ielivate®

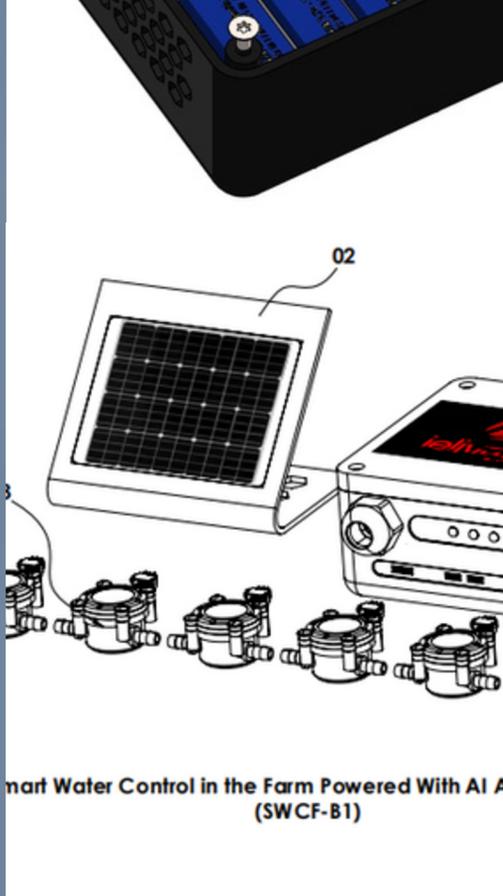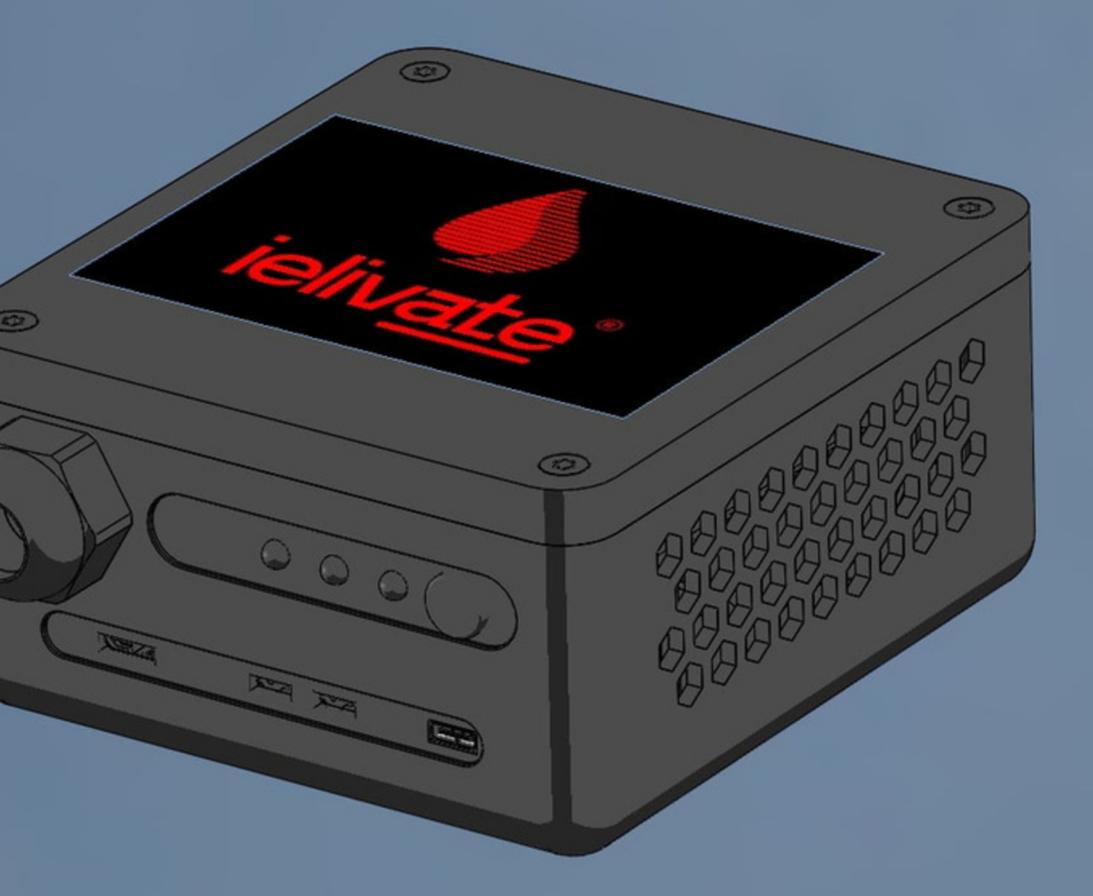