CarbonLab Systems

Carbon Space

Real-time carbon monitoring protocol

Most climate tech startups focus on carbon offsetting, carbon removal (CCS/DAC), or credit marketplaces, which are important — but they all rely heavily on self-reported, batch-based, or estimated data.

The Problem with Most Current Solutions:

- Carbon credits are often based on estimated models, delayed reporting, or trusted intermediaries.
- Lack of real-time, location-based emissions data.
- Verification is slow, expensive, and not scalable.
- Policymakers and credit auditors operate blindly or based on legacy surveys and assumptions.

"Proof-of-Emission" Infrastructure

We’re not another offset registry or credit broker. we are:

- Building a “Google Maps for Carbon Emissions”: real-time, GPS-tagged, ground-truth emissions real-time data.

- Creating a decentralized carbon intelligence layer for:
  - Regulators to enforce carbon caps and incentives.
  - Auditors to verify carbon credit projects.
  - Companies to report actual, not theoretical, ESG performance.
  - Researchers to access transparent, verifiable datasets

The *"Base Layer"* of the Carbon Economy

“Before you can reduce or offset emissions, you need to prove they exist. We’re building the open proof layer.”

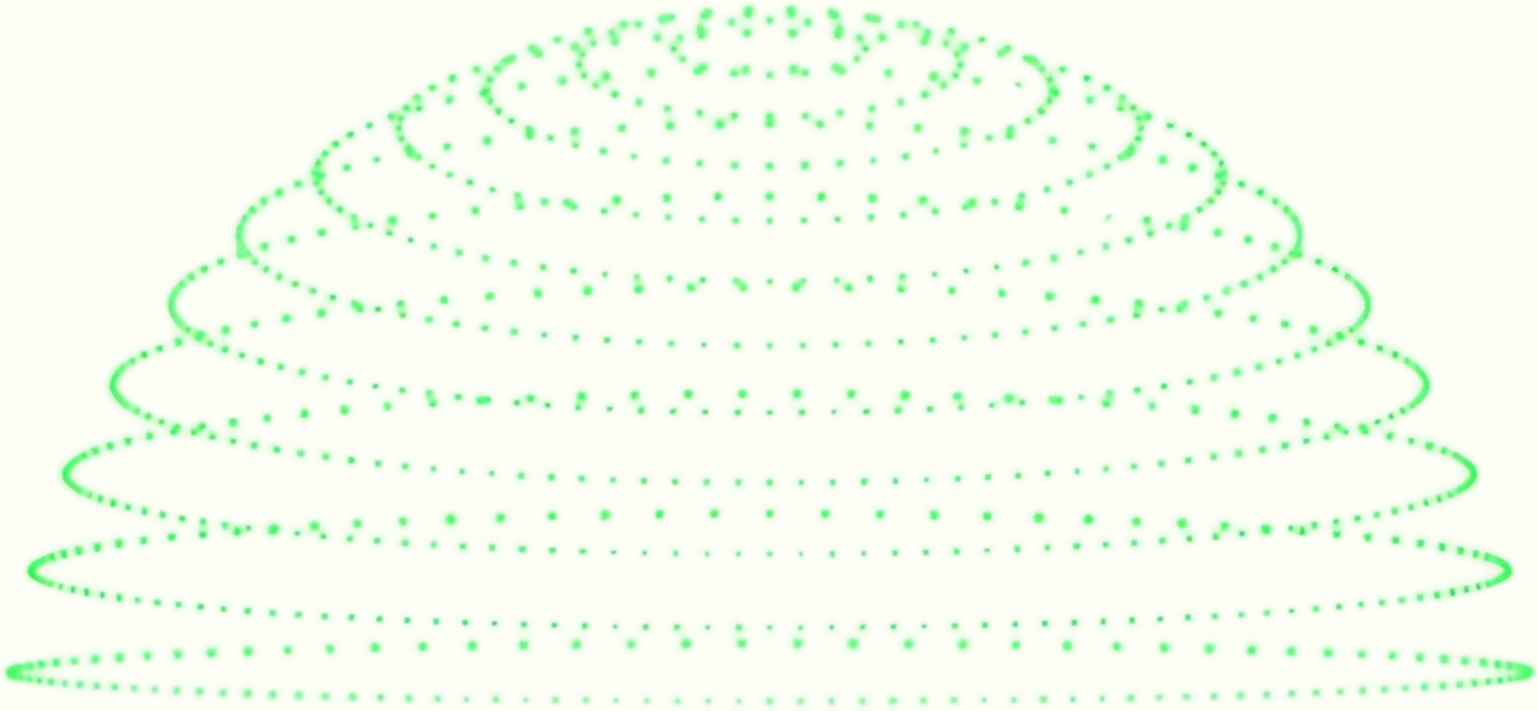
- Carbon-Scope is the first protocol to track carbon emissions like an oracle tracks asset prices.
- Enables transparent climate accounting, not just marketplace speculation.
- Helps shift carbon credits from trust-based to truth-based.

