



A.4.1 Learning Activity

Control circuit to activate and deactivate a DC motor, using NodeMCU ESP32 via Bluetooth.



Development

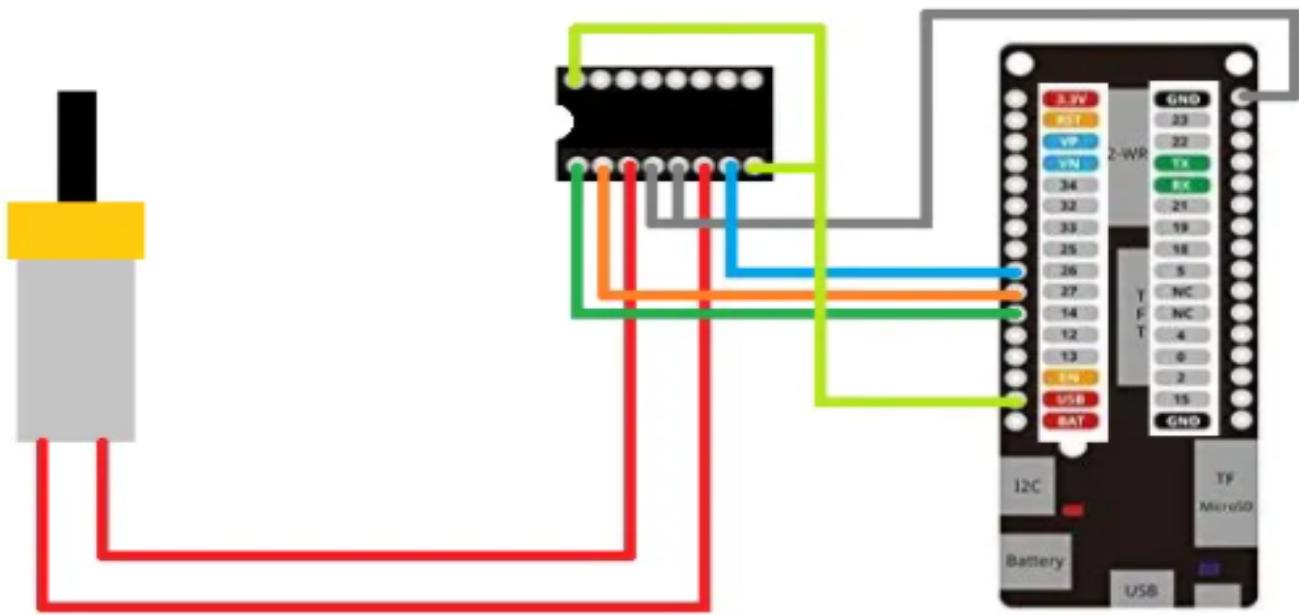
1. Use the following list of materials to prepare the activity

| Amount | Description |
|--------|-------------------|
| 1 | IC L293D |
| 1 | 5V voltage source |
| 1 | NodeMCU ESP32 |
| 1 | BreadBoard |
| 1 | Jumpers M/M |
| 1 | DC Motor |