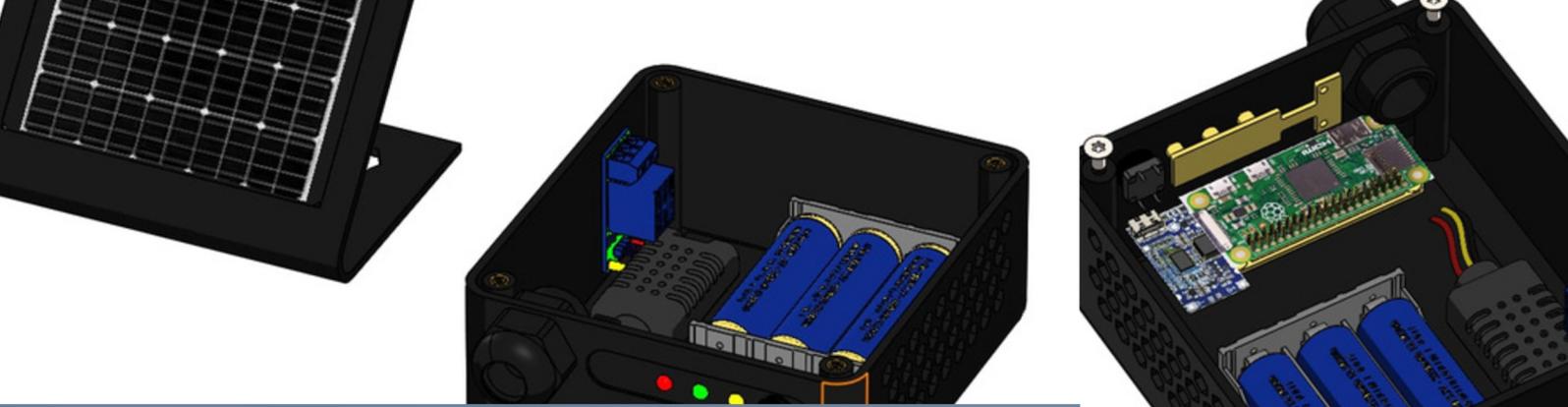# SWCF-B1 Prototype Portfolio

