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Stretch 4 | Mobile Manipulator Data Sheet

Open, Friendly, and Ready to Work.

Stretch 4 builds upon its predecessors to provide a highly capable, 9-DOF platform designed for indoor commercial and industrial environments. It comes with a top-to-bottom open source robotics stack, a suite of demos, and a community of 1000s of users.

1. System at a Glance

Calibrated, capable, portable, and deployable -- ready to work.

Feature	Specification
Reach	55 cm + 6 cm wrist
Payload (Arm exnded)	2.5 kg
Payload (Arm retracted)	4 kg
Total Weight	46 kg / 33 kg ballast off for transport
Runtime	8 hours (Light CPU load)
Height / Footprint	160 cm Height / 43 cm Diameter

2. Performance & Manipulation

The Stretch 4 features a unique telescoping arm and a high-speed lift mechanism, allowing for versatile reach in constrained environments.

Manipulator Capabilities

- Degrees of Freedom (9): 3-wheel omnidirectional base, 1 lift, 1 telescoping arm, 3-axis wrist (Yaw, Pitch, Roll), and optional end-of-arm tool.
- Range of Motion: 120 cm (Lift), 55 cm (Arm Extension).
- Wrist Rotation: 310° for Yaw, Pitch, and Roll.
- Dynamic Speed: 50 cm/s (Lift), 70 cm/s (Arm).

Mobility & Base

- Drive System: Low gear-ratio omnidrive wheels (3) for seamless 360° movement.
- Top Speed: 60 cm/s.
- Terrain Handling: up to 20 mm step/threshold clearance
- Environment: Handles from smooth floors to heavy pile carpet.

3. Perception & Intelligence

Equipped with a hemispherical vision system and edge AI processing, Stretch 4 maintains a 360° understanding of its workspace.

Vision & Sensing Suite

- Head Lidars: Dual 3D Hemispherical Hesal J128 Lidars 360° x 187° H x 189° FOV
- Head Wide FOV Cameras: Dual Global Shutter 2.3MP RGB Cameras (Luxonis OAK-FFCAR0234).
- Head High Res Camera: 12MP RGB Camera (Luxonis OAK-FFC IMX378).

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- Wrist Depth Sensing: Stereo Depth Camera (Luxonis OAK-D SR) with 4 TOPs processing.
- Hazard Detection: 6x Pixart Laser Line Sensor Curtains for cliff and hazard monitoring.
- 9 DOF IMU in mobile base for tilt detection and odometry

4. Compute & Connectivity

The onboard intelligence is powered by a dual-processor architecture, separating primary autonomy tasks from auxiliary vision or AI processing.

Primary Compute: Intel NUC 15

- Processor: Intel® Core™ Ultra 5 225H
- Memory: 32.0 GiB RAM
- Storage: 1.0 TB NVMe

Auxiliary Compute: NVIDIA Jetson Orin NX

- Memory: 16GB RAM
- Storage: 128GB NVMe
- Connectivity: WiFi 5.2 and Ethernet.

5. Safety & Human Interaction

Stretch 4 is designed to operate safely around humans with fully backdriveable joints and reactive controllers.

- Active Safety: Force limiting via motor current monitoring; 100Hz watchdog monitors; Tilt avoidance via IMU.
- Collision Avoidance: 100Hz self-collision avoidance using Mujoco + URDF.
- Physical Safety: Manual override for the braked lift joint; dedicated Runstop button in the head.
- Interaction: Dual RGB Neopixel "eye" arrays; 360° noise-reduction speakerphone (3W stereo).

6. Developer Ports & Power

- Power System: 512Wh LiFePO4 battery with quick-swap capability, integrated charge,r and BMS.
- Tooling: Quick-release tool plate with 24V Feetech RS485 bus.
- Expansion Ports:
  - Base: HDMI, Ethernet, 3x USB 3.2 Type A.
  - Head: USB 3.2 Type A, Type C.
  - Wrist: USB 2.0 Type A.
- End of Arm Tools: Includes Stretch Gripper 4 (200mm aperture); supports Parallel Gripper 4 and Tablet mounts.

7. Other Specifications

Category	Detail
Warranty	12-month standard; optional 2-year service plan
Operating Temp	10°C to 30°C
Ingress Protection	IP20
Humidity	10% - 90% RH (non-condensing)
Included Accessories	Stretch 4 Gripper, Gamepad, Wall Power Adapter, Aruco tags

FCC Compliance Notice: This product is currently intended for research, development, and laboratory use only. It has not yet been certified for compliance with FCC Class A limits.