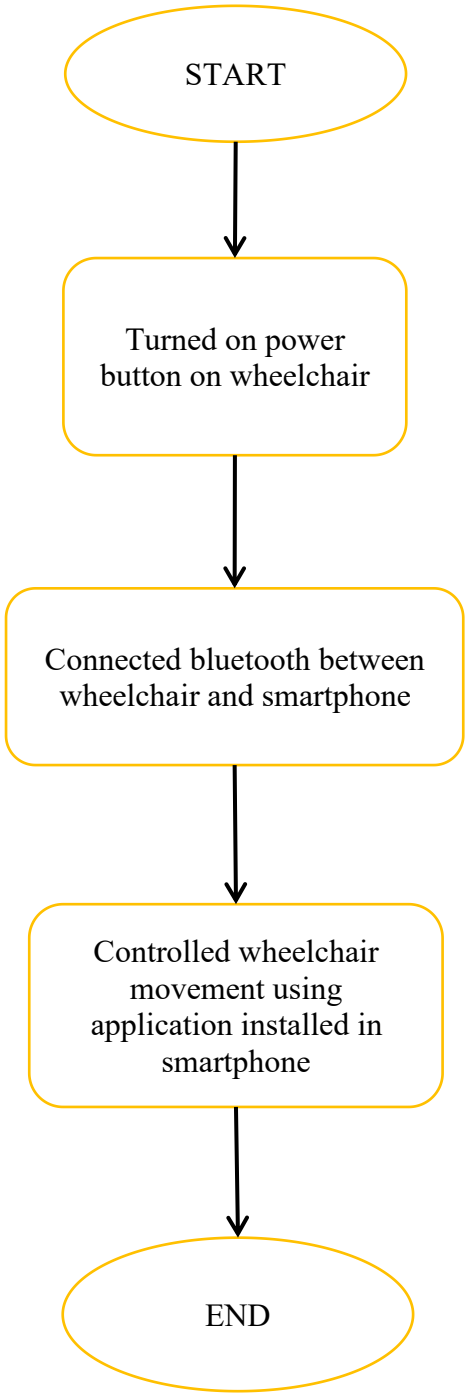


FIGURE 3.2 Flow Chart Of Project Process

3.3 GANTT CHART

Course	No	Task Name	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
DEE50102 PROJECT 2		INSTALLATION														
	1	INSTALLATION OF COMPONENTS ON PCB														
	2	INSTALLATION OF WIRING														
	3	INSTALLATION OF SOFTWARE														
	4	INSTALLATION OF CONTROL CIRCUIT / SYSTEM														
	5	INSTALLATION OF PROJECT CASING														
		TESTING														
	6	TEST THE ELECTRONIC PART														
	7	TEST THE MECHANICAL PART														
	8	TEST THE OVERALL PROCESS / PROJECT														
		DOCUMENTS														
	9	PREPARATION OF SLIDE PRESENTATION														
	10	PREPARATION OF LOGBOOK														
	11	PREPARATION OF SURVEY														
	12	PREPARATION OF PROJECT 2 FINAL REPORT														
	13	END														

TABLE 3.3 Gantt Chart

3.4 BLOCK DIAGRAM AND FUNCTION

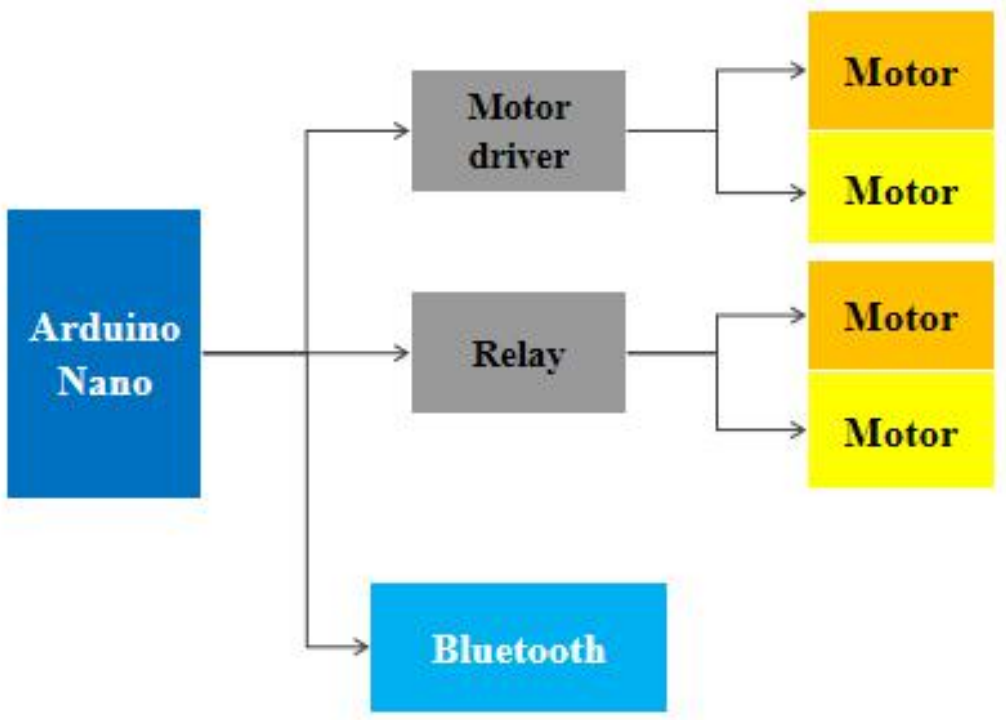


FIGURE 3.4.1 Block Diagram

ATMEGA BASED MICROCONTROLLER (ARDUINO NANO)

Arduino NANO is an microcontroller board based on the ATmega328P. It has 14 digital input/output pins(of which 6 can be used as PWM outputs), a 16MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller.

BLUETOOTH MODULE

Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz) from fixed and mobile devices, and building personal are networks (PANs).

4 CHANNEL 5V RELAY MODULE

The 4 Channel Relay Module is a convenient board which can be used to control high voltage, high current load such as motor, solenoid valves, lamps and AC load. It is designed to interface with microcontroller such as Arduino, PIC and etc. The relays terminal (COM, NO and NC) is being brought out with screw terminal. It also comes with a LED to indicate the status of relay.

DC MOTOR

A DC motor is any of class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanically or electronic, to periodically change the direction of current flow in part of the motor.

MOTOR DRIVER(L298)

The L298N is an integrated monolithic circuit in a 15-lead Milliwatt and PowerS020 packages. It is a high voltage, high current dual full-bridge driver de-signed to accept standard TTL logic level sand drive inductive loads. An additional supply input is provided so that the logic works at a lower voltage.