Ielivate Smart Water Control — Powered by AI Optimization

Pammas Technologies Inc.

Theme: Rouge (#FF0000) & Noir (#0A0A0A)

Water Control in the Farm Powered With AI Algorithm
(SWCF-B1)

2025

Smart Water Control in the Farm Powered With AI A
(SWCF-B1)

PORTFOLIO

CO-FOUNDER

BELHACHEMIA
MOHAMMED

2025

Table of Contents

SWCF-B1

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Executive Summary

This document compiles prototype renders, assembly views, and branding references for the Ielivate Smart Water Control in the Farm (SWCF-B1). It highlights the system concept, a high-level component analysis, and explodes key internal modules. Original visuals from engineering PDFs are appended as image pages to preserve fidelity.

• Purpose — showcase the device, its parts, and how they fit together. • Scope — combines labeled overview (01–03) and exploded modules (04–14). • Brand — updated red #FF0000 with black #0A0A0A throughout.

! AI Algorithm Optimization
Small Box SWTCH1

Pump/Valve Set — Five compact inline actuators for zone control; distribute and dose water to independent irrigation lines.

Power/Driver Board — High■current switching (relay/MOSFET) and protection; isolates valve transients from logic rails.
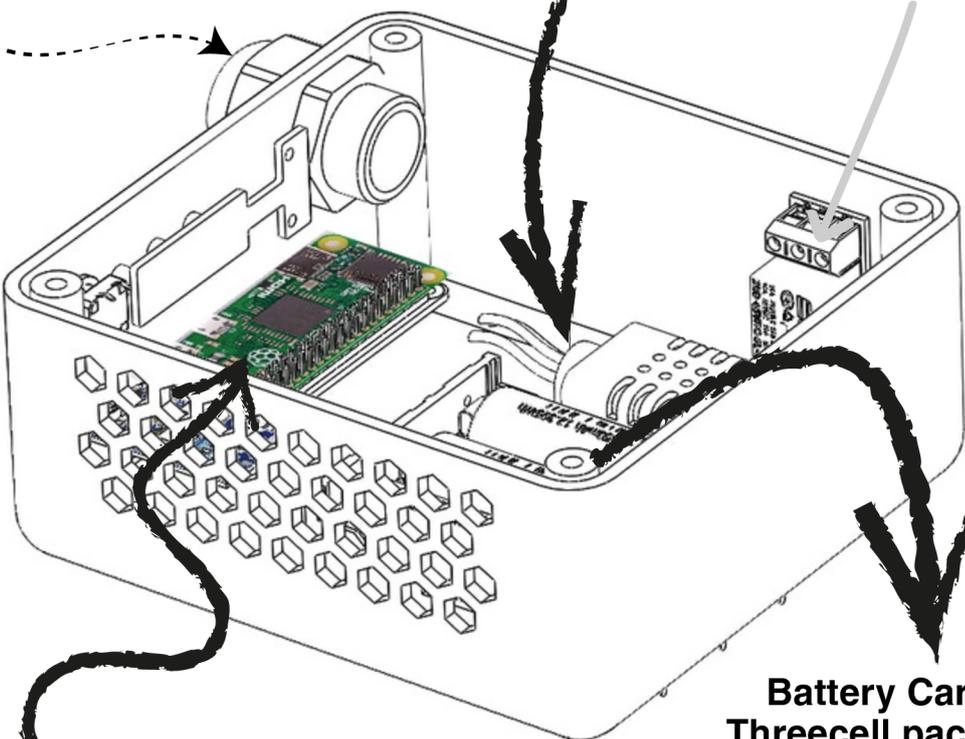
Controller

Battery Carrier — Threecell pack cradle providing solar autonomy and balanced weight distribution.

Controller Board — Pi Zero 2 W
quad-core 64-bit ARM Cortex-A53 processor clocked at 1GHz and 512MB of SDRAM, Zero 2 is up to five times as fast as the original Raspberry Pi Zero

WiFi · Bluetooth · SD

Based on the labeled overview page, the system comprises: (01) the SWCF-B1 controller unit, (02) a standalone photovoltaic panel, and (03) a set of five compact in-line pumps/valves for zone control. The appended overview page should be used as the visual reference for these labels.

• 01 — Controller: housing with front user interface (rotary/knob, status LEDs) and I/O ports; side ventilation for thermal management.
• 02 — Solar panel: provides off-grid power; panel stand optimizes angle and stability in field conditions.
• 03 — Pump/valve set: five actuated nodes for distributing and dosing water to independent irrigation lines.

See the appended "Plan d'assemblage final (overview)" page for the pictured layout and numbering.
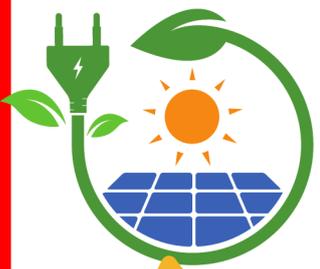
Solar Panel — Offgrid power input; angle adjustable stand for optimal irradiance and stable mounting in field conditions
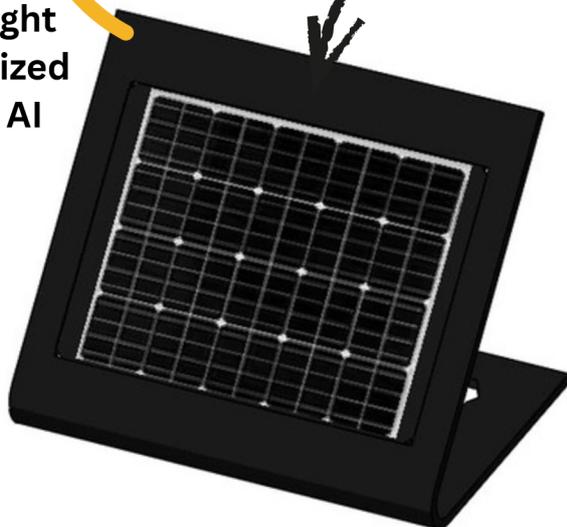
use light optimized with AI

