The Jolt Locator: A Blueprint for Focused Navigation

HAPTIC FEEDBACK MODULE

OLED DISPLAY (1200 NITS)

NAVIGATION FOCAL POINT
Neue Haas Grotesk Display Pro 65 Medium

HIGH-PRECISION GNSS/INS ANTENNA

TACTILE CONTROL INTERFACE

RUGGEDIZED HOUSING (IP68)

EFFICIENT POWER MANAGEMENT FLOW

MULTI-BAND CONNECTIVITY MATRIX

An Architectural Explainer

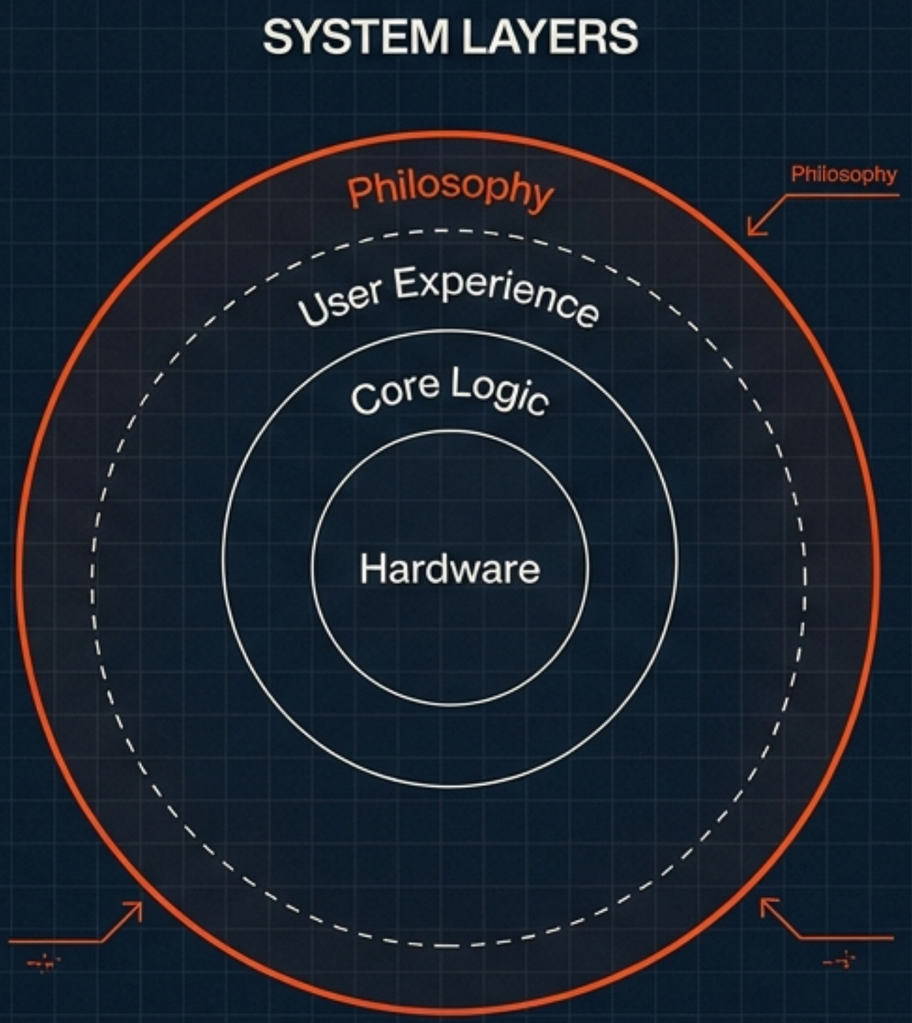
Inter

PRECISION ENGINEERED

SCALE 1:2

The Guiding Principle: “Just the Essentials”