3.5 CIRCUIT ASSEMBLY

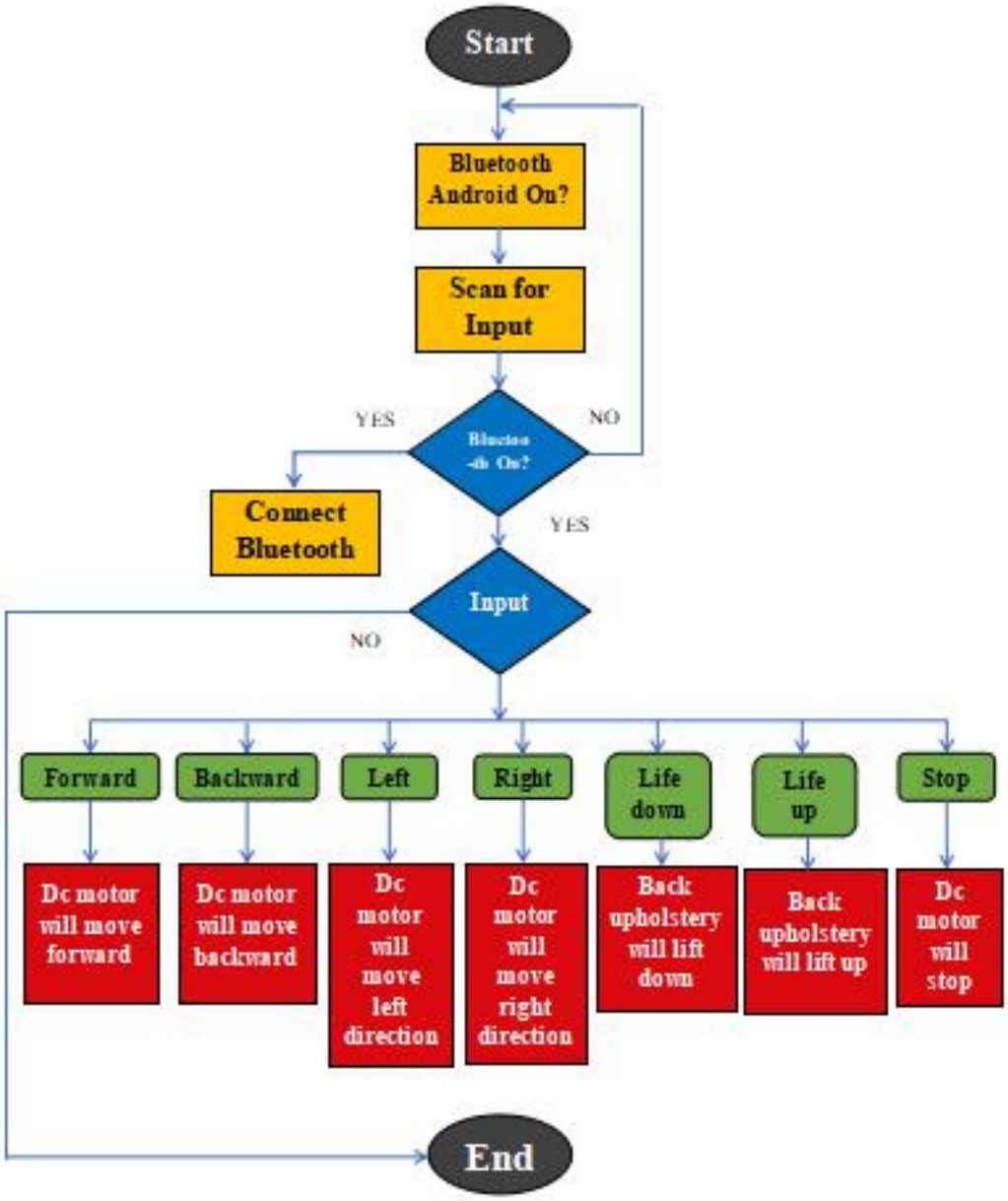
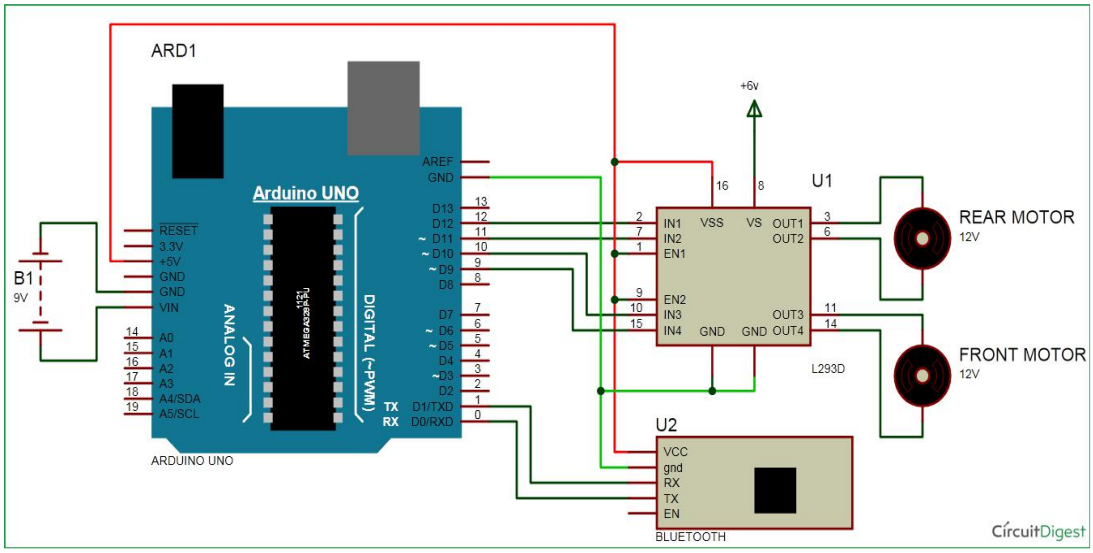


