

LoRa-net-manager

A framework for building monitoring and management

Motivation

Increased Internet of Things (IoT) demand over the last years, difficulty to setup LoRaWAN (Long Range Wide Area Network) and expensive subscription based services.

The idea is to make LoRaWAN more accessible creating a self hosted network and an Open Source software to manage these networks.

Contributions

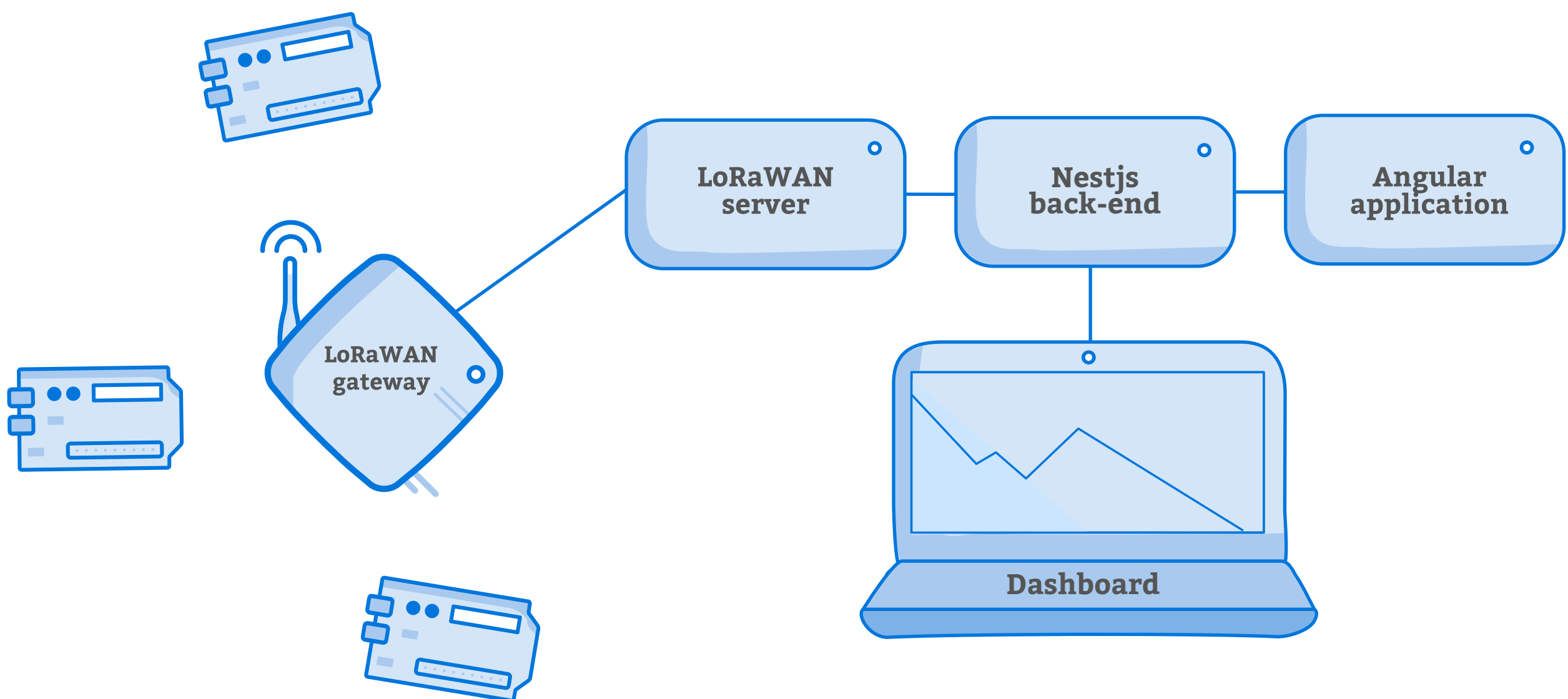
- Research about IoT technologies and choice of functionalities
- Gateway soldering and mounting inside a waterproof enclosure
- Software installation for a fully functional LoRaWAN network
- Nodes wiring, code to join network and send sensor data plus deep-sleep
- Realm Database for a fast retrieval of many different sensor readings
- Nestjs back-end to manage the network, save the data and act as an API
- Front-end angular application to manage the devices and visualize data

Angular application

Progressive Web App (PWA) with Web and Service Workers for multithreaded operation.