WSMB1 Smart Water Box — Callout Boxes

Structural Base/Chassis — Anchors PCBs, battery, and I/O; ensures stiffness and heat path.
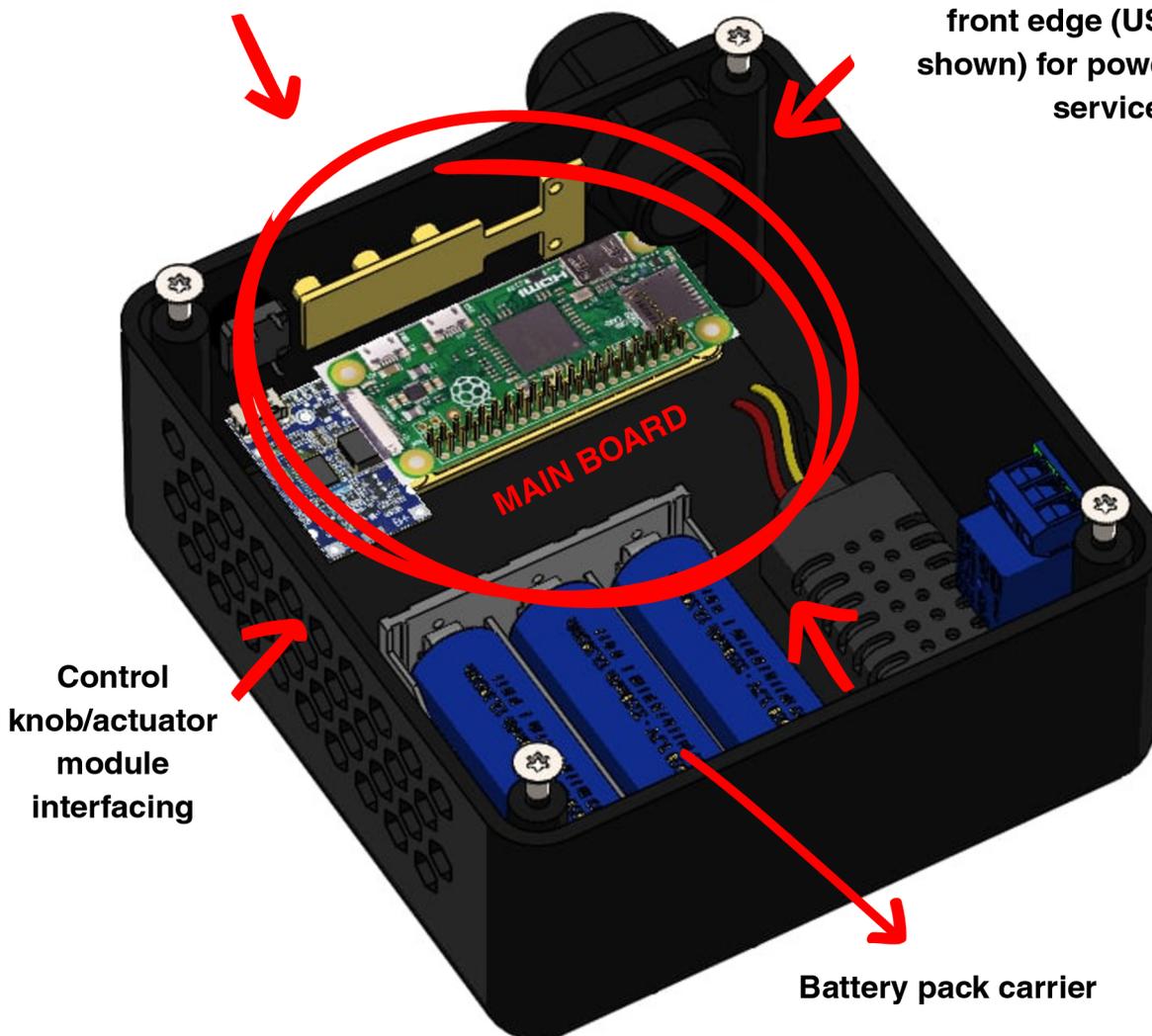
The exploded views reveal the controller's internal layout. The numbering below follows the annotated page. Descriptions focus on function rather than exact part names; confirm with CAD/BOM as needed.

