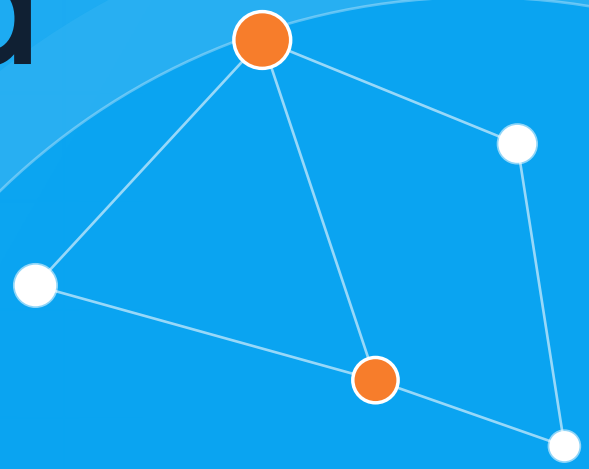
THE THINGS CONFERENCE

Building Connected Interfaces with Elecrow



From human–machine interaction to connected things in the real world.

Nina Hu
Head of Marketing & Sales

Elecrow
HMI Display · LoRaWAN · Meshtastic

WHO WE ARE

Reliable & Innovative IOT hardware for global developers

Elecrow helps teams move from an idea to a working connected product — combining intuitive HMI displays with practical wireless IoT building blocks.

12 +
Years of Innovation

5,000
m^2 Manufacturing

160 +
Team Members

150 +
Countries & Regions

WHAT WE HAVE

Human ↔ Machine

Clear feedback, intuitive control and a display that makes complex data understandable.

EXPERIENCE

INFRASTRUCTURE

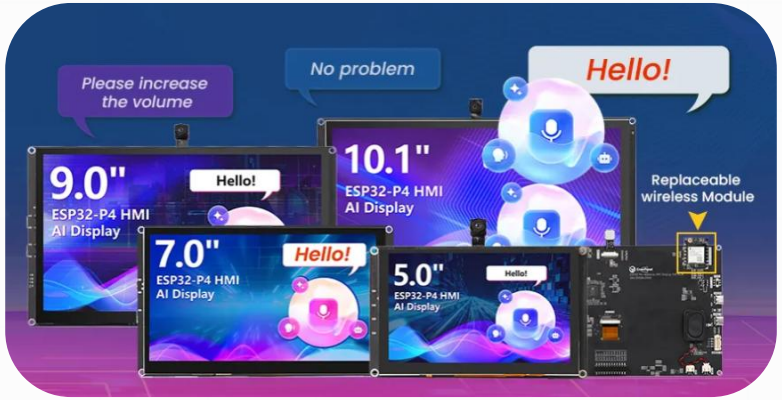
Device ↔ World

Reliable wireless links, long-range coverage and the freedom to connect beyond the lab.

HMI Display – CrowPanel

ESP32-powered interfaces that make devices clear, responsive and easy to operate.

ESP32 | Touch UI | Embedded display | Industrial display | WiFi | Bluetooth | Smart display | Medical Device



Connected IoT – ThinkNode

LoRa and ThinkNode products for reliable connectivity across cities, sites and communities.

Encrypted messaging | Meshtastic | NRF52840/ESP32 | LoRaWAN gateways | GPS Tracker | Smart Agricultures

Build the connectivity layer.

Three levels of hardware let teams choose how much of the connected product they want to build themselves.

01 · MODULES

Integrate LoRa into your own product.

02 · GATEWAYS

Connect other devices/sensors to the LoRaWAN network.

03 · THINKNODE

Start with a more complete LoRa-based platform.

CONNECTED IOT · THINKNODE SOLUTIONS

One product family. Multiple protocols.

ThinkNode is Elecrow's connected product family. Depending on the model, devices can support LoRaWAN, Meshtastic, or both — combining hardware, firmware and deployment-ready workflows.