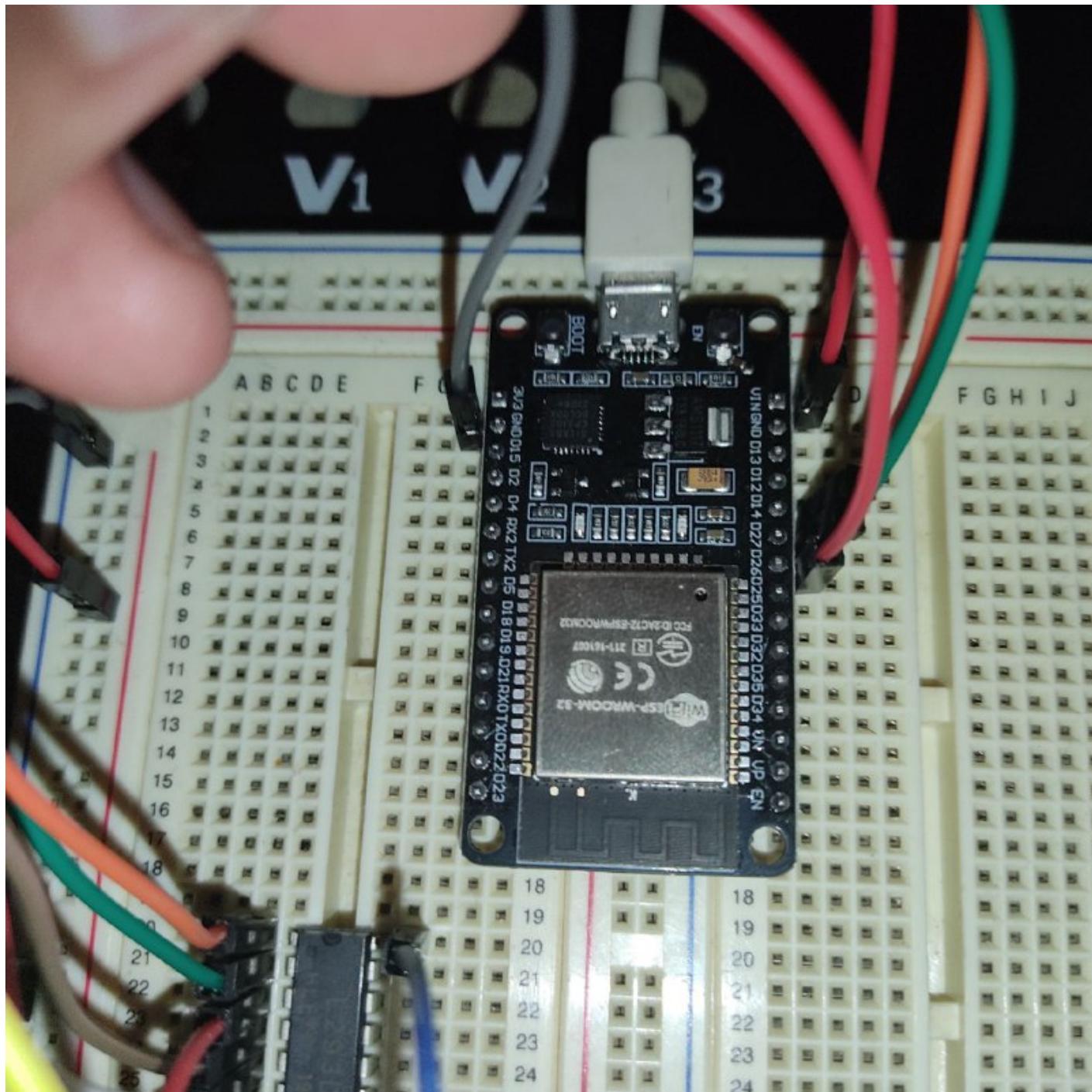
2. Based on the images shown in **Figure 1**, assemble an electronic circuit, in order to obtain a system capable of complying with the following instructions:

