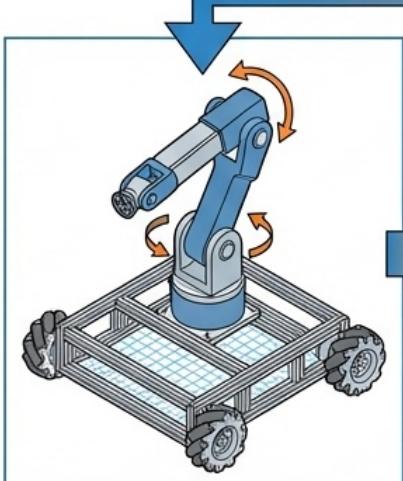
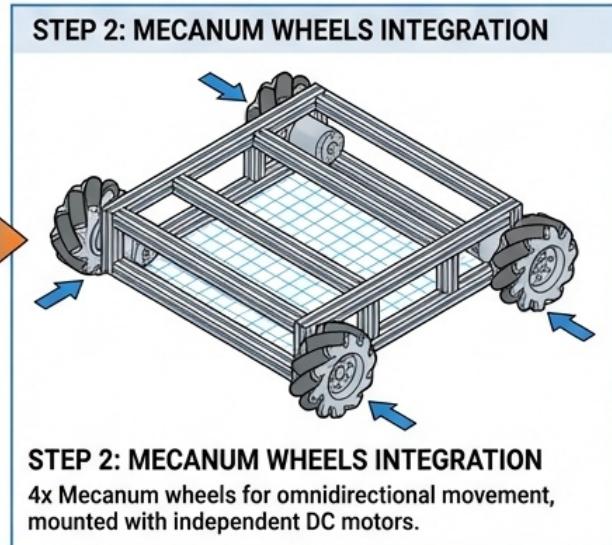
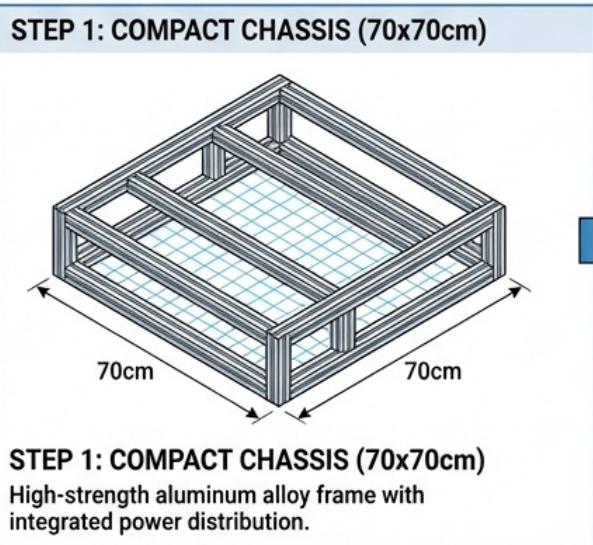


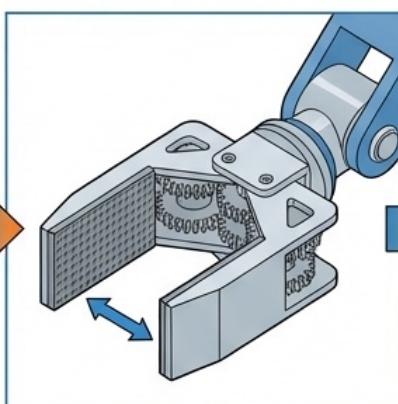
R2 Autonomous Robot - Mechanical Assembly

R2 AUTONOMOUS ROBOT: ASSEMBLY SEQUENCE



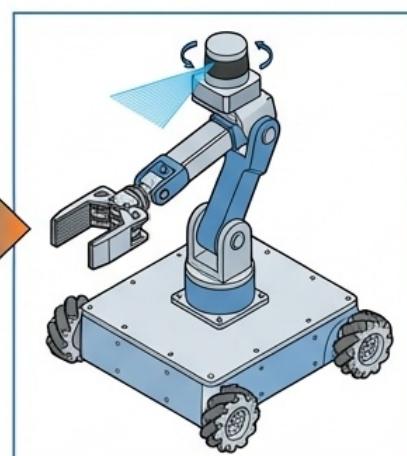
STEP 3: 2-DOF ROBOTIC ARM MOUNTING

2-degree-of-freedom manipulator arm for precise task execution.



STEP 4: WIDE GRIPPER MECHANISM DETAIL

High-torque, parallel-action wide gripper for diverse object handling.



STEP 5: FINAL ASSEMBLED R2 ROBOT

Complete autonomous platform with 360° Lidar sensor and integrated control unit.

TECHNICAL NOTE: All dimensions in cm.
Isometric view not to scale.

Target Spec: 800mm x 800mm Base | 40kg Limit | Mecanum Drive | 2-DOF Arm

Phase 1: Compact Chassis Assembly

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Goal: Build a rigid 700mm x 700mm square frame.

Materials:

- Profile: 30mm x 30mm T-Slot Aluminum Extrusion (Series 30)
- Fasteners: M6 T-nuts, M6 x 12mm Hex Socket Head Screws

Steps:

1. Cut Profiles: 2x @ 700mm (Side beams), 2x @ 640mm (Front/Back beams).
2. Assemble Outer Frame: Assemble in a perfect square. Verify diagonals match (~990mm).
3. Mid-Deck: Install a central plate for mounting sensors and compute unit.

Phase 2: Precision Drivetrain

Goal: Install 4 independent wheel modules for precise forest navigation.

Components:

- Wheels: 4x 100mm (4") High-Grip Mecanum
- Motors: 4x Encoder DC Motors (12V/24V, High Precision)
- Suspension: Optional printed flexure mounts.

Steps:

1. Mounting: Bolt motors tucked *inside* the frame for protection.
2. Alignment: Ensure absolute squareness; misalignment causes drift.

Phase 3: 2-DOF Arm Manipulator

Goal: Create an articulating arm to pick KFS blocks (150-200mm height).

Materials:

- Base: Rotating Turntable Bearing
- Shoulder: High-Torque Servo (60kg.cm) or NEMA17 Stepper
- Linkage: Carbon Fiber tubes or lightweight Aluminum channel

Steps:

1. Turret Base: Mount the rotating base centrally on the Mid-Deck.
2. Arm Link: Attach the main lift arm (length ~400mm) to the shoulder joint.
3. Motion Check: Ensure arm reaches ground level and up to 400mm height.

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Phase 4: Active End Effector

Goal: Gripper specialized for 150x150mm KFS cubes.

Materials:

- Jaws: Wide-grip parallel mechanism (opening > 160mm)
- Sensors: TOF distance sensor inside gripper palm.

Steps:

1. Assembly: Mount wide jaws to end of arm linkage.
2. Sensor Install: Embed TOF sensor for "Auto-Grasp" trigger.

Phase 5: Complete Integration

Goal: Final Autonomous System.

Checklist:

1. Sensors: Mount Lidar on top mast.
2. Camera: Mount depth camera on front chassis.
3. Compute: Secure Jetson/NUC with vibration damping.