FIGURE 3.5 Flow Chart of The Project

3.5.1 CIRCUIT

The circuit that we used is to measure the distance using ultrasonic sensor

3.5.1.1 SCHEMATIC DIAGRAM



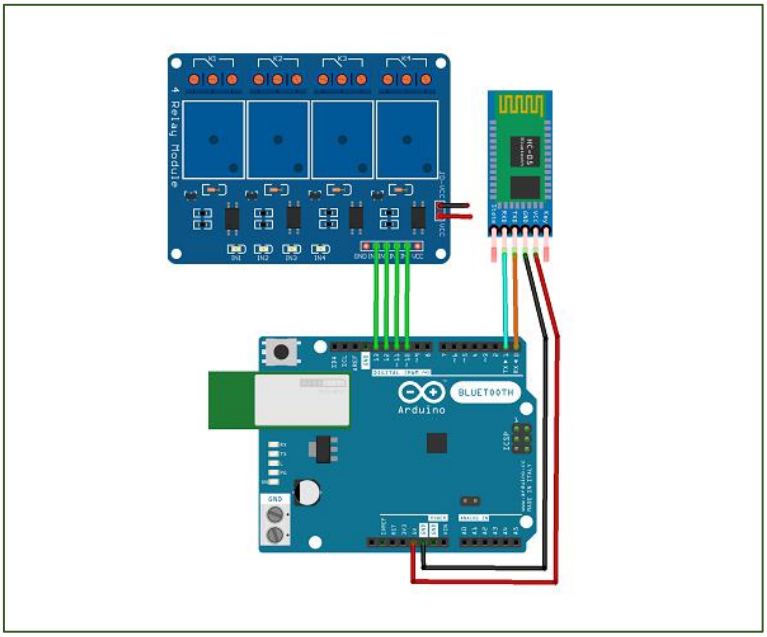


FIGURE 3.5.1.1 Schematic Diagram

3.5.2 LIST OF COMPONENTS

3.5.2.1 ARDUINO NANO

Arduino NANO is an microcontroller board based on the ATmega328P. It has 14 digital input/output pins(of which 6 can be used as PWM outputs), a 16MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller.

3.5.2.2 ARDUINO BLUETOOTH HC-05 MODULE

Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz) from fixed and mobile devices, and building personal are networks (PANs).

3.5.2.3 MOTOR DRIVER L298N

The L298N is an integrated monolithic circuit in a 15-lead Milliwatt and PowerS020 packages. It is a high voltage, high current dual full-bridge driver de-signed to accept standard TTL logic level sand drive inductive loads. An additional supply input is provided so that the logic works at a lower voltage.

3.5.2.4 4 CHANNEL 5V RELAY MODULE

The 4 Channel Relay Module is a convenient board which can be used to control high voltage, high current load such as motor, solenoid valves, lamps and AC load. It is designed to interface with microcontroller such as Arduino, PIC and etc. The relays terminal (COM, NO and NC) is being brought out with screw terminal. It also comes with a LED to indicate the status of relay.

3.5.2.5 HIGH TORQUE DC 12V 40RPM

Torque is the amount of force an engine can exert on the wheels. Torque is hard the engine can “push” the car, where acceleration comes from. In gas engines, torque builds with engine speed, often up to the middle of the engine speed range.

3.5.2.6 DC MOTOR

A DC motor is any of class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanically or electronic, to periodically change the direction of current flow in part of the motor.

3.6 COST

ITEM	COMPONENT	QUANTITY	PRICE
1	ARDUINO NANO	1 PCS	RM13.00
2	ARDUINO BLUETOOTH HC-05 MODULE	1 PCS	RM15.00
3	4 CHANNEL 5V RELAY MODULE	1 PCS	RM17.00
4	MOTOR DRIVER L298N	1 PCS	RM7.00
5	12 RECHARGERBLE BATTERY GP 7.24H	1 PCS	RM135.00
6	BATTERY CHARGER 12V 2A	1 PCS	RM115.00
7	HIGH TORQUE DC 12V 40RPM	2 PCS	RM120.00
8	MY6812 150W 12V DC HIGH SPEED	2 PCS	RM240.00
9	SIT HARDEN STEEL SPROCKET	2 PCS	RM200.00
10	ELECTRONIC COMPONENT SET FOR CONTROL SYSTEM	1 SET	RM60.00
11	MECHANICAL MODIFICATION GEAR & CHAIN PARTS	1 SET	RM240.00
12	WHEELCHAIR SECOND HAND	1 PCS	RM164.00

TABLE 3.6 Component Cost

3.7 PROPOSAL

The proposal consists of introduction for the project, objectives, problem statement, scope, literature review and methodology, principle of operation, block diagram, schematic diagrams, circuit operation, cost and Gantt chart. When the proposal is approved the project can proceed the project installation where the real project is build. The copy of the approved proposal is attached on appendices sections.

CHAPTER 4
ANALYSIS AND RESULT

4.1 INTRODUCTION

For this chapter we chose random person to try out our project and make some analysis through our survey to them after they tried our project.

4.2 RESULTS AND DISCUSSION

Results: Once the circuit has been built as discussed in Chapter 3, the Arduino has been programmed the Bluetooth sensor controlling the movement of the wheelchair. The arduino, bluetooth and control box works as it programmed to control the movement of the wheelchair using android smartphone.

4.3 BAR CHARTS SHOWS THE NUMBER OF PEOPLE REACTION FOR USING WIRELESS CONTROL WHEELCHAIR TO CONTROL RHE MOVEMENT OF WHEELCHAIR.

