OS Project

CONTROLLED CAR PROJECT

OSAMA- ELZEKRED

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Tools:

    1- Bluetooth module HC-05

    2- Arduino uno

    3- H Bridge DC Stepper Motor Controller (L298N)

    4- DC Motor

Bluetooth module:

There are several ways for wireless communication such as NRF, ZigBee, Wi-Fi, and Bluetooth.

Bluetooth protocol: an affordable communication method in PAN network, with a maximum data rate of 1Mb/S, working in a nominal range of 100 meters using 2.4 G frequency is a common way of wireless communicating.

HC05 module is a Bluetooth module using serial communication, mostly used in electronics projects.

HC05 Bluetooth module important specifications:

Working voltage: 3.6V – 5VInternal antenna: Yes, Automatic connection to the last device: Yes
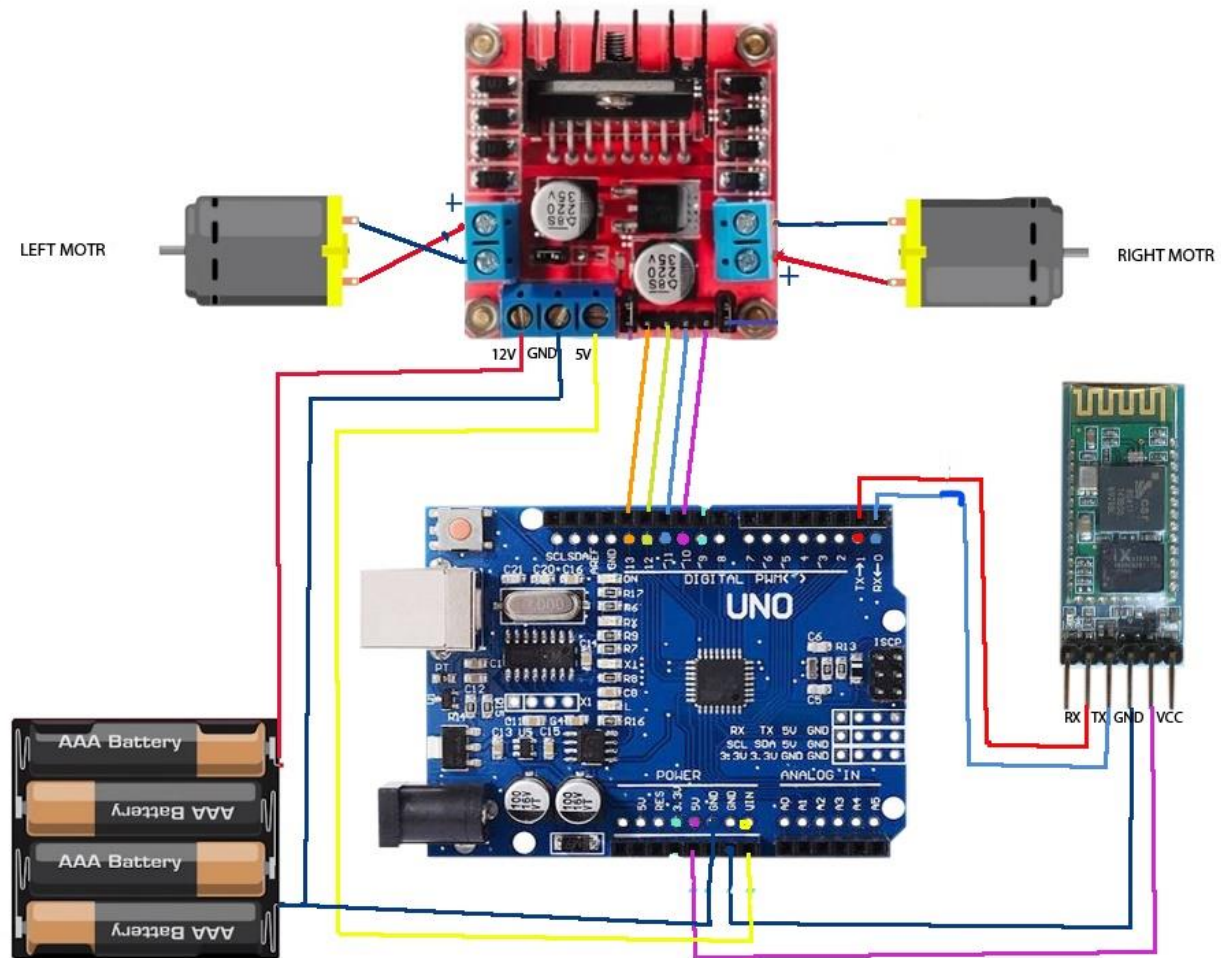
Sending Data to Arduino via Bluetooth

