

OpenAssistive — Technical Specification v1.0

Project: OpenAssistive — Modular Assistive Mobility System
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Non-profit open social technology initiative.

1. Purpose and Scope

Defines a modular, low-cost assistive mobility system to support blind and visually impaired persons. Complements the white cane with sensors, camera reading, haptic and audio feedback.

2. Design Principles

Low cost, modular hardware, repairability, textile-integrated cabling, offline capability, open documentation, GPL licensing, social purpose.

3. System Overview

Modules: Smart Cane Sensor, Shoulder Camera, Backpack Compute, Haptic Feedback, Audio & Voice Interaction. Flow: Sensors → MCU → Compute → Haptic/Audio.

4. Main Modules

Cane sleeve with ToF sensors and MCU; handle with button and vibration; shoulder camera; Raspberry Pi backpack unit; haptic motors; audio headset.

5. Recommended Components

ToF sensors (VL53L1X class), ESP32/RP2040 MCU, Raspberry Pi 4/5, Pi or USB camera, coin vibration motors, 20,000 mAh power bank, magnetic connectors.

6. Electrical Topology

Sensors connected to MCU, MCU to Raspberry Pi via USB/UART. Improves timing and robustness.

7. Power Budget

Estimated 8–12W average. Typical autonomy 6–10 hours with 20,000 mAh battery.

8. Prototype Phases

Phase build order: sensor sleeve → vibration alerts → Pi integration → camera QR → backpack integration → user tests.

9. Safety Notes

Assistive only, not a replacement for training. Must be tested gradually in controlled environments.

10. Open Contribution Model

Derivatives must remain GPL-compatible. Modifications must be documented.

11. Future Extensions

GPS assist, offline maps, object recognition, indoor beacons, wireless cane module.