[A] SECTION A

1. Gender

A. Man

B. Female

2. Age

A. 20 – 30 years

B. 31 – 40 years

C. 41 – 50 years

D. 51 – 60 years

3. Status

A. Married

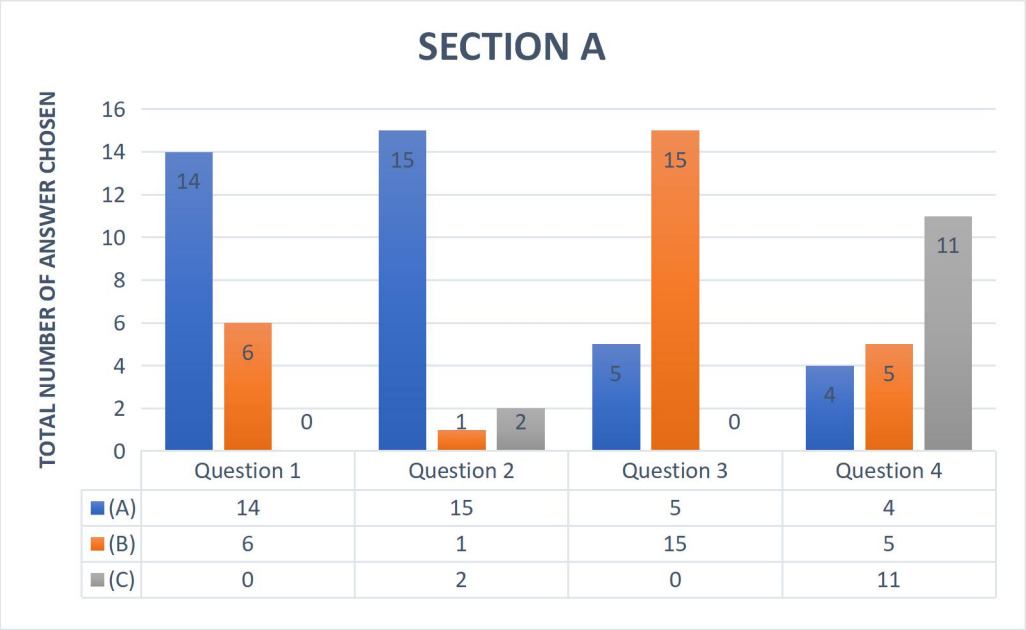
B. Single

4. Occupation

A. The government

B. Private

C. Students



[B] SECTION B

1. Do you or people in the surrounding you have used a wheelchair?

A. Yes

B. Not

2. What are the difficulties faced by patients while wanting to use toilets?

A. Transfer Users

B. Need help

C. Smooth

D. The wheelchair does not fit to enter toilet

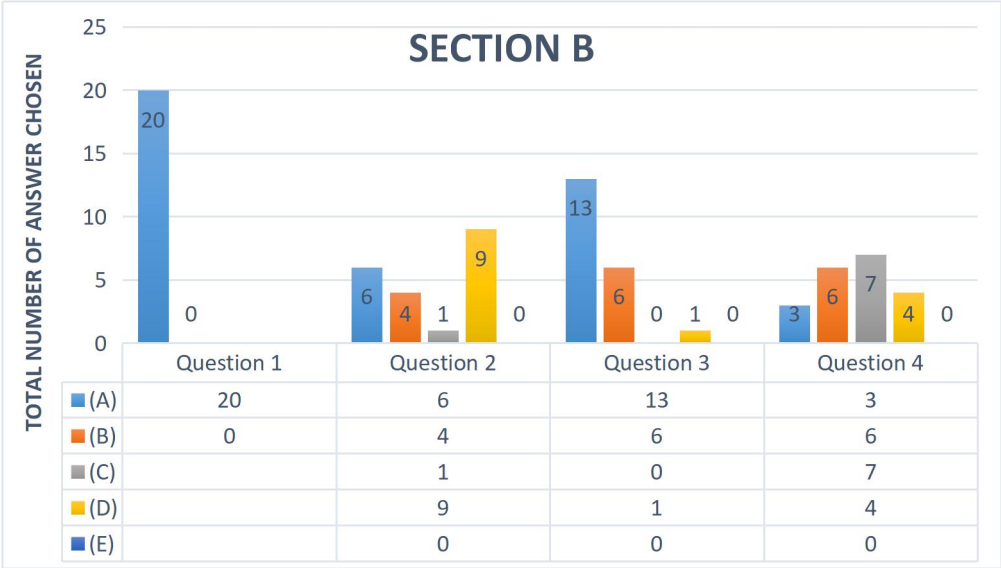
E. Others, specify: _____

3. What is a wheelchair problem?

A. Cannot be adjusted (sit, reverse or lie)
B. Manual (wheelchairs should be refused to move)
C. No speed control
D. Hard control device reached (joystick)
E. Others, specify: _____

4. What type of wheelchairs do you prefer to improve wheelchairs?

A. Speed control
B. High Security
C. Easily adjust
D. Easy to control
E. Other



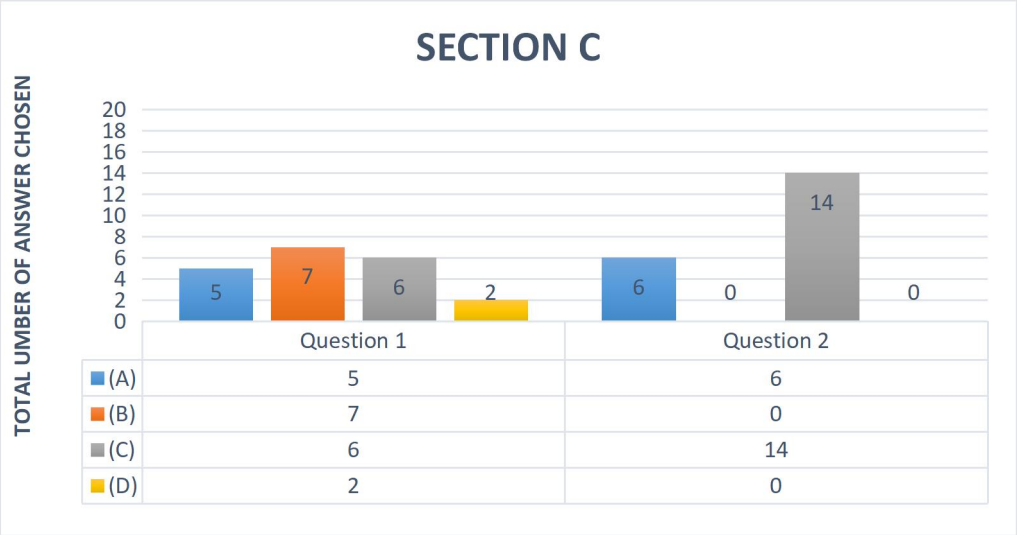
[3] SECTION C

1. As a guardian, what is the inconvenience you encounter when with the user?

A. Safety
B. Transfer Users
C. Helps for cleaning purposes
D. Regulating the synchronization and speed of the wheelchair

2. What is the operation of the wheelchair that you prefer?

A. Automatic
B. Manual
C. Partly automatic
D. Other



4.1 DISCUSSION

This wireless control wheelchair helps the people to manage their movement. This wireless control wheelchair also can control all the movement function at the wheelchair which is forward, reverse, left, right, laying down, sitting position and compact it into lower hight. Not only this the user also able to used any android phone to control it or can control it using traditional way.

CHAPTER 5
CONCLUSION

5.1 CONCLUSION AND RECOMMENDATION

CONCLUSION

Since 90% of the people own a smart phone, smart wheelchair is one of the best solutions. As the person can remotely control the wheelchair using smart phone the proposed system becomes more helpful and efficient. This gives him confidence for his life carrier. The patient monitoring system on the wheelchair will be constantly monitoring the health of the patient. If any abnormality is detected, the system will alert to the relative or doctor. Thus, this system greatly helps the patients with lower limb impairment.

RECOMMENDATION

When we finished the 'wireless control wheelchair' Project, we were able to conclude and exchange some of our suggestions and insights after seeing and knowing the result. The following suggestions are:

a) Understand in more detail the scope of the project to be completed is done.
b) Get the insights from those who are more experienced and experienced start the project work.

5.2 REFERENCE

[1] Anusha, S., M. Madhavi, and R. Hemalatha. "HOME AUTOMATION USING ATmega328 MICROCONTROLLER AND ANDROID APPLICATION." (2015).

[2] Rajini, Gangadhari and Lr Siva. "Android Mobile Phone Controlled Bluetooth Robot Using Arm7 Microcontroller." (2015).

[3] Megalingam, Rajesh Kannan et al. "'Gest-BOT'-A Highly Convenient Locomotive Solution for the Elderly and Physically Challenged." Global Humanitarian Technology Conference (GHTC), 2012 IEEE. IEEE, 2012.