HC05 module has an internal 3.3v regulator and that is why you can connect it to 5v voltage. But we strongly recommend 3.3V voltage, since the logic of HC05 serial communication pins is 3.3V. Supplying 5V to the module can cause damage to the module.

In order to prevent the module from damages and make it work properly, you should use a resistance division circuit (5v to 3.3v) between Arduino TX pin and module RX pin.

When master and slave are connected, blue and red LEDs on the board blink every 2seconds. If they aren't connected, only blue one blinks every 2 seconds

Project Circuit:

CONNECT

EXIT

FORWARD

LEFT

RIGHT

BACK

left speed is
:

right speed
is
.

Java Code:

Code link in GitHub: [Link](#)

```java
package com.example.blutoothproj;

import android.annotation.SuppressLint;
import android.app.Activity;
import android.bluetooth.BluetoothAdapter;
import android.bluetooth.BluetoothDevice;
import android.bluetooth.BluetoothSocket;
import android.content.Intent;
import android.os.Bundle;
import android.view.MotionEvent;
import android.view.View;
import android.widget.Button;
import android.widget.Toast;
import android.widget.TextView;
import androidx.appcompat.app.AppCompatActivity;

import java.io.IOException;
import java.io.OutputStream;
import java.util.Set;
import java.util.UUID;

public class MainActivity extends Activity {
    private final String DEVICE_ADDRESS = "00:21:07:00:29:FB"; //MAC Address
of Bluetooth Module
    private final UUID PORT_UUID = UUID.fromString("00001101-0000-1000-8000-
00805f9b34fb");

    private BluetoothDevice device;
    private BluetoothSocket socket;
    private OutputStream outputStream;
    Button left_speed_up;
    Button left_speed_down;
    Button right_speed_up;
    Button right_speed_down;
    TextView left_speed ;
    TextView right_speed ;
    Button forward_btn, forward_left_btn, forward_right_btn, reverse_btn,
bluetooth_connect_btn,exit;

    char command = 'F'; //string variable that will store value to be
transmitted to the bluetooth module
    int l_speed=100,R_speed=100;
    @SuppressLint({"ClickableViewAccessibility", "MissingPermission"})
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        BluetoothAdapter btAdapter = BluetoothAdapter.getDefaultAdapter();
        //declaration of button variables
        forward_btn = (Button) findViewById(R.id.forward_btn);
        forward_left_btn = (Button) findViewById(R.id.forward_left_btn);
        forward_right_btn = (Button) findViewById(R.id.forward_right_btn);
        reverse_btn = (Button) findViewById(R.id.reverse_btn);
```

```java
        bluetooth_connect_btn = (Button)
findViewById(R.id.bluetooth_connect_btn);
        left_speed_up = (Button)findViewById(R.id.left_speed_up);
        left_speed_down = (Button)findViewById(R.id.left_speed_down);
        right_speed_up = (Button)findViewById(R.id.right_speed_up);
        right_speed_down = (Button)findViewById(R.id.right_speed_down);
        exit = (Button)findViewById(R.id.exit);

        left_speed = (TextView) findViewById(R.id.left_speed);
        right_speed = (TextView) findViewById(R.id.right_speed);


        System.out.println(btAdapter.getBondedDevices());

        //OnTouchListener code for the forward button (button long press)
        forward_btn.setOnTouchListener(new View.OnTouchListener() {
            @SuppressLint("ClickableViewAccessibility")
            @Override
            public boolean onTouch(View v, MotionEvent event) {

                if (event.getAction() == MotionEvent.ACTION_DOWN)
//MotionEvent.ACTION_DOWN is when you hold a button down
                {
                    command = 'F';

                    try
                    {
                        outputStream.write(command); //transmits the value of
command to the bluetooth module
                    }
                    catch (IOException e)
                    {
                        e.printStackTrace();
                    }
                }
                else if(event.getAction() == MotionEvent.ACTION_UP)
//MotionEvent.ACTION_UP is when you release a button
                {
                    command = 'S';
                    try
                    {