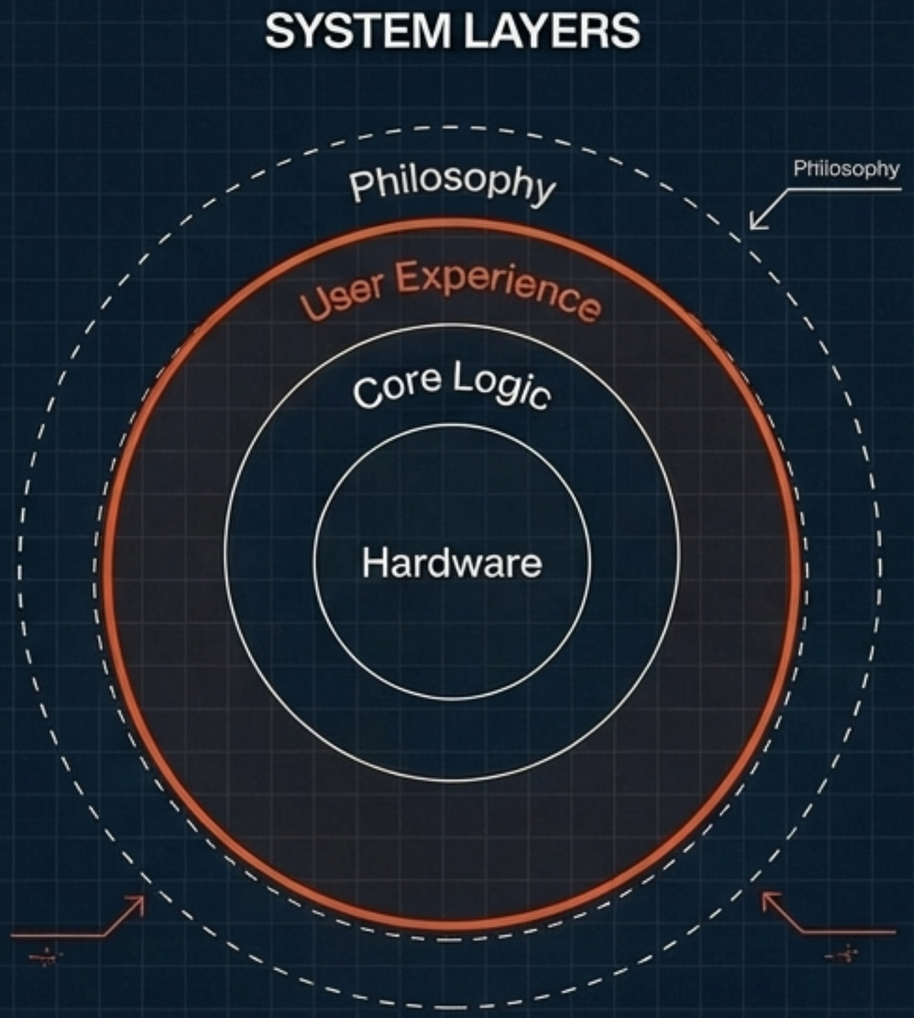
The Jolt Locator is a compact, standalone navigation device designed to deliver essential data at a glance. It intentionally avoids the complexity and distraction of a smartphone UI. The core mission is to provide only the data needed to reach a target, prioritizing readability and quick decision-making.



An Appliance-Like Experience, By Design

The device is meant to behave like an appliance. Connect power, it boots, locks GPS when possible, and immediately starts showing useful navigation information without setup. Interactions are kept minimal so operation stays intuitive intuitive even while moving.

> *Intentional Simplicity: The appliance-like behavior is a core design goal, eliminating setup friction for the user.*



A High-Contrast UI for At-a-Glance Navigation

1. **Distance Remaining**:
   The primary data point.

2. **Heading/Direction Cue**:
   Orients the user relative to the target.

3. **GPS Status**:
   Communicates data reliability.

The 'home screen' prioritizes these three items because they cover the majority of real-world walking navigation decisions.

The Core Functions: Translating Raw Data into Actionable Guidance

The device continuously reads sensor data and performs a series of computations to transform raw coordinates and magnetic readings into the simple, useful information shown on the display.

- Live Position Acquisition
- Distance-to-Destination Calculation
- Bearing & Heading Estimation
- Data Validation

The System's Heartbeat: The Main Program Loop

Calculating the Path: Position and Distance

The system first parses GPS output to extract a valid **latitude** and **longitude**. Using this current coordinate and a stored destination coordinate, it then calculates the real-world distance.

This is achieved using a spherical distance approach, commonly the **Haversine method**, which accounts for the Earth's curvature.