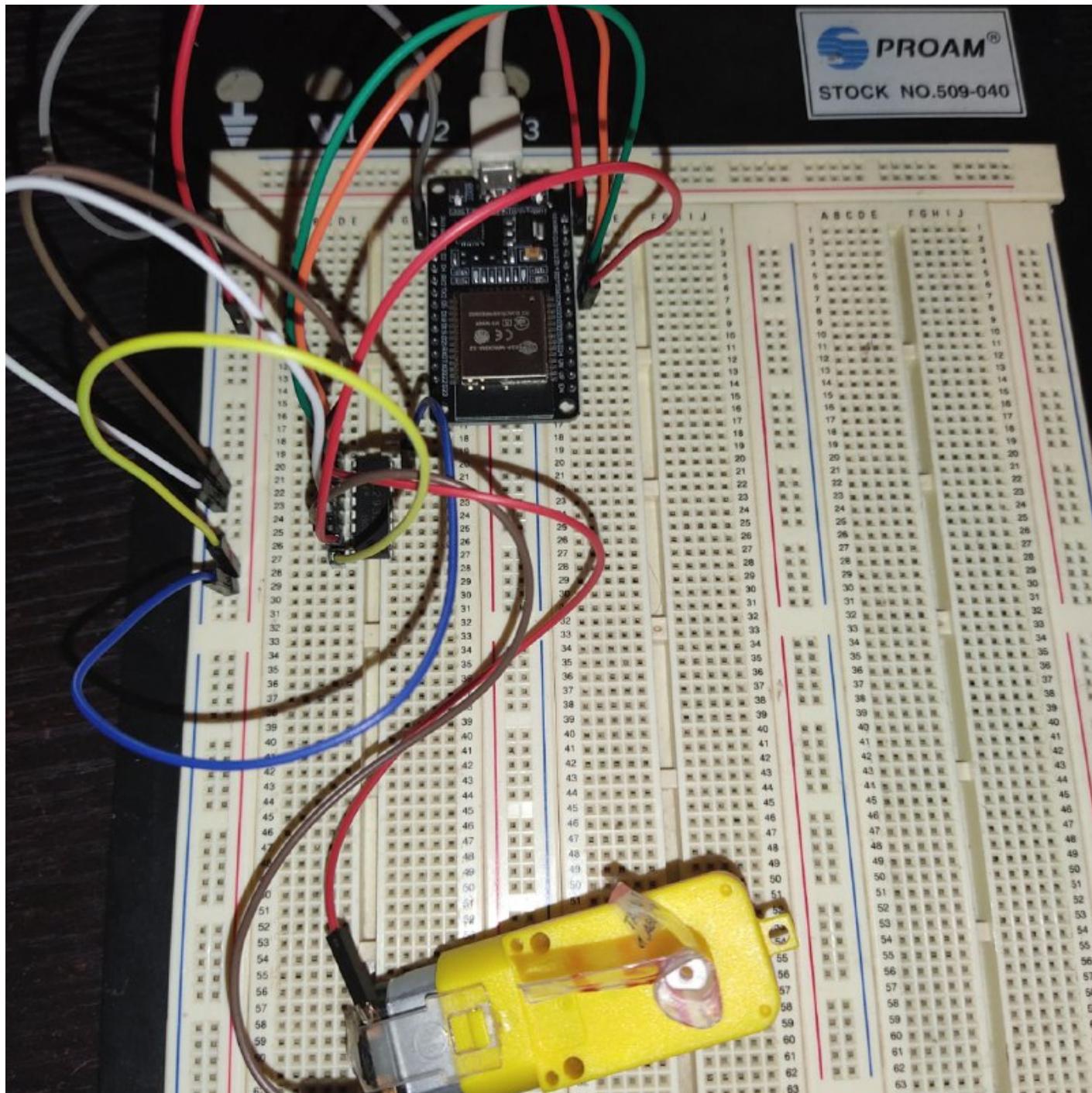
- Through the application "Serial Bluetooth terminal" that can be downloaded from the google play Store or even any other that you consider, you must control the start and shutdown of a DC motor, that is, there will be two requests, one of which one of them will represent the **"START" and the other option "STOP"**
- The motor must be able to rotate clockwise for 5 seconds, at the end of that time it must brake for 1 second and reverse its rotation for another 5 seconds, that is, the activity must have the following sequence: The **stop** can be executed at any time, and the engine will be executing 5s forward, 1s stop, 5s reverse, 1s stop, 5s forward, 1s stop, 5s reverse, ...