How we do?

Distributed Ground Nodes (DePIN Sensors)

Satellite Infrastructure for Macro Emissions Tracking

Prediction Model (AI)



Distributed Ground Nodes

The Distributed Ground Nodes infrastructre which is used to measure CO_2, CH_4 (methane), PM2.5, PM10, NOx, VOCs, Temperature, humidity, GPS (for correlation). This is a peer measuring and validating infrastructure which collects more accurate data locally.

- Plug-and-play capability
- Tamper detection (for network trust)
- Timestamp + location stamped data packets
- Blockchain-integrated firmware (hashing on-device)

Prototype Core Components:

Sensors: Senseair S8 (CO_2), Figaro TGS (VOC), Alphasense (CH_4, NOx), Plantower PMS7003 (PM2.5/10)

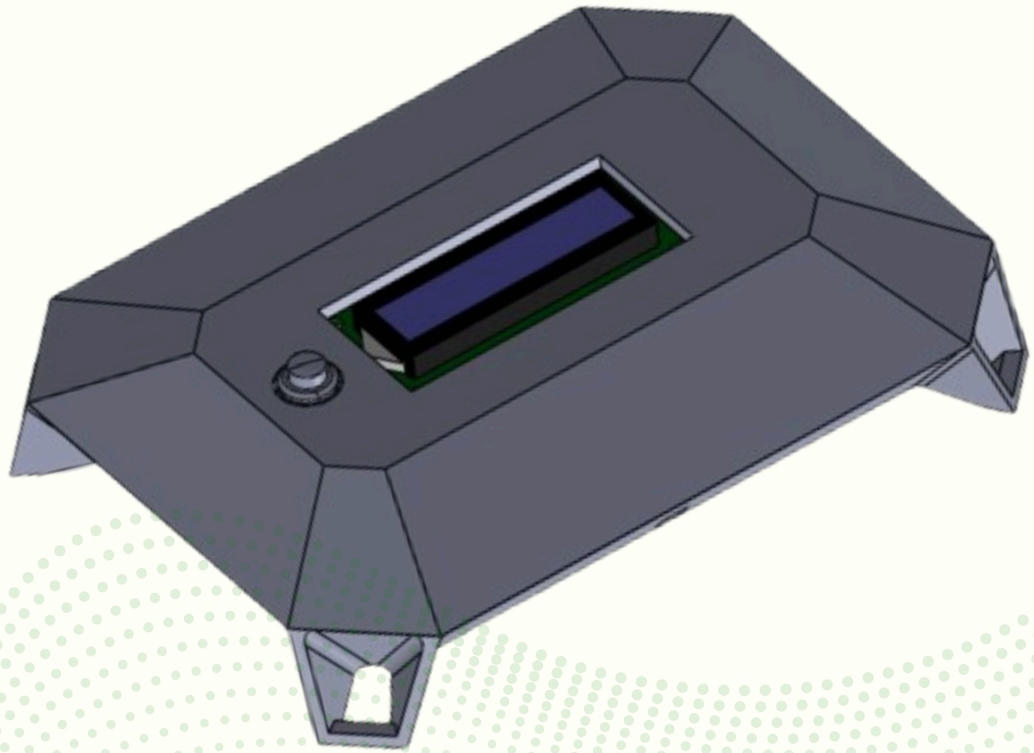
MCU / SoC: ESP32, Raspberry Pi, STM32 (for control + comms)

Communication: LoRaWAN, 4G/5G, Wi-Fi, NB-IoT (for mesh + city deployment)

GPS Module: u-blox NEO-6M or Quectel L76

Power: Solar + battery OR grid power with UPS

Casing: Weatherproof IP65+ housing



Satellite Infrastructure for Macro Emissions Tracking

This infrastructure helps to collect more data from different layers of the atmosphere. Correlating this data with the distributed infrastructure gives more accurate data to monitor the global emission.