Finding Your Way: Bearing and Heading

Heading	Bearing
	
Which way you are facing	The direction you should go

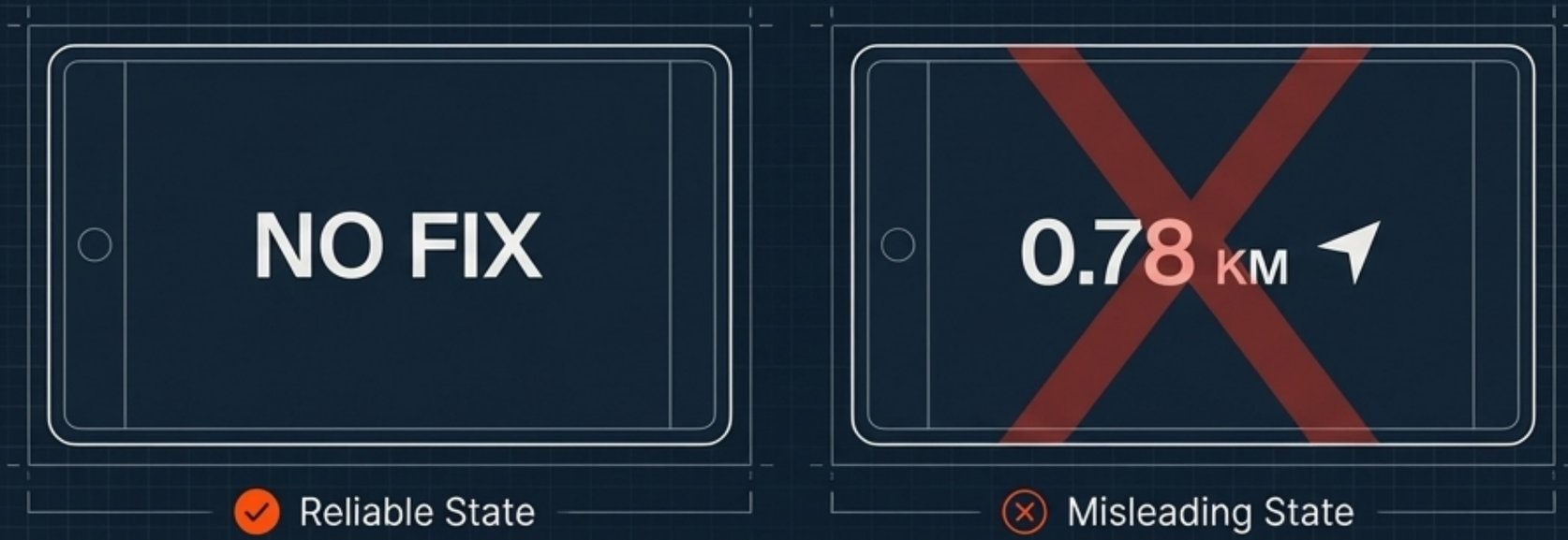
Heading Estimation

From the magnetometer, it estimates the device's magnetic heading. This translates the abstract bearing into user-centric “turn left/right/straight” style guidance.

Bearing-to-Destination

From the same two coordinate pairs, the device computes a forward azimuth, or bearing. This represents "the direction you should go on the map.”

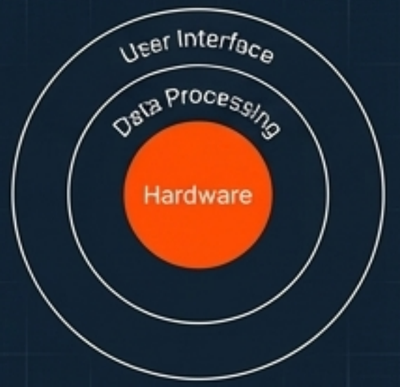
Ensuring Reliability with Data Validation



A robust navigation tool must be trustworthy. If the GPS fix is missing or stale, the Jolt Locator is designed to freeze distance and bearing updates and clearly display a “NO FIX” status.