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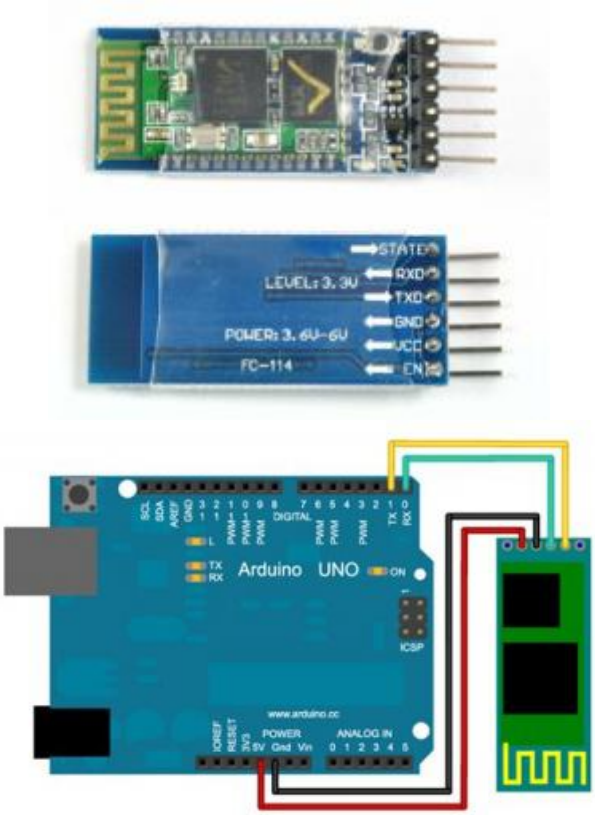
APPENDIX

HC-05 BLUETOOTH MODULE



HC-05 module is an easy to use **Bluetooth SPP (Serial Port Protocol) module, designed** for transparent wireless serial connection setup. The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless communication. This serial port bluetooth module is fully qualified **Bluetooth V2.0+EDR (Enhanced Data Rate)** 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses **CSR Bluecore 04** - External single chip Rluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature).

The Bluetooth module HC-05 is a MASTER/SLAVE module.By default the factory setting is SLAVE.The Role of the module (Master or Slave) can be configured only by AT COMMANDS.The slave modules cannot initiate a connection to another Bluetooth device, but can accept connections.Master module can initiate a connection to other devices. We can use it simply for a serial port replacement to establish connection between MCU and GPS, PC to our project.

PROGRAMMING FOR BLUETOOTH MODULE

```
01.  int LED= 12;
02.  char input;
03.
04.  void setup()
05.  {
06.    Serial.begin(9600);
07.    pinMode(LED, OUTPUT);
08.    Serial.println(">> START<<");
09.  }
10.
11.  void loop()
12.  {
13.    if(Serial.available()>0)
14.    {
15.      input= Serial.read();
16.      if(input=='1')
17.      {
18.        Serial.println("ON");
19.        digitalWrite(LED, HIGH);
20.        delay(2000);
21.      }
22.      else if(input=='0')
23.      {
24.        Serial.println("OFF");
25.        digitalWrite(LED, LOW);
26.        delay(2000);
27.      }
28.      else
29.      {
30.        Serial.println("NO INPUT");
31.        Serial.println(input);
32.      }
33.    }
```

In the Definition part, we declare the LED variable that accepts 12 (in other words the Digital PIN). And the char input that we will further use for accepting the user's instructions. Until now, we have just declared two variables. Next we have a setup() block where we will initialize a LED and serial communication. So, we have pinMode() and Serial.begin(). In the next loop() block we do all the actual coding. First, we decide whether or not the serial port is available. If yes, then we will do the communication. For that, we have a Serial Method available(). On Yes, we proceed and ask for the user's input via the serial port. And, the read() method is there that accepts input from the serial port. Whatever value we get from the serial port we store

in the input variable that we defined earlier. And, on input it will decide to turn it on or not. See, we haven't written any code for Bluetooth communication. So, that's because Bluetooth communication is implicitly Serial Communication. And in Arduino, what we do with the Serial Monitor in Arduino is that we can implement Bluetooth Serial Communication.

PROGRAMMING FOR WHEELCHAIR MOVEMENT.

```
signed int x;
signed int y;
signed int z;
signed int btna;
signed int btnb;

float a;
float m;

String str;
char dir = 0;

int ML1 = 8;
int ML2 = 7;
int MR1 = 5;
int MR2 = 4;

int EL = 9;
int ER = 3;

int el = 0;
int er = 0;

int elp = 0;
int erp = 0;

boolean fast = true;
boolean StateA0 = false;
boolean StateA1 = false;
boolean StateA2 = false;

void setup() {

pinMode(ER, OUTPUT);
pinMode(EL, OUTPUT);
pinMode(ML1, OUTPUT);
pinMode(ML2, OUTPUT);
pinMode(MR1, OUTPUT);
pinMode(MR2, OUTPUT);
```

```
pinMode(A0, OUTPUT);
pinMode(A1, OUTPUT);
pinMode(A2, OUTPUT);
pinMode(10,OUTPUT);
digitalWrite(10,LOW);
Serial.begin(9600);
Serial.println("Start");
}


void loop()
{
      while(Serial.available())
      {

         char getData = Serial.read();

            if (getData == 'M')
            {
               m = Serial.parseFloat();

               if (Serial.read() == '#')
               {
                  processM();
               }
            }

            if (getData == 'A')
            {
               a = Serial.parseFloat();

               if (Serial.read() == '#')
               {
                  processA();
               }
            }

            if (getData == 'a')
            {
               delay(5);
               if (Serial.read() == '#')
               {
                  processa();
               }
            }

            if (getData == 'b')
            {
               delay(5);
               if (Serial.read() == '#')
```

```
    {
      processb();
    }
}

if (getData == 'c')
{
   delay(5);
   if (Serial.read() == '#')
   {
      processc();
   }
}

if (getData == 'x')
{
   delay(5);
   if (Serial.read() == '#')
   {
      processx();
   }
}

if (getData == 'y')
{
   delay(5);
   if (Serial.read() == '#')
   {
      processy();
   }
}

if (getData == 'z')
{
   delay(5);
   if (Serial.read() == '#')
   {
      processz();
   }
}

if (getData == '~') {

   x = Serial.parseInt();

      if (Serial.read() == '*') {

         y = Serial.parseInt();

            if (Serial.read() == '@') {
```