                        outputStream.write(command);
                    }
                    catch(IOException e)
                    {
                        e.printStackTrace();
                    }

                }

                return false;
            }

        });

        //OnTouchListener code for the reverse button (button long press)
        reverse_btn.setOnTouchListener(new View.OnTouchListener(){
```

```java
            @Override
            public boolean onTouch(View v, MotionEvent event)
            {
                if(event.getAction() == MotionEvent.ACTION_DOWN)
                {
                    command ='B';

                    try
                    {
                        outputStream.write(command);
                    }
                    catch (IOException e)
                    {
                        e.printStackTrace();
                    }
                }
                else if(event.getAction() == MotionEvent.ACTION_UP)
                {
                    command = 'S';
                    try
                    {
                        outputStream.write(command);
                    }
                    catch(IOException e)
                    {
                        e.printStackTrace();
                    }
                }
                return false;
            }
        });

        //OnTouchListener code for the forward left button (button long
press)
        forward_left_btn.setOnTouchListener(new View.OnTouchListener(){
            @Override
            public boolean onTouch(View v, MotionEvent event)
            {
                if(event.getAction() == MotionEvent.ACTION_DOWN)
                {
                    command = 'L';

                    try
                    {
                        outputStream.write(command);
                    }
                    catch (IOException e)
                    {
                        e.printStackTrace();
                    }
                }
                else if(event.getAction() == MotionEvent.ACTION_UP)
                {
                    command = 'S';
                    try
                    {
                        outputStream.write(command);
```

```java
                    }
                    catch(IOException e)
                    {
                        e.printStackTrace();
                    }

                }
                return false;
            }
        });

        //OnTouchListener code for the forward right button (button long
press)
        forward_right_btn.setOnTouchListener(new View.OnTouchListener(){
            @Override
            public boolean onTouch(View v, MotionEvent event)
            {
                if(event.getAction() == MotionEvent.ACTION_DOWN)
                {
                    command = 'R';

                    try
                    {
                        outputStream.write(command);
                    }
                    catch (IOException e)
                    {
                        e.printStackTrace();
                    }
                }
                else if(event.getAction() == MotionEvent.ACTION_UP)
                {
                    command = 'S';
                    try
                    {
                        outputStream.write( command);
                    }
                    catch(IOException e)
                    {
                        e.printStackTrace();
                    }

                }
                return false;
            }
        });

        left_speed_up.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                l_speed+=5;
                left_speed.setText("left speed is \n :
"+String.valueOf(l_speed));
                command = '1';
                try
                {
                    outputStream.write(command);
```

```java
                }
                catch(IOException e)
                {
                    e.printStackTrace();
                }


            }
        });
        left_speed_down.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                l_speed-=5;
                left_speed.setText("left speed is \n :
"+String.valueOf(l_speed));