WebSockets for live data visualisation and notifications.

CSV and Arduino files generator and downloader.



Nestjs back-end

Responsible for data storage, settings and communication from gateway to application. Connects to LoRaServer via Websockets and REST interface. Handles the security of the LoRaWAN server with randomly generated keys.

LoRaWAN Gateway

Self built 8 channel LoRaWAN gateway with Semtech Packet Forwarder (can be used with multiple networks simultaneously).

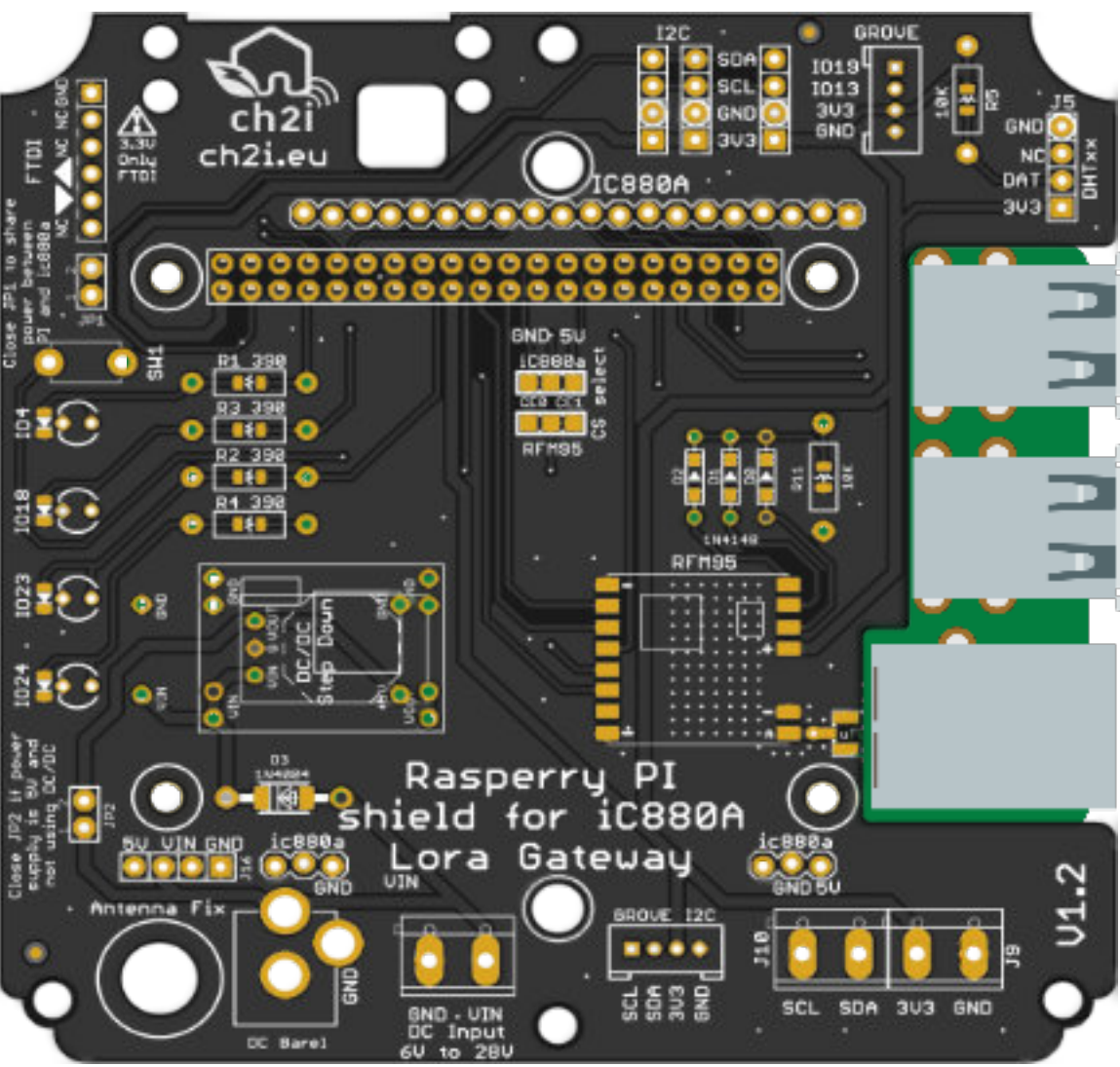
15 Km range (Line of Sight)