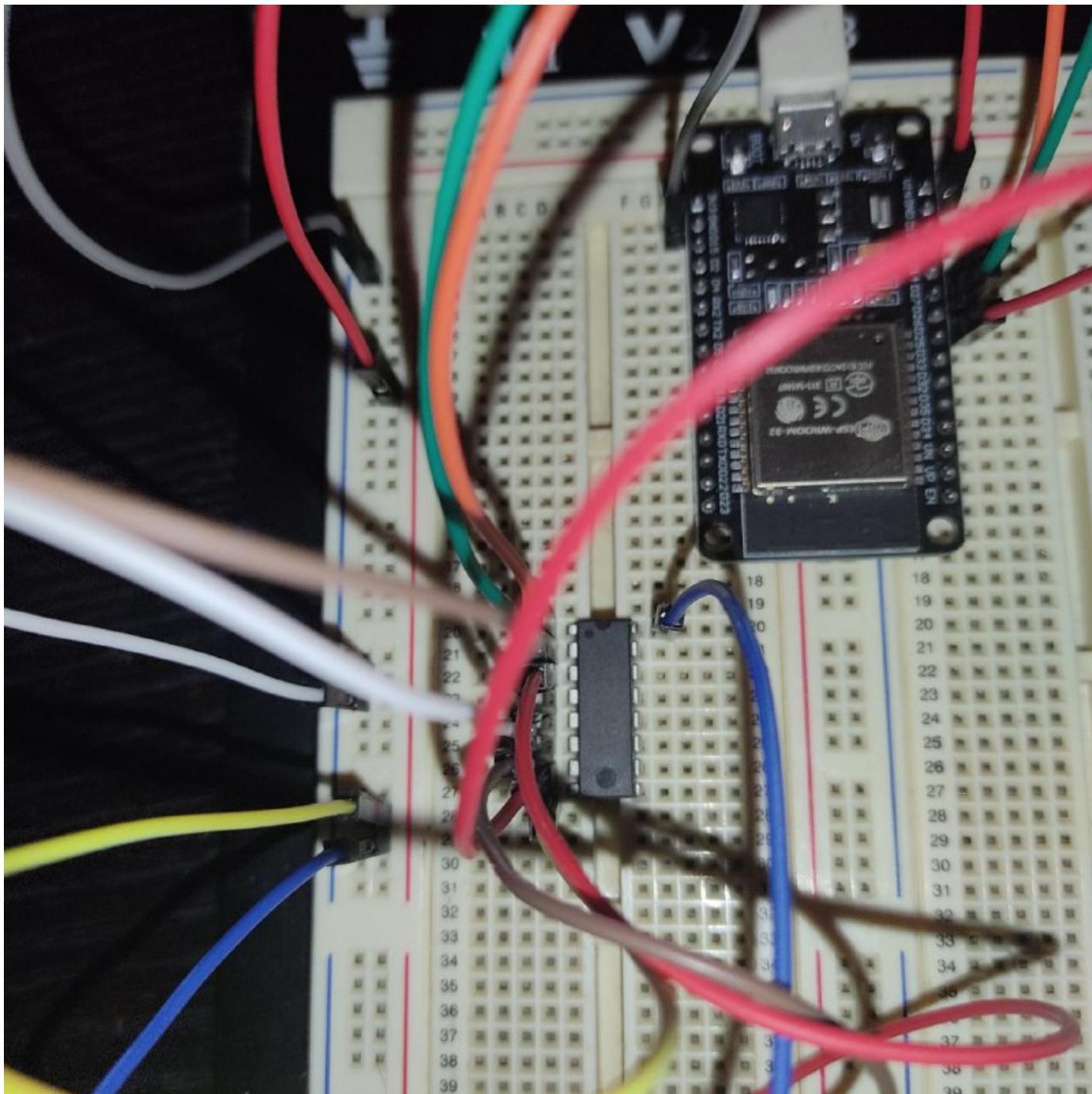
Figura 1 Circuito ESP32 IC L293 Motor DC