ThinkNode hardware

Gateways and communication nodes designed for sensing, tracking and remote operations.

Product family-From Module to Device

Protocol flexibility

Choose LoRaWAN, Meshtastic, or Other protocol model to fit the deployment.

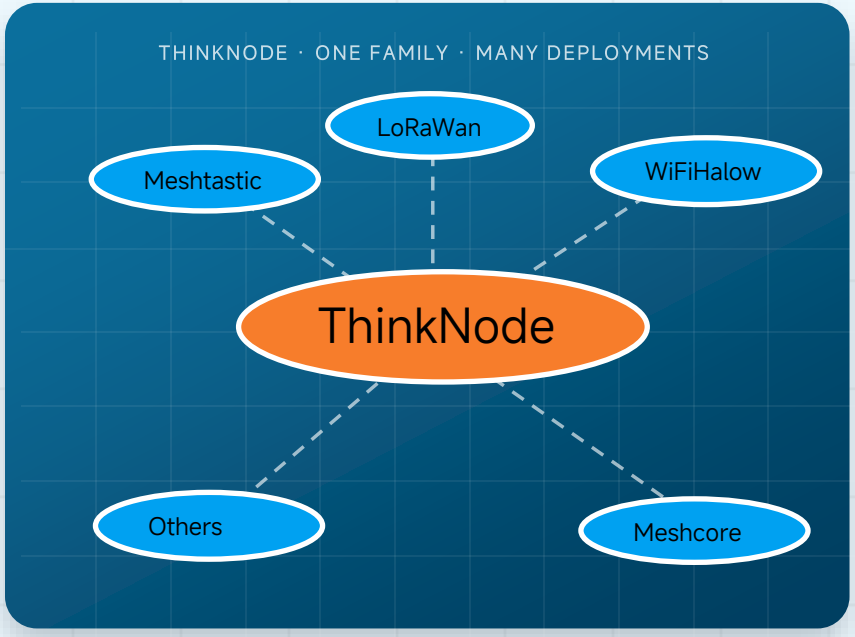
LoRaWAN

Meshtastic

Solution layer

Hardware, firmware and practical deployment workflows brought together for real-world IoT.

Hardware + software



CASE STUDY · GROVETY SMART-CITY STREETLIGHT CONTROLLER

A streetlight becomes a city node.

A mains-powered NEMA / ANSI C136.41 controller that combines LoRaWAN, BLE commissioning and low-power geolocation — built with Elecrow modules and an Elecrow production HMI.

Inside the product

Elecrow nRFLR1110 — nRF52840 + Semtech LR1110

— LoRaWAN long-range link, BLE commissioning, and built-in low-power geolocation.

- Remote dimming & scheduling
- Energy metering & fault reporting
- 40 A / 277 VAC relay

Inside the production line

Elecrow Pi Terminal — 7″ Raspberry Pi CM4 industrial HMI

— a Raspberry Pi CM4-based 7-inch industrial HMI (IPS 1024×600 capacitive touch, rich interfaces, optional 4G/LoRa/GPS/WiFi/BLE).

- 6-slot flash & personalization station
- Writes DevEUI, keys and QR binding
- Full functional test per node
- Database-backed traceability

1–2 min
test time per node

2,000–2,500
nodes per day

100%
queryable production history

36
nodes flashed & tested at once

Grovety project data · 6 stations × 6 slots · test time reduced from ~6 minutes

SMART CITY · ELECROW HARDWARE

Two Elecrow products.One complete system.

The nRFLR1110 powers the product in the field. The Pi Terminal helps build and test that product at scale.

INSIDE THE NODE

nRFLR1110: nRF52840 + LR1110 wireless and compute core.

INSIDE THE LINE

Pi Terminal: 7-inch Raspberry Pi CM4 industrial HMI.

THE CONNECTION

Hardware, firmware, testing and manufacturing designed as one workflow.

From prototype to dependable product.

