Chapter 3 — Hardware Course (Rosmaster R2)

[DIAGRAM — BASIC HARDWARE LAYOUT]

Battery → Power Module → Jetson Xavier NX
→ Motor Driver → Motors
Camera → USB → Xavier NX
LiDAR → USB → Xavier NX

All sensors send data → ROS
ROS sends commands → Motor Driver

1. Overview

This chapter introduces the main hardware parts of the Rosmaster R2. Understanding the hardware helps you diagnose problems, upgrade components, and safely maintain the robot.

2. Power System

• Main lithium battery powers motors and Jetson.
• Power module regulates voltage for electronics.
• Check battery level before each session.
• Keep wiring organized to prevent shorts.

3. Jetson Xavier NX

• The main computer of the robot.
• Runs ROS, navigation, mapping, and AI models.
• Connect sensors (camera, LiDAR, gamepad USB) here.
• Use SSH to access the Jetson from your laptop.

4. Motor Driver

• Receives commands from ROS via /cmd_vel.
• Controls speed and direction of the motors.
• Must be correctly wired to battery and motors.
• Supports smooth acceleration and braking.

5. Motors & Wheels

• Provide forward/backward motion.
• Steering motor controls turning (Ackermann).
• Check wheel alignment to ensure accurate driving.

• Keep wheels clean to avoid slipping.

6. Sensors Overview

The robot may include:
• Camera — visual processing, AI lane following.
• LiDAR — mapping and navigation.
• IMU — helps with orientation and stability.
• Ultrasonic sensors — obstacle detection (if installed).

7. Wiring Layout

• Keep wires short and tidy.
• Avoid crossing power wires over sensor wires.
• Use zip ties to prevent loose connections.
• Ensure USB cables fit securely into Jetson NX.

8. Hardware Safety Tips

• Never touch moving wheels.
• Keep liquids away from electronics.
• Check for loose wires regularly.
• Disconnect battery when working on motors.