3. Place the image of the assembled circuit here.







4. Place in this place the program created within the Arduino environment

```
#include "BluetoothSerial.h"
#if !defined(CONFIG_BT_ENABLED) || !defined(CONFIG_BLUEDROID_ENABLED)
#error Bluetooth is not enabled! Please run `make menuconfig` to and enable it
#endif
BluetoothSerial SerialBT;
//El valor que guardamos arriba lo guardamos aqui como CHAR
char receivedChar;
char charTemporal;
const char turnON = 'o';
```

```
const char turnOFF = 'f';
int motor1Pin1 = 27;
int motor1Pin2 = 26;
int enable1Pin = 14;
// Propiedades PWM
const int freq = 30000;
const int pwmChannel = 0;
const int resolution = 8;
int dutyCycle = 200;
bool flag = false;

void setup() {
    Serial.begin(115200);
    //Le ponemos el nombre que queramos a nuestro esp32
    SerialBT.begin("ESP32_Parvada");
    Serial.println("Ya se puede usar con bluetooth!");
    //Esto se imprime en el smonitor de arduino
    Serial.println("Para encender el motor START");
    Serial.println("Para apagar el motor STOP");
    // sets the pins as outputs:
    pinMode(motor1Pin1, OUTPUT);
    pinMode(motor1Pin2, OUTPUT);
    pinMode(enable1Pin, OUTPUT);
    ledcSetup(pwmChannel, freq, resolution);
    // attach the channel to the GPIO to be controlled
    ledcAttachPin(enable1Pin, pwmChannel);
}

void loop() {
    charTemporal = SerialBT.read();
    if (Serial.available() > 0)
    {
        SerialBT.write(Serial.read());
    }
    //Aqui le asignamos la variable para guardar lo que va a leer como instruccion
    if (charTemporal == turnON || turnOFF )
    {
        receivedChar = charTemporal;
    }
    else (receivedChar == turnON);
    {
        //Si el serialBT esta disponible entonces le manda las lineas siguientes
        if (SerialBT.available() > 0)
        {
            //Esto aparece en la app
            SerialBT.print("Instrucción recibida: ");
            //Aqui imprime la intruccion que se ingreso
            SerialBT.println(receivedChar);
            Serial.print ("Instrucción recibida: ");
            Serial.println(receivedChar);
        }
    }
}
```

```
}

if(receivedChar == turnON || flag==true )
{
    flag = true;
    dutyCycle = 255;
    while (dutyCycle <= 255)
    {
        ledcWrite(pwmChannel, dutyCycle);
        //Serial.print("Adelante con el ciclo de trabajo: ");
        //Serial.println(dutyCycle);
        dutyCycle = dutyCycle + 5;
        delay(500);
    }
    SerialBT.println("Motor ON: ");
    Serial.println("Motor ON: ");
    // Mueve el motor dc hacia adelante
    Serial.println("Moviendo hacia adelante");
    digitalWrite(motor1Pin1, LOW);
    digitalWrite(motor1Pin2, HIGH);
    delay(1000);
    st();
    delay(1000);
    st();
    delay(1000);
    st();
    delay(1000);
    st();
    delay(1000);
    st();
    delay(1000);
    st();
    // Detiene el motor
    Serial.println("Motor detenido");
    digitalWrite(motor1Pin1, LOW);
    digitalWrite(motor1Pin2, LOW);
    delay(1000);
    st();
    // Mueve el motor dc en reversa
    Serial.println("Moviendo en reversa");
    digitalWrite(motor1Pin1, HIGH);
    digitalWrite(motor1Pin2, LOW);
    delay(1000);
    st();
    delay(1000);
    st();
    delay(1000);
    st();
    delay(1000);
    st();
    delay(1000);
    st();
    // Detiene el motor
```

```
Serial.println("Motor detenido");
digitalWrite(motor1Pin1, LOW);
digitalWrite(motor1Pin2, LOW);
delay(1000);
st();
}
}
}

static void st(){
charTemporal = SerialBT.read();
if (charTemporal == turnON || turnOFF )
{
receivedChar = charTemporal;
}
//Si la intruccion es igual a TurnOFF, entonces apaga el motor
if(receivedChar == turnOFF || flag ==false)
{
flag = false;
SerialBT.println("Motor detenido: ");
Serial.println("Motor detenido");
digitalWrite(motor1Pin1, LOW);
digitalWrite(motor1Pin2, LOW);
delay(500);
}
}
```

5. Place here evidence that you consider important during the development of the activity.

The screenshot shows a messaging interface with a dark theme. At the top, there's a header bar with icons for microphone, video, camera, and user profile, followed by a search bar and a help icon. Below the header, the recipient is listed as "mich_iv, Nelly". On the right side, there's a sidebar titled "MEMBERS—3" showing three users: "105Javix" with a crown icon, "mich_iv", and "Nelly". The main conversation area contains the following code:

```
Serial.println(dutyCycle);
dutyCycle = dutyCycle + 5;
delay(500);
}

// Mueve el motor dc en reversa incrementando la velocidad
//digitalWrite(motor1Pin1, HIGH);
//digitalWrite(motor1Pin2, LOW);
}
//Si la intruccion es igual a TurnOFF (a), entonces apaga el motor y le dice que esta
apagado tanto en arduino como en la app
if(receivedChar == turnOFF)
{
    dutyCycle = 256;
    SerialBT.println("Motor OFF: ");
    Serial.println("Motor OFF: ");
    Serial.println("Motor detenido");
    digitalWrite(motor1Pin1, LOW);
    digitalWrite(motor1Pin2, LOW);
}
}
```

Below the code, a message from "mich_iv" is shown:

mich_iv Yesterday at 8:28 PM
if (receivedChar != turnON)
{
 receivedChar = (char)SerialBT.read();
}
else (receivedChar == turnON);
{