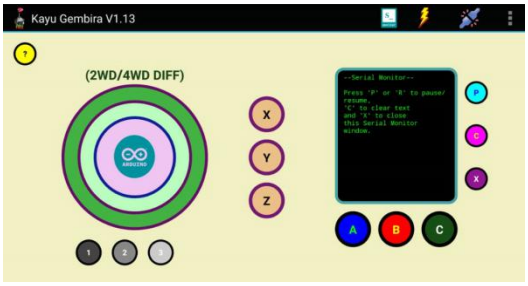
```
                        z = Serial.parseInt();

                            if (Serial.read() == '#') {

                                process();
                        }
                    }
                }
            }



        }

}

void processa(){
   Serial.println("Button a! ");
   StateA0 = !StateA0;
   if (StateA0 == true) { digitalWrite(A0, HIGH); } else { digitalWrite(A0, LOW); }
   Serial.flush();
}

void processb(){
   Serial.println("Button b! ");
   StateA1 = !StateA1;
   if (StateA1 == true) { digitalWrite(A1, HIGH); } else { digitalWrite(A1, LOW); }
   Serial.flush();
}

void processc(){
   Serial.println("Button c! ");
   StateA2 = !StateA2;
   if (StateA2 == true) { digitalWrite(A2, HIGH); } else { digitalWrite(A2, LOW); }
   Serial.flush();
}

void processx(){
   Serial.println("Button x! ");
   Serial.flush();
   fast = true;
}

void processy(){
   Serial.println("Button y! ");
   Serial.flush();
}

void processz(){
```

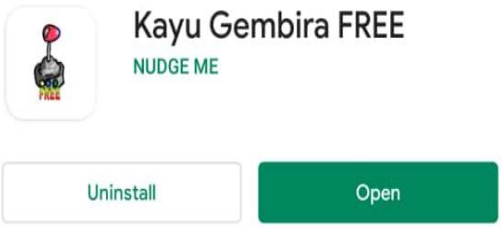
```
    Serial.println("Button z! ");
    Serial.flush();
    fast = false;
}



void processM(){
//    m1 = map(m, 0, 500, 0, 255);
//    Serial.print("Received Magnitude: ");
//    Serial.println(m1);
//    Serial.flush();
}

void processA(){
    Serial.print("Received Angle: ");
    Serial.println(a);
    Serial.flush();
}

void process(){

//    Serial.println("x: " + String(x) + ", y: " + String(y));
//
//    Serial.print("Received x: " );
//    Serial.print(x);
//
//    Serial.print(", Received y: " );
//    Serial.println(y);


    //left motor control:

    y = constrain(y, -255, 255);

    if (fast == false) { er = map(y, 0, 255, 0, 255); }
    else { er = y; }

    if (er < 0) {
        digitalWrite(MR1, HIGH);
        digitalWrite(MR2, LOW);
    }

    else if (er >= 0) {
        digitalWrite(MR1, LOW);
        digitalWrite(MR2, HIGH);
    }

    erp = abs(er);
```

```
//right motor control:

   x = constrain(x, -255, 255);

   if (fast == false) { el = map(x, 0, 255, 0, 255); }
   else { el = x; }

   if (el < 0) {
      digitalWrite(ML1, HIGH);
      digitalWrite(ML2, LOW);
   }

   else if (el >= 0)    {
      digitalWrite(ML1, LOW);
      digitalWrite(ML2, HIGH);
   }

   elp = abs(el);

   analogWrite(EL, elp);
   analogWrite(ER, erp);

  Serial.flush();
}
```

USER MANUAL

HOW TO USE WIRELESS CONTROL WHEELCHAIR



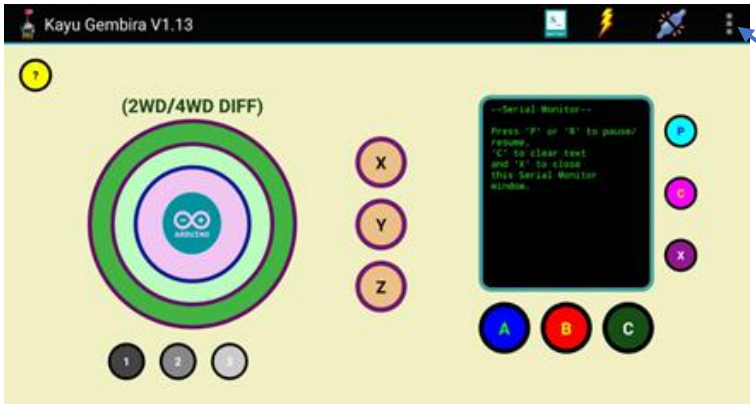


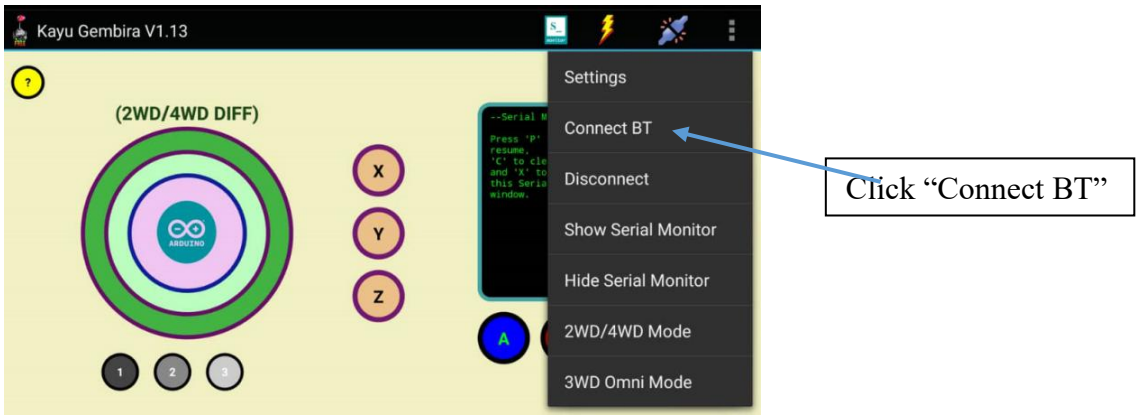
STEP 1:
Install wheelchair control application on Play Store named “Kayu Gembira FREE”

STEP 2:
Turn on power button on right side wheelchair

STEP 3:

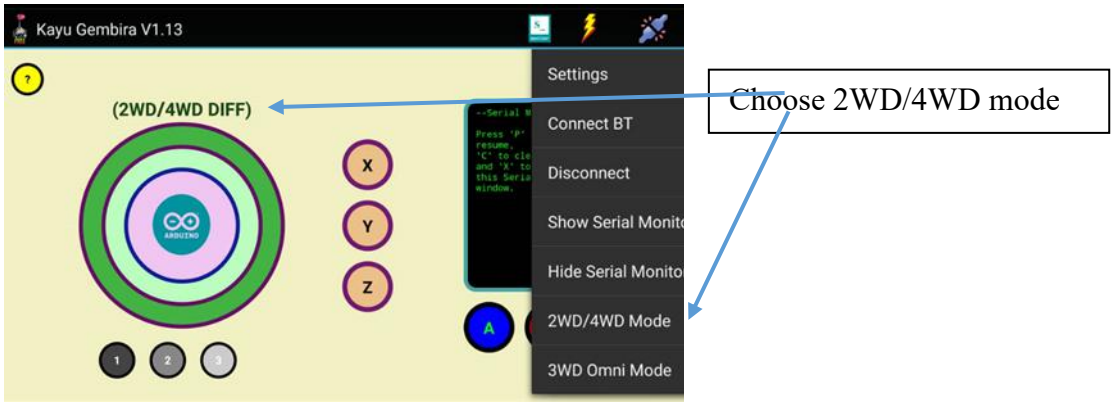
Connect Bluetooth between smartphone and wheelchair on the application



