Final Shopping List – Self-Balancing Robot Project

This document contains the finalized list of hardware components and accessories required to construct and operate the two-wheeled self-balancing robot. This includes motor and sensor hardware, power management, microcontroller components, mechanical structure, and wiring essentials.

# 1. Core Electronics

* ESP32 Microcontroller Board (DevKit v1 or similar)
* MPU6050 or MPU9250 IMU Sensor Module (Accelerometer + Gyroscope)
* L298N Dual H-Bridge Motor Driver
* 2x Pololu 3701 6V DC Gear Motors (31.25:1 gear ratio)
* 2x 5-inch Diameter Wheels (compatible with motor shafts)

# 2. Power Supply and Regulation

* 12V Li-ion or LiPo Battery Pack (2S or 3S, ≥2000mAh recommended)
* 2x Buck Converters (MP1584 or LM2596) – One for 5V (ESP32), one for 5V (L298N logic)
* SPST Toggle Switch – for battery cut-off to both buck converters
* Voltage display module (optional, to monitor battery status)

# 3. Wiring and Connectivity

* Male-to-Male and Male-to-Female Jumper Wires
* Silicone Insulated Power Wires (16–22 AWG)
* Screw Terminal Blocks or Soldering Kit
* Breadboard or Perfboard (optional for power distribution)
* Heat Shrink Tubing or Electrical Tape
* Zip Ties or Velcro Straps for Wire Management

# 4. Mechanical and Structural Components

* 3D Printed Chassis Components (base, motor mounts, electronics trays)
* Battery Holder or Tray
* Foam Tape or Rubber Mounts (for IMU vibration isolation)
* Screws, Nuts, and Washers for Motor and Frame Assembly
* IMU Mounting Bracket (centered at wheel axle level)

# 5. Optional Decorative Components

* 3D Printed Darth Vader Figurine (4-inch tall)
* Custom Enclosure or Themed Shell (optional aesthetic addition)