- Differentiating emissions by altitude (troposphere vs surface)
- More data for machine learning to stitch together satellite + ground data
- Uninterrupted macro monitoring system
- Initially the data is taken from Sentinel-5P, GHGSat, TROPOMI, Carbon Mapper
- Phase 2 includes inhouse custom satillite launch

Build and Launch Own Satellite (Expansion Phase)

Type - CubeSat (3U or 6U) – easier, customizable

Payload Specification - Spectrometers (NIR, SWIR), Gas correlation filters, hyperspectral Imaging, Gas concentration mapping.

Data Relay - S-band/X-band or AWS Ground Station integration

Launch Providers
SpaceX Transporter, Rocket Lab, ISRO rideshare, Momentus

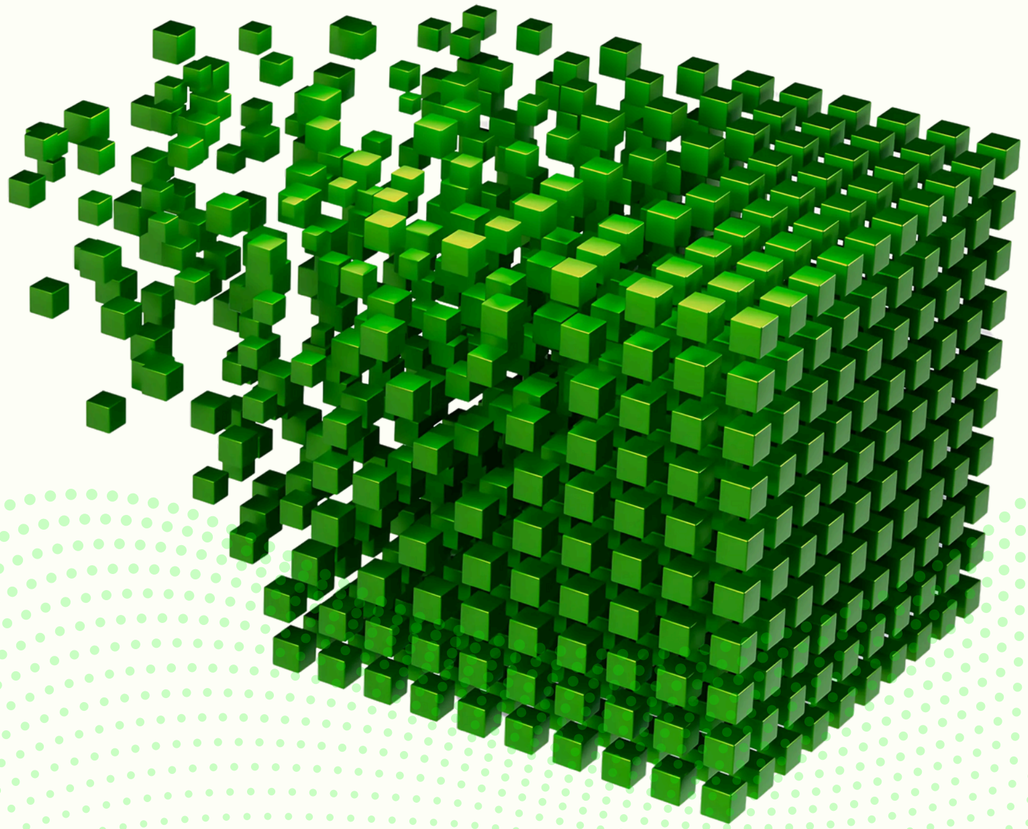
Carbon Emission / Offsetting AI Tool

This AI module helps predicting the carbon emission at different geographical locations with curated data from the DePIN infrastructure installed locally.