<https://github.com/ttn-zh/ic880a-gateway/wiki>

<https://github.com/ch2i/ic880A-Raspberry-PI>

Technologies

- | | |
|----------------------|-------------|
| Gotthardp LoRaServer | Electronics |
| PWA | Arduino |
| Service Workers | SASS |
| Web Workers | Docker |
| HTML5 | Chart.js |
| Angular | nest |
| Konva.js | Realm |



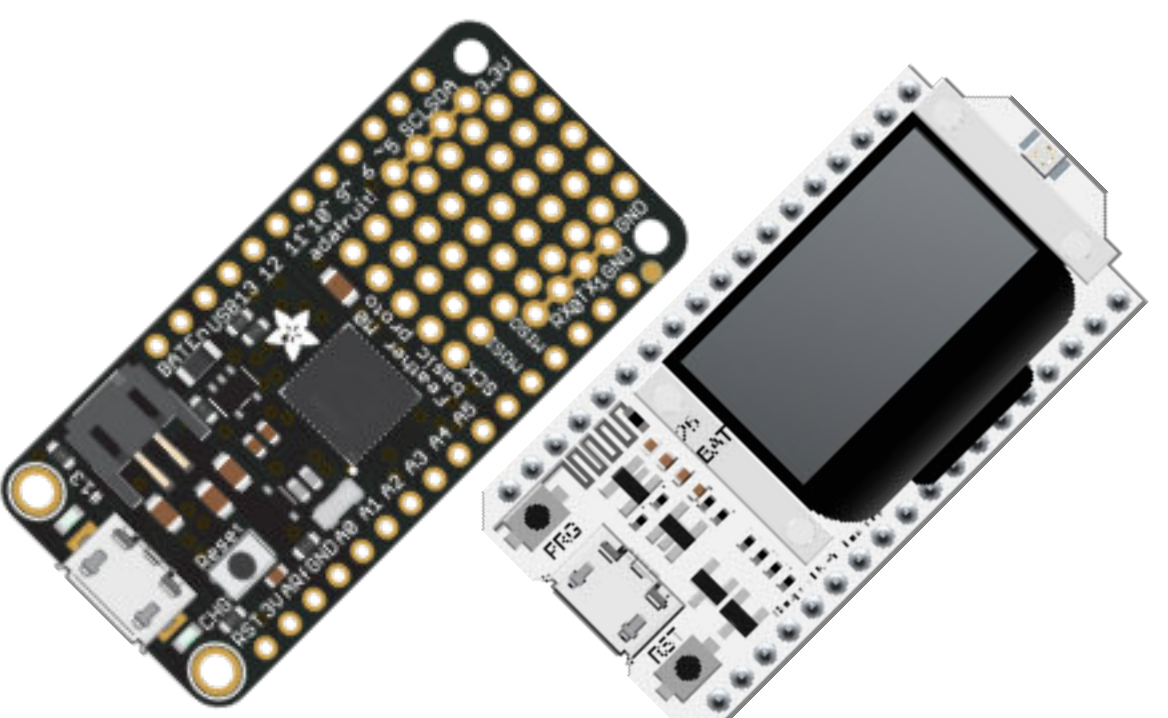
Gateway without concentrator chip

Sensing device

Arduino-like devices working with the IBM LMIC library. The *.ino project files with Over The Air Activation (OTAA) are self generated on the backend server and made available through the front-end application. More than 2 Km range.



Dashboard view of the application - <https://github.com/samuelebischof-ch/lora-net-manager>



Adafruit LoRa Feather M0

ESP 32 LoRa