Electronic Trail Signs

Introduction and Overview

The project has as its aims the realization of electronic trail signs capable of:

- Collect information from the environment around them and hikers who cross them
- Provide useful and interesting information to hikers who interact with the trail sign

The electronic trail signs will be equipped with a data acquisition system through sensors that once acquired can be made available through the Open Data Hub platform for different purposes like analysis of environmental conditions - needed for the development of applications dedicated to hikers or rescuers - and have detailed and real-time information on the climate situation area covered by the trail.

Customers

The users of the electronic trail signs are essentially two:

1. Who encounter the sign physically, interact with it and get some information about the trail and the area.
2. Either companies or solo developers who have access to the data collected through the OpenDataHub and use it to develop innovative ideas or to enrich users experiences

Functionalities

Data collection

A single device correctly placed is able to capture:

External measurements	**Internal measurements**
Temperature	Battery status
Pressure	Consumption

Humidity	Hours of charge
Air pressure	
Rain sensor	
Air quality	

GPS and Triangulation

Track the trail signs' position and if the user is equipped with a special device it's possible even to track it's position over the trail.

Communication

Thank to the LoRaWan module, trail signs talks to each other over a mesh network that is designed to be fault tolerant even if some node get down. This allow data to be collected from over the top of the mountain with ease.

While a combination of NFC and Bluetooth modules allow the exchange of informations with the user that interact directly with the trail sign.

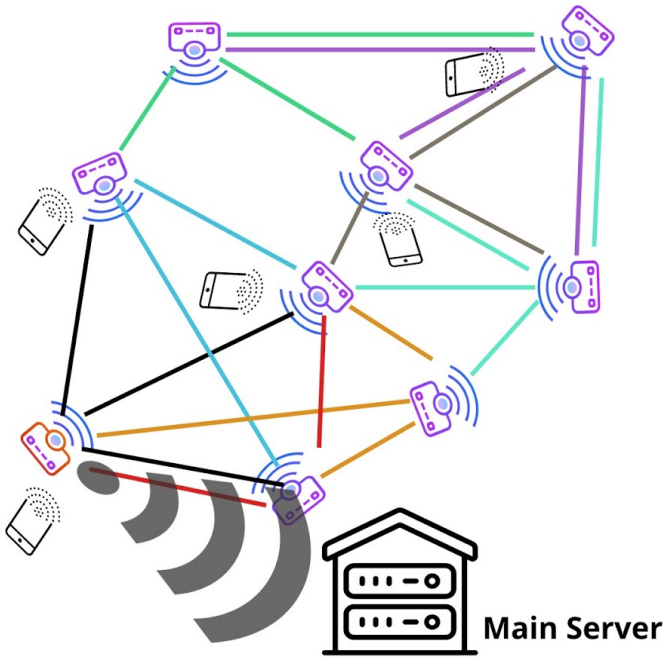
Platform

The device

The device, sensors and modules are embedded together into a new trail sign - identical to the previous one it replaces plus a socket for battery and solar system panels. An antenna is needed for the LoRaWan module to enable the communication with other trail signs.

The network

The trail signs will be integrated into a mesh network supported by LoraWan technology that allows a radius of diffusion/reception data to ~10km, at a very low cost and the benefits from transmitting from a high position to a lower position.



The mesh network of the connected devices.

A trail sign acts as the "base" for the others at the top and will take care of transmitting the data received to the server.

Open Data Hub Integration

A daemon process hosted on the server woke up when new data arrive. It process the request formatting the data according to the specification and send it to the Open Data Hub.

Risk Management

Risk	**Mitigation**
Maintenance costs to high	Predictive maintenance allow to know in advice which device need maintenance reducing the cost of the interventions.
Users won't buy the external device for tracking	The user can always be tracked by the trail signs he passed through
Thefts or breaks	-