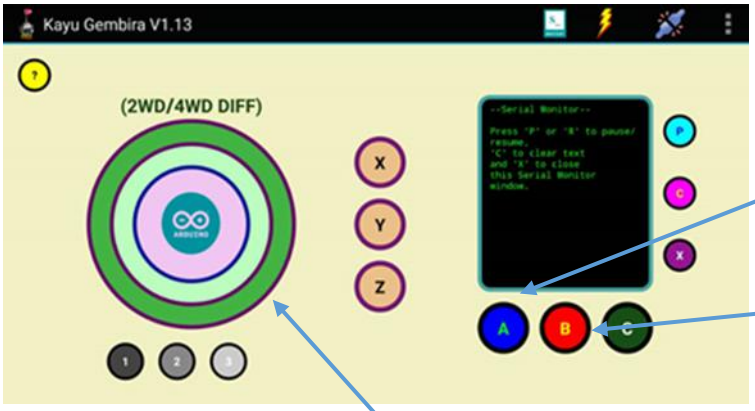


STEP 4:
Choose HC-05 with password “1234”

STEP 5:



STEP 6:



Button A for lift down the backrest
Button B for lift up the backrest

This part is for control basic movement of wheelchair which forward, reverse, left and right.

BROCHURE

INTRODUCTION

In this project we are using Android Application and bluetooth System. But many of individuals with disabilities who need wheelchairs are satisfied with it, few members of the disabled community find it is difficult or impossible for operating a standard power wheelchair. This project is included in assistive technology. For handicapped and depended disable it is more independent, productive and enjoyable living.To perform functions a handicapped person with locomotive disabilities needs a wheelchair that require him or her to move around. He/she can do so manually by pushing the wheelchair with his/her hands. However, many of us have weak upper limbs or find the manual mode of operating too tiring. Therefore, it is desirable to provide them with a motorized wheelchair which is controlled by moving a smartphone command. Since motorized wheelchair is important that it be able to avoid obstacles automatically in real time, it can move at a fair speed. Cost of this motorized wheelchair is affordable for many handicapped people as possible, as well as for organizations that support it. With these requirements in mind we propose an automated wheelchair with real-time Herald avoidance capability. The power wheelchair control interfaces currently still not enough to provide mobility for substantial number of persons with disabilities. Through research and design wise, the wheelchair to control development along safe and effective use of the provision independence and self-use mobility. This project will provide disability weight innovative solutions to handle the wheel chairs to use voice interface. This project describes a wheelchair which can be controlled only by using the android application and user's smartphone also. The main aim of this project is to facilitate the movement of the disabled people and elderly people who cannot move properly so with this we can enable them to lead better lives without any problem. Speech recognition is a key technology which can provide human interaction with machines for controlling a wheelchair. This project includes two parts which is software and hardware. It is realized that for input of Bluetooth we are using Android phone as an intermediary. In this project, Arduino Uno (Atmega 328) is used as controller to control the movement of wheelchair based on the human voice as an input.

PROMBLEM STATEMENT

Nowadays, the number or elderly people has increased. Some live with their children, some live in adult foster home and some even live by themselves. The problem arises when the elderly people lose their ability to move around. Not everyone can be present to help them at all time. Patients involved in physical injuries and disabilities with good mental strength struggle to get through places using the conventional hand powered wheelchair. A wheelchair is a chair with wheels, designed to be a replacement for walking. A wheelchair is a device used for mobility by people for whom walking is difficult or impossible, due to illness or disability. To face this problem, an android device that can control DC motor will be developed.

OBJECTIVE

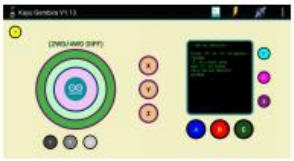
The project is implemented in order to achieve the following objectives which are:

i. To develop a system that can control the movement of a wheelchair by using android.

ii. To design android system that can control electrical appliances.

FLOW CHART

RESULT



CONCLUSION

Since 90% of the people own a smart phone, smart wheelchair is one of the best solutions. As the person can remotely control the wheelchair using smart phone the proposed system becomes more helpful and efficient. This gives him confidence for his life carrier. The patient monitoring system on the wheelchair will be constantly monitoring the health of the patient. If any abnormality is detected, the system will alert to the relative or doctor. Thus, this system greatly helps the patients with lower limb impairment.

POLITEKNIK MALAYSIA
SULTAN SALAHUDDIN ABDUL AZIZ SHAH

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WIRELESS CONTROL WHEELCHAIR

MDM. AKMARYA SYUKHAIRILNISAH BT MOHD AKHIR

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MDM. ASTRAHUDA KAMARULAINI BINTI MOHD FAHMI

MDM. ZAITUN BINTI TAAT

TECHNICAL PAPER

WIRELESS CONTROL WHEELCHAIR

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ABSTRACT - Nowadays, the number of elderly people has increased. Some of them live with their children, some live-in parents' homes and some live alone. Problems arise when older people lose the ability to move. Not everyone can be by their side all the time to help them. The project is designed to help those who have trouble using their feet to walk like disabled adults or those who have been paralyzed by accidents. The purpose of the project was to develop a Wheelchair System and Control using a wireless Android consisting of an Android smartphone and a control box that can control the movement of the wheelchair using a motor. The source code is written in the Basic 4 Android software. Arduino Uno is the main controller that controls the motor, sends signals to the Bluetooth HC-06 signal receiver and receives serial data from the android smartphone. Bluetooth communication protocol is used to communicate between android smartphones and controller boxes.
The direction and speed of the motor are controlled using the MD30C motor driver. One way to control wheelchair movement is by using smartphone software. The four movement options are forward, backward, left and right. The system also has the ability to control the movement of electricity by laying down and sitting using Bluetooth as wireless communication. Electrical equipment can be switched on and off wirelessly using the use of android smartphone software that sends alerts to recipients of electrical equipment. In conclusion, this product not only allows people with disabilities to control their own wheelchair without the help of others, but also allows others to use android smartphones to control wheelchairs and electrical appliances while also providing direction for Muslims to pray.

I. INTRODUCTION

In this project we are using Android Application and bluetooth System. But many of individuals with disabilities who need wheelchairs are satisfied with it, few members of the disabled community find it is difficult or impossible for operating a standard power wheelchair. This project is included in assistive technology. For handicapped and depended disable it is more independent, productive and enjoyable living.