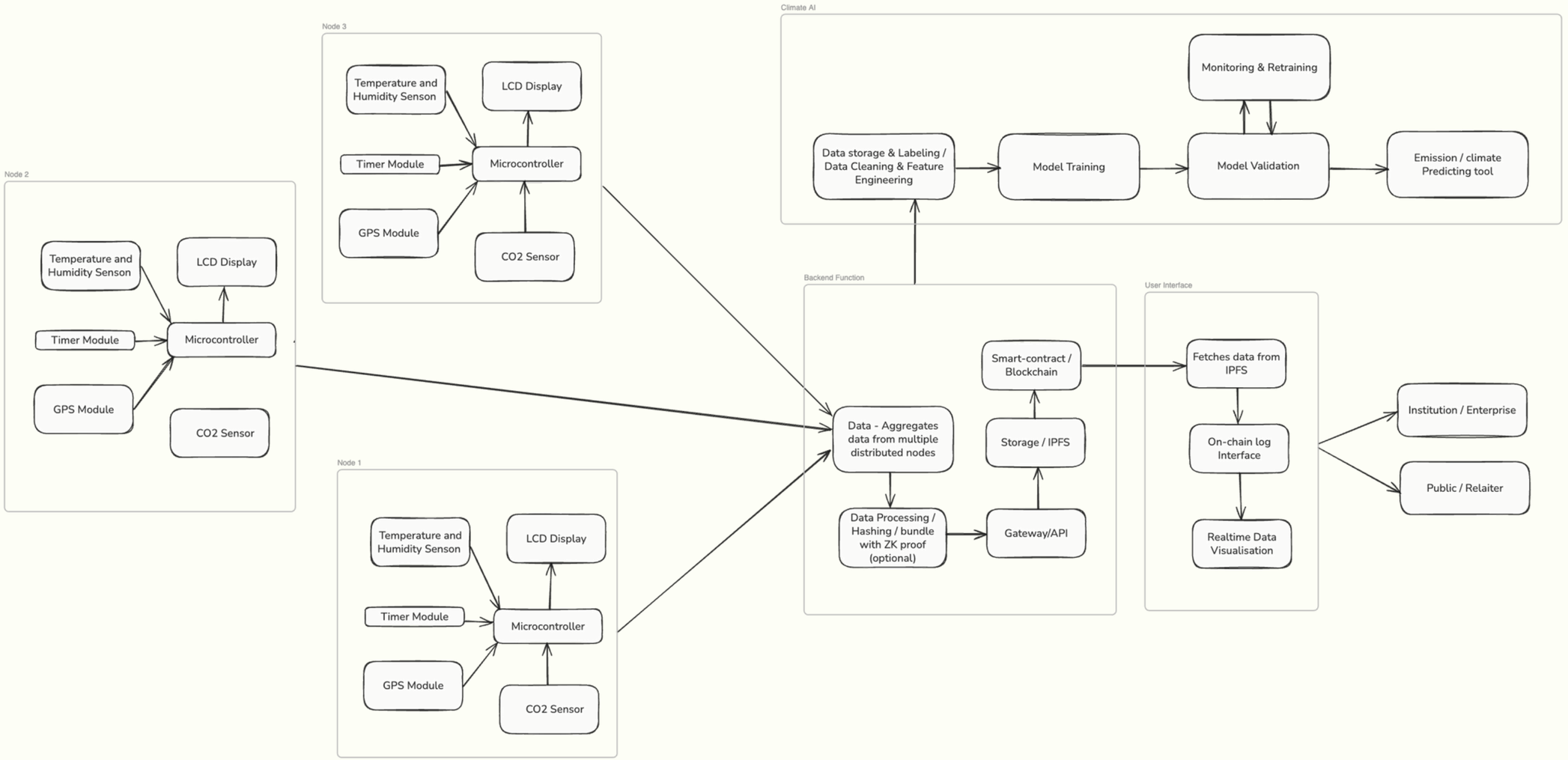
- More accurate monitoring and prediction system which overcomes the assumption model
- More data for pricing carbon credits at different parts of the world
- Insights for policy makers to effectively analyse the situation and frame policies.

Sync with Blockchain & DePIN Framework

- Each sensor/satellite sends hashed emission packets to a blockchain layer.
- Protocol uses oracles or ZK proofs to verify sensor authenticity.
- Node operators are rewarded with tokens for high-quality, timestamped, location-stamped data.



Product Architecture



Our system helps to monitor

- Illegal Carbon emission beyond limits
- Measuring outcomes of carbon offsetting projects for carbon credits
- Wetland Carbon Emissions, and other natural phenomena
- Variation in phytoplankton carbon sequestration
- Natural disaster monitoring by prediction model

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Thank You