The hard part begins after the first prototype works. Direction, RF and power decisions determine whether the product can survive in the real world.

01 PRODUCT DIRECTION

How did we start planning ThinkNode?

02 ANTENNA DESIGN

How do we make the signal better?

03 LOW POWER

How do we make power consumption lower?

ELECROW

THINKNODE DEVELOPMENT · PRODUCT DIRECTION

Start small.Validate. Scale.

Before expanding the product family, we used an agile path to test **whether the direction was right** — while continuing to refine the details that make hardware dependable.

01

Explore

Begin with **two PCBA designs** and **3D-printed** enclosures. Keep the first investment flexible.

Fast feedback

Test form factor, positioning and real user interest.

02

Validate

Use early products and market response to learn which scenarios deserve deeper engineering.

Evidence before tooling

Let demand guide the next hardware decision.

03

Scale

After positive feedback, invest in tooling, refine the design and expand the ThinkNode lineup.

From idea to family

Agile exploration becomes a repeatable product path.

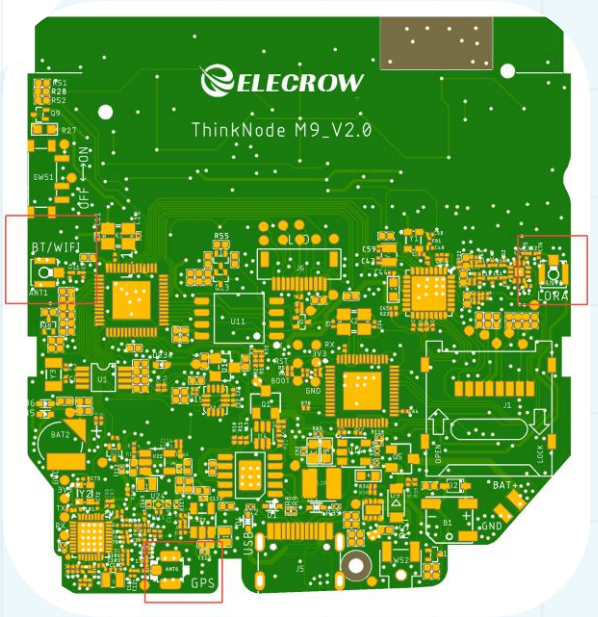
Development principle: reduce uncertainty before increasing cost.

Direction is an engineering decision.

THINKNODE M9 · ANTENNA DESIGN

Three radios.One compact RF system.

M9 integrates Wi-Fi, BLE,GPS and LoRa inside a phone-sized Meshtastic terminal. The antenna could not be treated as an afterthought.



Inside the M9

A full-keyboard, 2.4-inch communication terminal with an optimized internal antenna design — no external antenna required.

Wi-Fi/BLE | GPS | LoRa

01 · Partition

Separate the Bluetooth/Wi-Fi, Gps and LoRa regions on the PCB to reduce interference.

02 · Customize

Develop a purpose-designed antenna for the compact enclosure and target range.

03 · Iterate

Co-design RF, enclosure and layout through repeated engineering and test cycles.

A reliable wireless product is a system of RF decisions — not plus a last-minute antenna.

THINKNODE M3 · LOW-POWER LORAWAN TRACKER

Battery life is a system problem.

For M3-A loRawan Tracker, extending standby time meant optimizing the complete cycle — hardware circuit, firmware behavior and the time spent sending and receiving information.

Wake only when it matters.

Design the tracker around a short, purposeful communication window, then return to deep sleep as quickly as possible.

WAKE → MEASURE → TRANSMIT → SLEEP

3–4
months of standby time

1×
message sent per day

HW
circuit optimization

SW
firmware optimization

Low power is not a component specification. It is a system design decision.

CROWPANEL HMI DISPLAYS · FIVE PRODUCT FAMILIES

Five ways to build the human interface.