To perform functions a handicapped person with locomotive disabilities needs a wheelchair that require him or her to move around. He/she can do so manually by pushing the wheelchair with his/her hands. However, many of us have weak upper limbs or find the manual mode of operating too tiring. Therefore, it is desirable to provide them with a motorized wheelchair which is controlled by moving a smartphone command. Since motorized wheelchair is important that it be able to avoid obstacles automatically in real time, it can move at a fair speed. Cost of this motorized wheelchair is affordable for many handicapped people as possible, as well as for organizations that support it. With these requirements in mind we propose an automated wheelchair with real-time Herald avoidance capability. The power wheelchair control interfaces currently still not enough to provide mobility for substantial number of persons with disabilities. Through research and design wise, the

wheelchair to control development along safe and effective use of the provision independence and self-use mobility. This project will provide disability weight innovative solutions to handle the wheel chairs to use voice interface.

This project describes a wheelchair which can be controlled only by using the android application and user's smartphone also. The main aim of this project is to facilitate the movement of the disabled people and elderly people who cannot move properly so with this we can enable them to lead better lives without any problem. Speech recognition is a key technology which can provide human interaction with machines for controlling a wheelchair. This project includes two parts which is software and hardware. It is realized that for input of Bluetooth we are using Android phone as an intermediary. In this project, Arduino Uno (Atmega 328) is used as controller to control the movement of wheelchair based on the human voice as an input.

There are seven basic movements of a wheelchair to be applied by the user. The seven operations perform by the wheelchair are described as following:

i. Moving forward
ii. Moving backward
iii. Turning to the right
iv. Turning to the left
v. Stop condition
vi. Leaning down
vii. Sitting

II. METHODOLOGY

a. Flow Chart

III. RESULT

IV. CONCLUSION

Since 90% of the people own a smart phone, smart wheelchair is one of the best solutions. As the person can remotely control the wheelchair using smart phone the proposed system becomes more helpful and efficient. This gives him confidence for his life carrier. The patient monitoring system on the wheelchair will be constantly monitoring the health of the patient. If any abnormality is detected, the system will alert to the relative or doctor. Thus, this system greatly helps the patients with lower limb impairment.

ACKNOWLEDGEMENT

A very special thanks to my supervisors for thier support, idea, knowlegde and sharing their experience to full fill the objective of this final year project. Their support helps me to gain knowledge from this project. I have leamed a lot of project management which include the time and cost effective to realize the project. Thanks to my friends for spending their time teaching me about the IOT system and teaching me about software which seems to be very difficult for me to understand before and millon thanks to all my friends that giving me supports to the output of the project.

REFERENCE

[1] Anusha, S., M. Madhavi, and R. Hemalatha. "HOME AUTOMATION USING ATmega328 MICROCONTROLLER AND ANDROID APPLICATION." (2015).

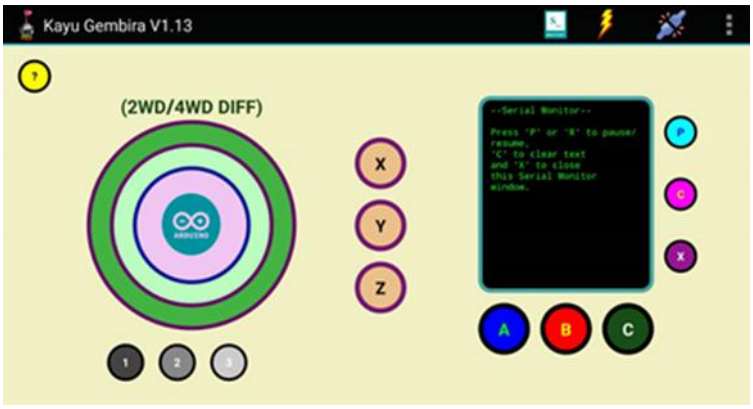
[2] Rajini, Gangadhari and Lr Siva. "Android Mobile Phone Controlled Bluetooth Robot Using Arm7 Microcontroller." (2015).

[3] Megalingam, Rajesh Kannan et al. "'Gest-BOT'-A Highly Convenient Locomotive Solution for the Elderly and Physically Challenged." Global Humanitarian Technology Conference (GHTC), 2012 IEEE. IEEE, 2012.

[4] Skraba, Andrej, et al. "Prototype of speech controlled cloud based wheelchair platform for disabled persons." Embedded Computing (MECO), 2014 3rd Mediterranean Conference on. IEEE, 2014.

TESTING

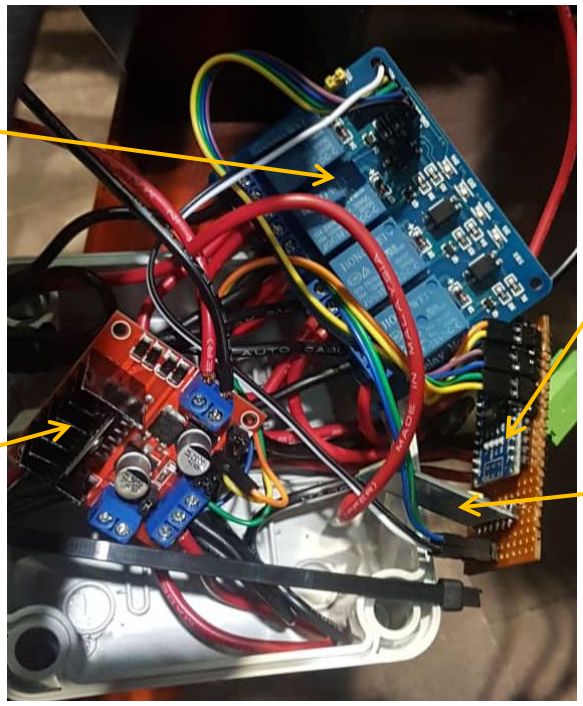
We have been tested our project, the all function of the wheelchair went well, we also put some various weight from 10kg until 35kg. The wheelchair still can move as usual using smartphone controller. The backrest also able to function well even we put weight on it.



DESIGN CASING

PRODUCT

4 CHANNEL 5V RELAY MODULE

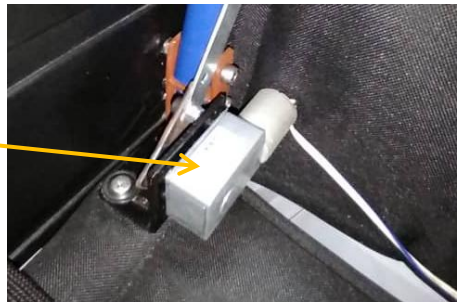


ARDUINO NANO

MOTOR DRIVER L298N

BLUETOOTH MODULE HC-05

HIGH TORQUE DC 12V 40RPM



SIT HARDEN STEEL SPROCKET

MY6812 150W 12V DC HIGH SPEED