Objective:

Build an arduino-controlled car that can strafe, turn, and move, based on hand gesture inputs via a Raspberry Pi & camera module configuration wirelessly.

Project Outline:

1. Raspberry Pi (Gesture Recognition)

- **Camera**: The Raspberry Pi uses a camera to capture video input.
- **OpenCV**: The Raspberry Pi processes the video feed with OpenCV to recognize gestures.
- **Bluetooth**: The Raspberry Pi communicates wirelessly with the car via Bluetooth to send control commands to the Arduino.
- **Power**: The Raspberry Pi is powered by a separate 5V power supply

2. Arduino (Motor Control)

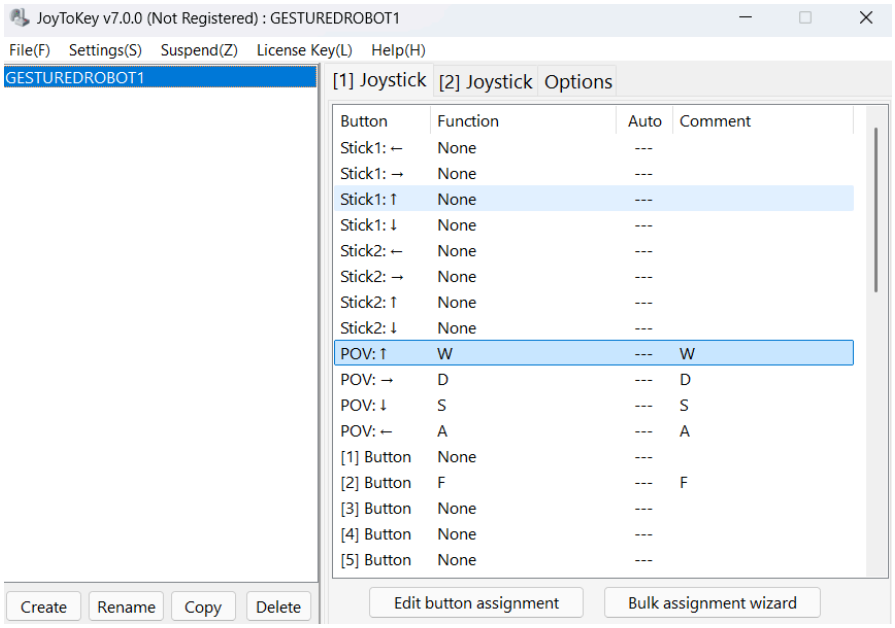
- **HC-06 Bluetooth Module**: The Arduino receives the Bluetooth commands from the Raspberry Pi.
- **Motor Driver (L298N)**: The Arduino uses the motor driver to control the motors on the car based on the Bluetooth commands.
- **Motors**: The L298N motor driver controls the motors that drive the car's wheels.
- **Power**: The Arduino and motor driver are powered by a 6 AA battery pack (providing 6V).

3. Motor Driver (L298N)

- **Control Pins (IN1, IN2, IN3, IN4)**: These are connected to the Arduino's digital pins and used to control the direction of the motors.
- **Enable Pins (ENA, ENB)**: These are connected to 5V or used for PWM control to adjust the motor speed.
- **Power**: Powered by the 6 AA battery pack, which also powers the Bluetooth module.

4. Wireless Communication

- **Test motor functions:** Connect the bluetooth module on the Arduino to a terminal software for receiving bluetooth input. Connecting Xbox controller to the computer and mapping the controls to the program's controls.
    - Tera Term software: https://github.com/TeraTermProject/teraterm/releases
    - Joy2Key: https://joytokey.net/en/download



- **Bluetooth Communication**:
    - The Raspberry Pi sends gesture recognition commands (forward, backward, turn left, turn right) to the Arduino via Bluetooth.
    - The **HC-06 Bluetooth module** on the car is used to wirelessly receive those commands and pass them to the Arduino for motor control.

5. Power Supply

- **Raspberry Pi**: Powered by a 5V power supply.
- **Arduino and Motor Driver**: Powered by the 6 AA battery pack.

6. Car Chassis and Motors

- The chassis (funko pop box screwed onto a metal chassis) houses the motor drivers, Arduino, breadboard, and Bluetooth module.
- Motors are connected to the **L298N motor driver** to drive the wheels based on the Arduino's commands.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