From compact rotary controls to high-performance ESP32-P4 panels and low-power e-paper, CrowPanel gives connected products a practical display path.

01

Round & Rotary Display

Compact circular interfaces for focused control and glanceable status.

1.28″ 1.54″ 2.1″

02

ESP32 HMI · Basic

Accessible ESP32 display platforms for everyday embedded interfaces.

2.8″ 3.5″ 4.3″ 5.0″ 7.0″ 2.8″

03

ESP32 HMI · Advanced

More capable display platforms for richer interaction and connected applications.

2.4″ 2.8″ 3.5″ 4.3″ 5.0″ 7.0″

04

ESP32-P4 HMI

Higher-performance HMI for industrial automation, data and multimedia.

5.0″ 7.0″ 9.0″ 10.1″

05

E-Paper HMI

Low-power visual interfaces for information that should stay visible.

2.13″ 4.2″ 5.79″

One ecosystem, different product decisions. Choose the form factor, performance and power profile that fit the experience.

CROWPANEL IN REAL APPLICATIONS · HMI CASE STUDIES

HMI cases: from fleets to rooms.

Two different environments, one shared question: how should a display behave when it becomes part of the real product?

01 · CONNECTED FLEET

Elevator advertising panel

Turn elevator cabins into a reliable advertising fleet with offline playback and automatic recovery.

100 → 900 units | Wi-Fi · USB · SD | Watchdog protected

02 · COMMERCIAL HMI

Meeting room panel

A CrowPanel-based meeting-room interface. Project introduction and confirmed use case will be added here.

Quick room booking

Clear Room Status

Helpful Info On the Spot

Different contexts, same design priority: make the interface dependable in the place where people actually use it.

CROWPANEL IN REAL APPLICATIONS · INDUSTRIAL CONNECTED HMI

HMI cases: see the process.

In industrial environments, the HMI is where raw signals become a clear operating picture — and where an operator decides what happens next.

03 · INDUSTRIAL AUTOMATION

OpenPLC compressed-air station

An ESP32-P4 HMI for monitoring equipment, controlling operating modes, viewing alarms and following live trends.

Monitor | Control | Alarms | Trends

04 · CONNECTED SITE

LoRaWAN site monitoring

A beverage-facility interface that keeps the physical hierarchy visible: site → zone → equipment, across 60 simulated devices and 6 production zones.

Site overview | Zone detail | Equipment status

The HMI is not a data dump. It is the operating layer between connected infrastructure and human decisions.

CROWPANEL IN REAL APPLICATIONS · PROCESS INTERACTIVE HMI

HMI cases: different experiences.

The same embedded foundation can support a structured industrial workflow or a rich, offline interactive experience.

05 · PROCESS HMI

Product Explainer Panel

We help companies turn complex technical products into short, clear, self-guided demo experiences for trade shows, showrooms, partner offices, and product corners.

Promotion | Rich graphics | Voice interaction

06 · INTERACTIVE MEDIA

Interactive multimedia storybook

A self-contained experience combining touch, animation, narration, character voices and sound effects directly on CrowPanel.

Touch | Animation | Audio | Offline

One hardware platform, different experiences. The interface adapts to the job — from process control to storytelling.

THE ELECROW APPROACH

From UI Demo to real-world Application.

We work across the full hardware journey — Scenario, interaction and the engineering decisions that make products manufacturable and dependable.

Scenario

Smart Home· Smart Industry ·Smart Building · Smart Agriculture ·

INTERACTION

WiFi · BLE ·LoRa · Touch · Connector · Transmission(RS232/RS485/CAN/ETH)

ENGINEERING

Hardware· Firmware · Structure· Manufacturing

THANK YOU

Let's build the next IoT project together.

From a wireless module to a connected device. From a display to a complete HMI. From the first prototype to production.

Let's build the next IoT product together.

Meet us at L08 and explore how Elecrow can help move your idea from prototype to a dependable product.

elecrow.com