                command = '2';
                try
                {
                    outputStream.write(command);
                }
                catch(IOException e)
                {
                    e.printStackTrace();
                }


            }
        });
        right_speed_up.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                R_speed+=5;
                right_speed.setText("left speed is \n :
"+String.valueOf(R_speed));
                command = '3';
                try
                {
                    outputStream.write(command);
                }
                catch(IOException e)
                {
                    e.printStackTrace();
                }


            }
        });
        right_speed_down.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                R_speed-=5;
                right_speed.setText("Right speed is \n :
"+String.valueOf(R_speed));
                command = '4';
                try
                {
                    outputStream.write(command);
                }
                catch(IOException e)
                {
```

```java
                    e.printStackTrace();
                }


            }
        });

        //Button that connects the device to the bluetooth module when
pressed
        bluetooth_connect_btn.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {

                if(BTinit())
                {
                    BTconnect();
                }


            }
        });


        exit.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {

                finish();


            }
        });

    }

    //Initializes bluetooth module
    @SuppressLint("MissingPermission")
    public boolean BTinit()
    {
        boolean found = false;

        BluetoothAdapter bluetoothAdapter =
BluetoothAdapter.getDefaultAdapter();

        if(bluetoothAdapter == null) //Checks if the device supports
bluetooth
        {
            Toast.makeText(getApplicationContext(), "Device doesn't support
bluetooth", Toast.LENGTH_SHORT).show();
        }

        if(!bluetoothAdapter.isEnabled()) //Checks if bluetooth is enabled.
If not, the program will ask permission from the user to enable it
        {
            Intent enableAdapter = new
Intent(BluetoothAdapter.ACTION_REQUEST_ENABLE);
            startActivityForResult(enableAdapter,0);

            try
            {
```

```java
                Thread.sleep(1000);
            }
            catch(InterruptedException e)
            {
                e.printStackTrace();
            }
        }

        Set<BluetoothDevice> bondedDevices =
bluetoothAdapter.getBondedDevices();

        if(bondedDevices.isEmpty()) //Checks for paired bluetooth devices
        {
            Toast.makeText(getApplicationContext(), "Please pair the device
first", Toast.LENGTH_SHORT).show();
        }
        else
        {
            for(BluetoothDevice iterator : bondedDevices)
            {
                if(iterator.getAddress().equals(DEVICE_ADDRESS))
                {
                    device = iterator;
                    found = true;
                    break;
                }
            }
        }

        return found;
    }

    @SuppressLint("MissingPermission")
    public boolean BTconnect()
    {
        boolean connected = true;

        try
        {
            socket = device.createRfcommSocketToServiceRecord(PORT_UUID);
//Creates a socket to handle the outgoing connection
            socket.connect();

            Toast.makeText(getApplicationContext(),
                    "Connection to bluetooth device successful",
Toast.LENGTH_LONG).show();
        }
        catch(IOException e)
        {
            e.printStackTrace();
            connected = false;
        }

        if(connected)
        {
            try
            {
```

```java
                outputStream = socket.getOutputStream(); //gets the output
stream of the socket
            }
            catch(IOException e)
            {
                e.printStackTrace();
            }
        }

        return connected;
    }

    @Override
    protected void onStart()
    {
        super.onStart();
    }

}
```