- 04 — Top cover / cosmetic lid with lelivate branding, protects the stack and provides visual identity.
- 05–07 — Front interface bracket & light-pipe/encoder sub-assembly that supports the main knob and indicators.
- 08 — Control knob/actuator module interfacing to the UI bracket for user input (e.g., rotary + push).
- 09 — Main controller PCB hosting MCU/SoC, comms, and sensing; connects upstream/downstream modules.
- 10 — Power/driver board for high-current loads and protection (relays/MOSFETs as applicable).
- 11 — Terminal/connector block that routes field wiring to pumps/valves and sensors.
- 12 — Battery pack carrier (three cylindrical cells) for energy storage and solar autonomy.
- 13 — Structural base / chassis that anchors PCBs, battery cradle, and I/O.
- 14 — I/O daughterboard along the front edge (USB/ports shown) for power, data, or service.

Main controller PCB

I/O daughterboard along the front edge (USB/ports shown) for power, data, or service.

MAIN BOARD

**Control knob/actuator module interfacing**

Battery pack carrier

Brand palette used throughout this report: Red #FF0000 (RGB 255,0,0; CMYK 0,100,100,0) and Black #0A0A0A (RGB 10,10,10; CMYK 90,67,68,75). The logo dimension spec shows L1 = 100 mm usage.

Reference pages are appended at the end for accurate color/mark reproduction.

Main Controller PCB — MCU/SoC, comms, and sensing hub; connects upstream UI and downstream power/sensor modules.

ON/OFF
SWITCH
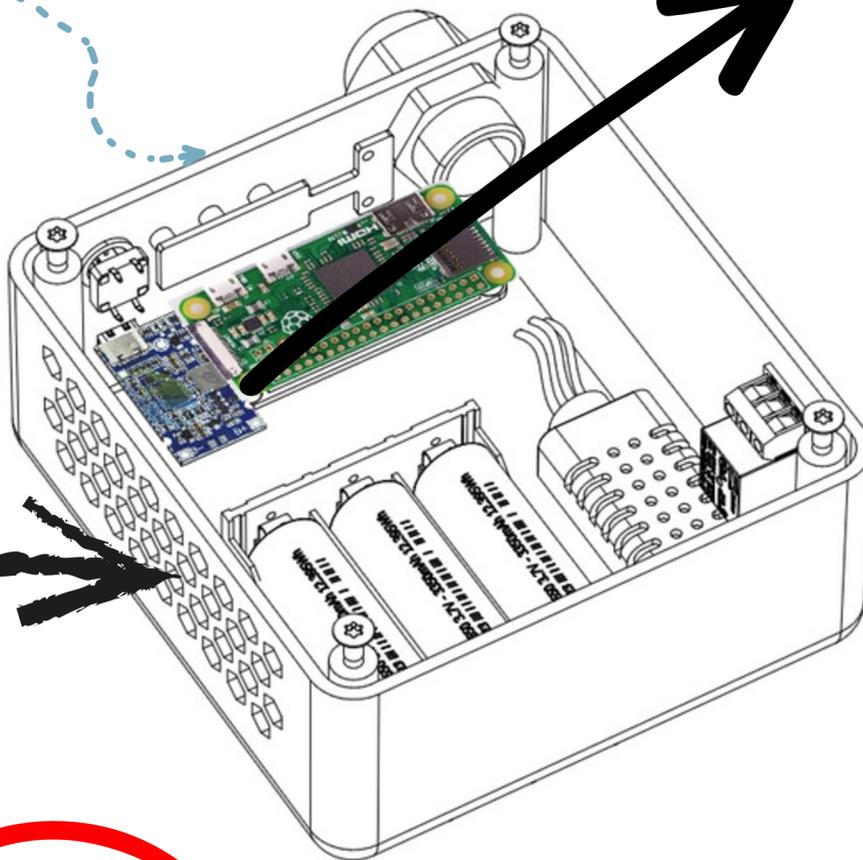
Power & I/O Harness Block — external cable entry and terminal interface.

