

Circuit Diagram Explanation – Autonomous Rover Project

The circuit diagram of the **Autonomous Rover** connects multiple hardware components to the Arduino Uno for navigation, sensing, and control.

Components Used in the Circuit:

1. **Arduino Uno** – Main microcontroller for processing sensor inputs and controlling motors.
2. **L298N Motor Driver Module** – Controls the speed and direction of the 4 BO motors.
3. **HC-05 Bluetooth Module** – Receives destination coordinates from a mobile device.
4. **HMC5883L Compass Module** – Provides heading direction for navigation.
5. **Ultrasonic Sensor (Obstacle Detection)** – Placed in the front to detect objects ahead.
6. **Ultrasonic Sensor (Pothole Detection)** – Placed facing downward to detect potholes or surface drops.
7. **4 BO Motors + Wheels** – Provide movement in all directions.
8. **Power Source (Li-ion Battery / 12V Battery)** – Supplies power to the entire system.

Wiring Connections:

1. Motor Driver (L298N) to Arduino:

- IN1 → Arduino Digital Pin 2
- IN2 → Arduino Digital Pin 3
- IN3 → Arduino Digital Pin 4
- IN4 → Arduino Digital Pin 5
- ENA → Arduino Digital Pin 9 (PWM)
- ENB → Arduino Digital Pin 10 (PWM)

- Motor A → Front Left + Front Right
- Motor B → Rear Left + Rear Right
- Power (12V) → Battery
- GND → Arduino GND

2. Ultrasonic Sensor 1 (Front – Obstacle Detection):

- VCC → 5V
- GND → GND
- Trig → Arduino Pin 6
- Echo → Arduino Pin 7

3. Ultrasonic Sensor 2 (Down – Pothole Detection):

- VCC → 5V
- GND → GND
- Trig → Arduino Pin 8
- Echo → Arduino Pin 12

4. HC-05 Bluetooth Module:

- VCC → 5V
- GND → GND
- TX → Arduino Pin 11 (RX)
- RX → Arduino Pin 13 (TX) (*with voltage divider if needed*)

5. HMC5883L Compass Module:

- VCC → 3.3V
- GND → GND
- SDA → Arduino A4
- SCL → Arduino A5

Diagram Notes:

- Ensure that all **GND connections** are linked together to avoid communication issues.

- Use a **separate battery pack** for motors if required to prevent voltage drops affecting sensors.
- The **down-facing ultrasonic sensor** must be placed close to the ground for accurate pothole detection.