XML Code:

```xml
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="@drawable/img3"
    tools:context=".MainActivity">


    <TextView
        android:id="@+id/left_speed"
        android:layout_width="93dp"
```

```xml
        android:layout_height="42dp"
        android:layout_marginTop="180dp"
        android:text="left speed is \n : "
        android:textColor="@color/white"
        android:textSize="15dp"

        android:textStyle="bold"

        app:layout_constraintBottom_toTopOf="@+id/left_speed_up"

        app:layout_constraintEnd_toStartOf="@+id/right_speed"
        app:layout_constraintHorizontal_bias="0.203"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/forward_left_btn"
        app:layout_constraintVertical_bias="0.349" />

    <Button
        android:id="@+id/forward_btn"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Forward"
        app:layout_constraintBottom_toTopOf="@+id/reverse_btn"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <Button
        android:id="@+id/reverse_btn"
        android:layout_width="103dp"
        android:layout_height="57dp"
        android:text="Back"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.498"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.499" />

    <Button
        android:id="@+id/forward_left_btn"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Left"
        app:layout_constraintBottom_toTopOf="@+id/reverse_btn"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.129"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/forward_btn" />

    <Button
        android:id="@+id/forward_right_btn"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Right"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.829"
```

```xml
        app:layout_constraintStart_toEndOf="@+id/forward_left_btn"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.368" />

    <Button
        android:id="@+id/bluetooth_connect_btn"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Connect"
        app:layout_constraintBottom_toTopOf="@+id/forward_left_btn"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.081"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.214" />

    <Button
        android:id="@+id/exit"
        android:layout_width="104dp"
        android:layout_height="52dp"
        android:text="Exit"
        app:layout_constraintBottom_toTopOf="@+id/forward_right_btn"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.714"
        app:layout_constraintStart_toEndOf="@+id/bluetooth_connect_btn"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.178" />

    <com.google.android.material.button.MaterialButton
        android:id="@+id/right_speed_up"
        style="@style/Widget.MaterialComponents.ExtendedFloatingActionButton"
        android:layout_width="56dp"
        android:layout_height="56dp"
        android:layout_marginTop="279dp"
        android:layout_marginBottom="16dp"
        android:text="Λ"
        app:cornerRadius="28dp"
        app:layout_constraintBottom_toTopOf="@+id/right_speed_down"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.901"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/forward_right_btn"
        app:layout_constraintVertical_bias="0.712"
        tools:ignore="MissingConstraints" />

    <com.google.android.material.button.MaterialButton
        android:id="@+id/right_speed_down"
        style="@style/Widget.MaterialComponents.ExtendedFloatingActionButton"
        android:layout_width="56dp"
        android:layout_height="56dp"
        android:layout_marginBottom="16dp"
        android:text="W"
        app:cornerRadius="28dp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.893"
```

```xml
            app:layout_constraintStart_toStartOf="parent"
            app:layout_constraintTop_toBottomOf="@+id/forward_right_btn"
            app:layout_constraintVertical_bias="0.937"
            tools:ignore="MissingConstraints" />

    <com.google.android.material.button.MaterialButton
            android:id="@+id/left_speed_up"
            style="@style/Widget.MaterialComponents.ExtendedFloatingActionButton"
            android:layout_width="56dp"
            android:layout_height="56dp"
            android:layout_marginTop="288dp"
            android:text="∧"
            app:cornerRadius="28dp"
            app:layout_constraintBottom_toBottomOf="parent"
            app:layout_constraintEnd_toStartOf="@+id/right_speed_up"
            app:layout_constraintHorizontal_bias="0.221"
            app:layout_constraintStart_toStartOf="parent"
            app:layout_constraintTop_toBottomOf="@+id/forward_left_btn"
            app:layout_constraintVertical_bias="0.291"
            tools:ignore="MissingConstraints" />

    <com.google.android.material.button.MaterialButton
            android:id="@+id/left_speed_down"
            style="@style/Widget.MaterialComponents.ExtendedFloatingActionButton"
            android:layout_width="56dp"
            android:layout_height="56dp"
            android:text="∨"
            app:cornerRadius="28dp"
            app:layout_constraintBottom_toBottomOf="parent"
            app:layout_constraintEnd_toStartOf="@+id/right_speed_down"
            app:layout_constraintHorizontal_bias="0.223"
            app:layout_constraintStart_toStartOf="parent"
            app:layout_constraintTop_toBottomOf="@+id/left_speed_up"
            app:layout_constraintVertical_bias="0.494"
            tools:ignore="MissingConstraints" />

    <TextView
            android:id="@+id/right_speed"
            android:layout_width="92dp"
            android:layout_height="45dp"
            android:layout_marginTop="168dp"

            android:text="right speed is \n : "
            android:textColor="@color/white"
            android:textSize="15dp"
            android:textStyle="bold"
            app:layout_constraintBottom_toTopOf="@+id/right_speed_up"
            app:layout_constraintEnd_toEndOf="parent"
            app:layout_constraintHorizontal_bias="0.946"
            app:layout_constraintStart_toStartOf="parent"
            app:layout_constraintTop_toBottomOf="@+id/forward_right_btn"
            app:layout_constraintVertical_bias="0.368" />
</androidx.constraintlayout.widget.ConstraintLayout>
```