



Kickstart Your Robotics Skills

Quick tasks to build real engineering ability.

1. Problem-first: define a simple robot task and outline steps

Description: Pick one small real-world problem (e.g. follow a dark line or avoid a single obstacle) and write a 5-step plan that solves it from problem to acceptance criteria.

Keep steps concrete (sensing needed, control action, simple success test) and note which theory you must revisit later to optimise the solution.

2. Quick C++ sensor filter prototype

Description: Write a short C++ function (≤ 30 lines) that takes a raw sensor value array and returns a median or moving-average value for stability.

Add two short comments explaining why this filter helps real hardware readings and one test case with sample inputs.

3. Tiny Linux debugging checklist for embedded testing

Description: Create a 10-item checklist for bringing up a new board on Linux: serial console, dmesg checks, device node presence, permissions, basic ros2-less test command.

For each item add one expected outcome and one troubleshooting tip you can try within 10 minutes.

4. Micro-simulation in MATLAB (single sub-system)

Description: Build a 10–15 minute MATLAB script that models a DC motor step response (input torque \rightarrow angular velocity) and plots the result.

Comment two lines on how the sim outcome guides hardware choices and one quick tweak to make the sim more realistic.

5. Low-level sensor comms mini-lab (I2C/Serial)

Description: Draft a short procedure to read one sensor over I2C or serial on an embedded board: required wiring, minimal init commands, one read command and expected byte format.

Add one simple validation test (e.g. known value or checksum) and one note on what failure behaviour indicates (wiring, power, or address issue).

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