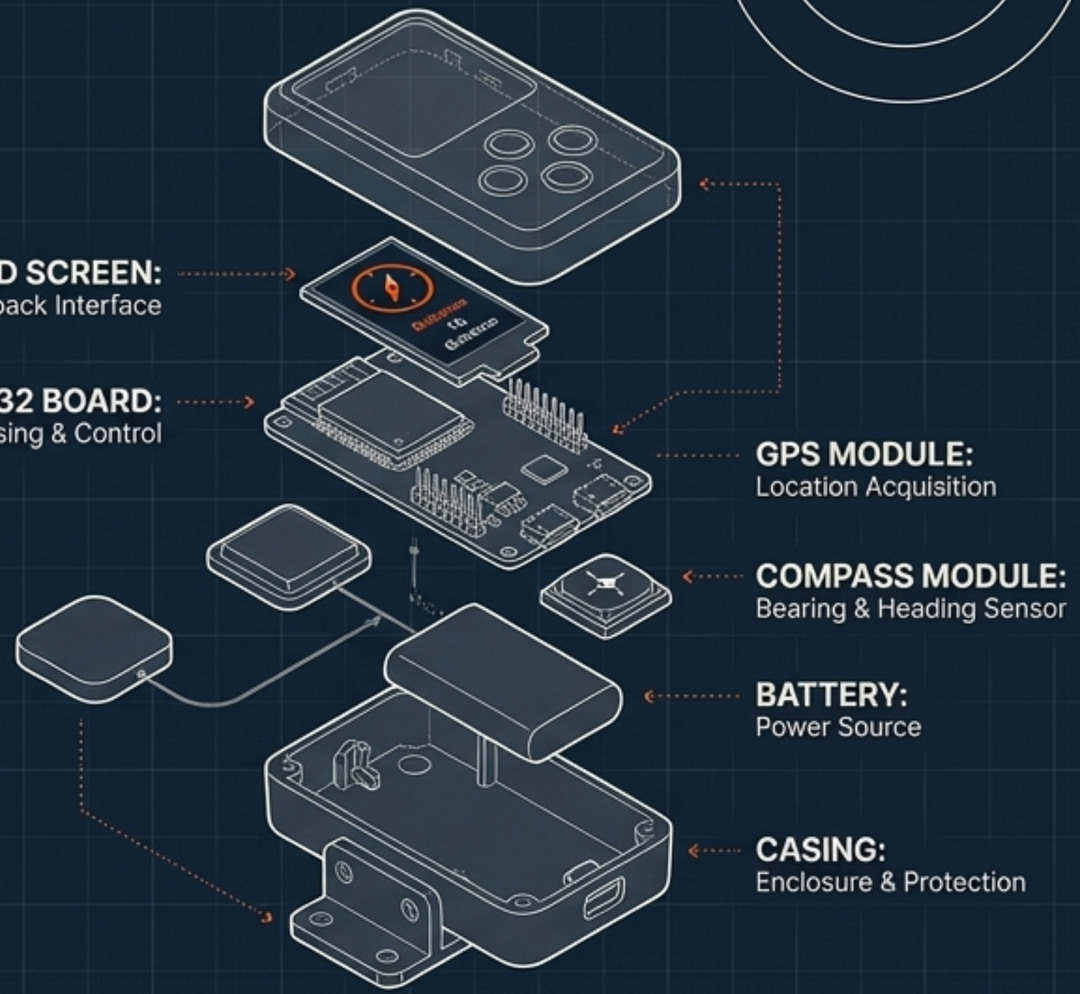
This prevents the system from displaying misleading numbers and builds user confidence.

System Layers
from previous slides

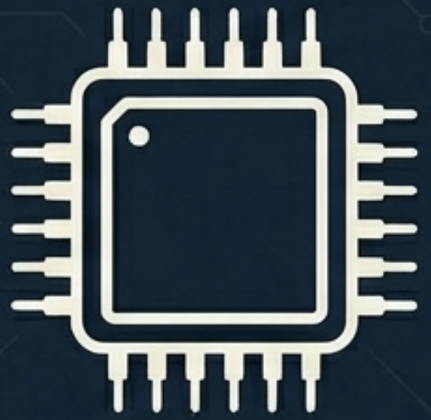


The Hardware Architecture: The Physical Foundation

The philosophy of focused functionality extends to the hardware selection. Each component is chosen for its specific role in the navigation and display pipeline, creating an efficient and compact system.



The Core Components: Controller and Sensors



ESP32 (Controller)

Handles all sensor I/O, mathematical computations, state logic, and the display update loop.

GPS Module (NEO-6M class)

Provides live position updates (latitude/longitude) over a serial/UART interface.

Digital Compass (HMC5883L / GY-271)

Provides magnetometer readings for heading estimation over the I2C bus.

The Interface Components: Display and Controls

OLED Display (SSD1306)

Shows the navigation UI, chosen for its high contrast and readability. Communicates over the I2C bus.

Optional Indicators/Controls

Push buttons for actions like “save destination” or “switch screen mode,” and RGB LEDs for expanded status states.

> *Note on optional controls: The core navigation computation is self-contained. Buttons are a design choice for adding features, not a requirement for the base function.*

An Elegant Solution: The Shared I2C Bus

The OLED display and the digital compass both sit on the same **I2C bus**. This means they share the same SDA (Data) and SCL (Clock) lines back to the controller.

> *Why a shared I2C bus?* ***To significantly reduce wiring complexity and the physical footprint of the device.***

The Complete System Architecture

From sensor input to user display, each layer of the Jolt Locator's architecture works in service of the next, transforming raw sensor data into clear, glanceable navigation.

Purpose-Built by Principle

Every element of the Jolt Locator—from the choice of an **I2C bus** to simplify wiring, to the use of the **Haversine method** for accurate distance, distance, to the **appliance-like user experience**—is a direct consequence of its core philosophy: to deliver “just the essentials” for navigation, and nothing more.