External Power & Sensor Harness — field-grade cable feed for solar, battery, and valve lines. Routed through sealed glands into the chassis; connects to internal terminal block for regulated _12 V and I/O_.

• Overview renders (black & white / full-color).
• Labeled overview (01–03).
• Exploded assemblies (04–14).
• Brand color & logo specification.
The following pages are the original PDFs appended without compression to preserve clarity.

(!) DISCLAIMER

I/O Daughterboard — Front▪edge USB/ports for power, data, or service; keeps main PCB uncluttered.

Controller Unit — Enclosed electronics with user interface (knob + status LEDs), ports, and side ventilation; hosts compute, drivers, and I/O routing
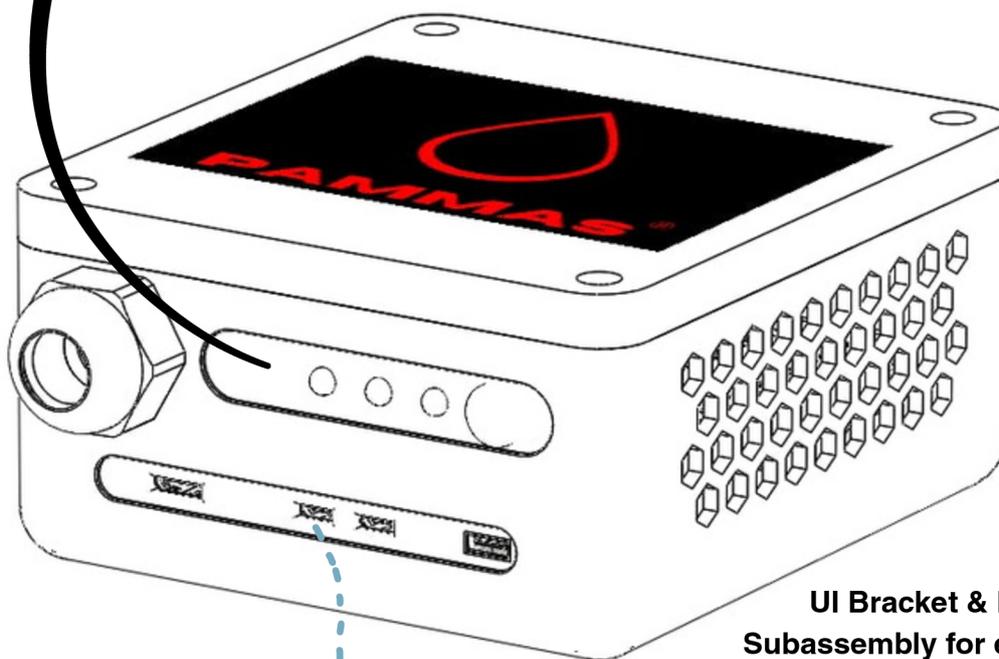
UI Bracket & Lightpipes — Subassembly for encoder/knob and indicators; aligns optics and provides mechanical support.

Front Connectivity & Ventilation Zone houses multi-port I/O daughterboard, air inlets, and lateral vents for thermal regulation.

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• **Local UI (Next.js)** — Static control pages exported to /opt/waterbox/www; Setup, Control, Network, Sensors, System, MQTT.

• **Device API (Flask)** — /status and /sensors (GET); /config and /valve (POST); token gate + CORS hardening.

• **Networking Modes** — AP first☐run SSID 'WaterBox☐Setup' at 192.168.4.1; Station mode joins farm Wi☐Fi; optional MQTT bridge.

• **Autostart & Services** — systemd (waterbox.service) and/or PM2 to resurrect Node☐RED/API; logs retained for troubleshooting.

• **Captive Portal (opt.)** — iptables DNAT to force HTTP:80 to setup page during AP pairing; disable AP after credentials saved.