At the bottom of the screen, there's a message input field with a plus icon and the text "Message mich_iv, Nelly", and a row of icons for gift, GIF, and smiley face.



```
COM3
Ya se puede usar con bluetooth!
Para encender el motor START
Para apagar el motor STOP
Instrucción recibida: ?
Instrucción recibida: o
Motor ON:
Moviendo hacia adelante
Motor detenido
Moviendo en reversa
Motor detenido
Motor detenido
Motor detenido
Motor detenido
Motor detenido
Instrucción recibida:
Instrucción recibida: ?
Instrucción recibida: o
Motor ON:
Moviendo hacia adelante
Motor detenido
Moviendo en reversa
Motor detenido
Motor detenido
Motor detenido
Motor detenido
Motor detenido
Motor detenido
Instrucción recibida:

Instrucción recibida: o
Motor ON:
Moviendo hacia adelante
Motor detenido
Motor detenido
Motor detenido
Motor detenido
Motor detenido
Moviendo en reversa
Motor detenido
Motor detenido
Motor detenido
Motor detenido
Motor detenido
Motor detenido
```

6. Insert images of **evidence** such as meetings of the team members held for the development of the activity.

mich_iv, Nelly

June 13, 2021

105Javix started a call that lasted 2 hours. Yesterday at 7:06 PM

mich_iv Yesterday at 7:06 PM
aguanta

Nelly Yesterday at 7:39 PM
https://www.hackster.io/Arnov_Sharma_makes/l293d-with-esp32-wemos-lolin-d32-v2-hacked-edition-ea2086

Hackster.io
L293D with ESP32 (Wemos Lolin D32 V2) Hacked Edition
Just a Tutorial on using L293D with an ESP32 MCU with a Twist/Hack By Arnov Sharma.



Message mich_iv, Nelly

MEMBERS—3

105Javix

mich_iv

Nelly

The screenshot shows a messaging interface with a dark theme. At the top, there's a header bar with icons for phone, video, microphone, person, search, and help. Below the header, a list of members is shown: mich_iv, Nelly, 105Javix, and another user whose profile picture is a cat. The main area contains two code snippets:

```
mich_iv Yesterday at 7:45 PM
bool condicion;
bool condicionFinal;
if (condicion == true)
{
    mover;
    while (condicion == true)
    {
        mover adelante;
        mover atras;
        readSerial = condicionFinal;
        condicionFinal = condicion;
    }
}
```

```
105Javix Yesterday at 8:12 PM
#include "BluetoothSerial.h"
#ifndef CONFIG_BT_ENABLED || !defined(CONFIG_BLUEDROID_ENABLED)
#error Bluetooth is not enabled! Please run make menuconfig to and enable it
#endif
BluetoothSerial SerialBT;
//Guardamos el valor que vamos a recibir
int received;
//El valor que guardamos arriba lo guardamos aqui como CHAR
char receivedChar;
const char turnON ='o';
const char turnOFF ='f';
int motor1Pin1 = 27;
```

At the bottom of the message window, there are buttons for sending a gift, a GIF, and an emoji.

Nelly Quino

In this practice we used the ESP32 with the L293D motor, through Bluetooth the motor had to turn on when we give the on instruction to rotate it for 5 seconds and turn off for 1 second then should it rotate the other way for 5 second and turndout for 1 second and it rotate the other way again and this case needs repeate until the motor receive the off intruction to fulfill the purpose the this activite in the code we implemented a serie of if for turning on and off the motor and used a flag for turning on the motor until receive the off instruction

Michelle Gasca

In this practice we learned to use the different forms of serial communication of the ESP32. the use of an H-bridge, in addition to the use of conditions that allowed us to start and stop the engine when we specified it, and at the same time, the specified objectives.

Francisco Villarreal

During practice we used the ESP32 a dc motor and controlled it with the cell phone via bluetooth, it was relatively easy to connect the ESP32 to the cell phone with bluetooth, since there were many tutorials, but the difficult thing was to make it possible for us to have a control engine and that it kept in the cycle of turns, since it stopped as soon as one finished one although the condition to stay in the cycle had been fulfilled, after that what was fought with was to make it stop at any time when We will tell you, for this we divide the seconds in which the program is executing and we create a method that is reading when to stop in that way in any second of the program we can stop the motor.

 Rubric

| Criteria | Description | Score |
|---------------|---|-------|
| Instructions | Do you fulfill each of the points indicated in the instruction section? | 10 |
| Development | Did you answer each one of the points requested in the development of the activity? | 60 |
| Demonstration | Was the student present in the explanation of the functionality of the activity? | 20 |
| Conclusions | Se incluye una opinión personal de la actividad por cada uno de los integrantes del equipo? | 10 |

 Members repositories Nelly Quino Michelle Gasca Francisco Villarreal