DeliveryBot NITG

Hardware Architecture & Wiring Schematic Document

System Power Distribution

Power management is streamlined using the motor driver's onboard voltage regulator to supply logic components, eliminating the need for an external buck converter.

COMPONENT	PIN	TARGET CONNECTION
12V Battery Pack	Positive (+)	L298N `12V IN` (or VIN)
L298N Motor Driver	`5V OUT`	ESP32 `VIN` (5V Logic Power)
Ground Integration	Battery (-) & L298N GND	Common `GND` on ESP32 & Sensors

Drive & Locomotion (L298N)

The L298N governs the 2WD differential chassis via PWM signals from the ESP32's LEDC peripheral.

L298N PIN	ESP32 GPIO	FUNCTION
`IN1`	GPIO 18	Left Motor Direction A
`IN2`	GPIO 19	Left Motor Direction B
`ENA`	GPIO 5	Left Motor PWM (Speed)
`IN3`	GPIO 23	Right Motor Direction A
`IN4`	GPIO 13	Right Motor Direction B
`ENB`	GPIO 4	Right Motor PWM (Speed)
`OUT1 / OUT2`	-	Connect to Left DC Motor
`OUT3 / OUT4`	-	Connect to Right DC Motor

Spatial Navigation Subsystem

U-blox NEO-6M GPS Module (UART2)

GPS PIN	ESP32 GPIO
`TX`	GPIO 16 (RX2)
`RX`	GPIO 17 (TX2 - optional)
`VCC`	3.3V or 5V
`GND`	Common GND

QMC5883L / HMC5883L Compass (I2C)

COMPASS PIN	ESP32 GPIO
`SDA`	GPIO 21
`SCL`	GPIO 22
`VCC`	3.3V (Strict)
`GND`	Common GND

> **Note:** Keep the magnetometer away from high-current power lines and motors to reduce electromagnetic interference (EMI).

Obstacle Detection (Ultrasonic Array)

Three HC-SR04 sensors are used. The primary (Center) sensor wiring is detailed below based on the firmware configuration. Left and Right sensors require their own dedicated GPIO pins.

HC-SR04 PIN	ESP32 GPIO / CIRCUIT
`TRIG`	GPIO 27 (Direct connection)
`ECHO`	GPIO 14 (Via Voltage Divider)
`VCC`	5V Rail
`GND`	Common GND

> **CRITICAL HARDWARE SAFETY:** The HC-SR04 ECHO pin operates at 5V logic, which will damage the 3.3V ESP32 GPIO over time. A voltage divider is **MANDATORY**.
> *Wiring:* ECHO pin → **1kΩ resistor** → ESP32 GPIO 14 → **2kΩ resistor** → GND.