• *MQTT Topics — waterbox/box1/cmd, /state, /metrics, /events; bridge to cloud broker via TLS for remote fleet control. • Edge AI (opt.) — Collect flow/pressure/soil; Edge Impulse anomaly model; gate irrigation decisions with policy thresholds.*
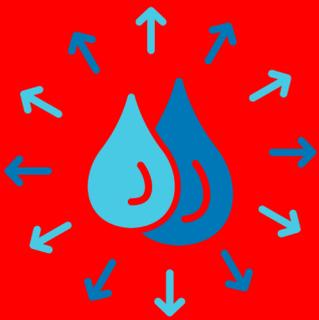
BOX
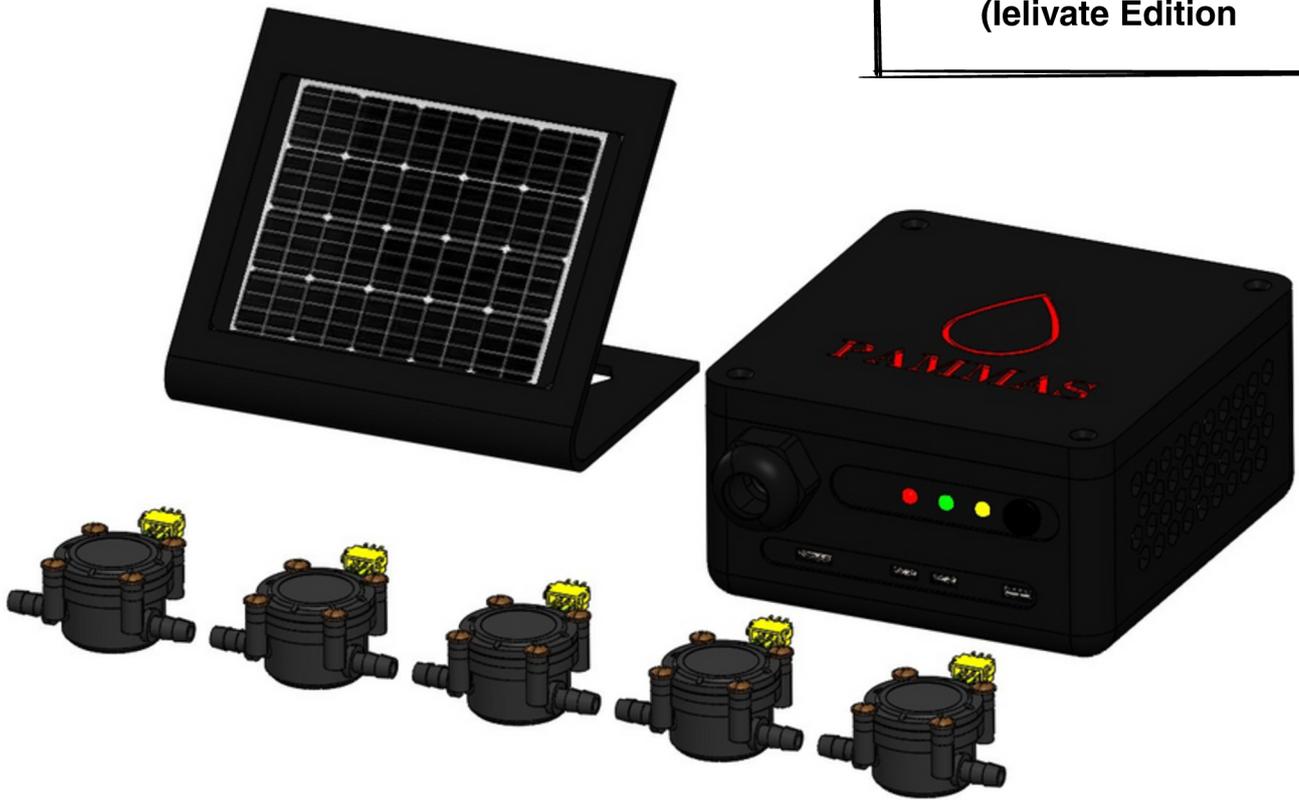
solar-powered irrigation controller with five smart valves and onboard AI management for autonomous zone watering.

The WSM-B1 Smart Water Box prototype represents a complete convergence of design, energy autonomy, and AI-driven water management.

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