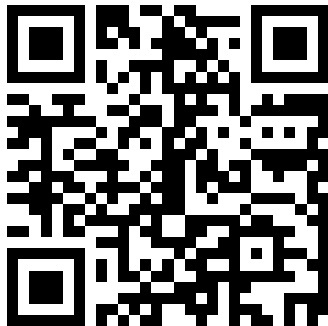# Sensor Network for Smart Agriculture

Jiří Maňák
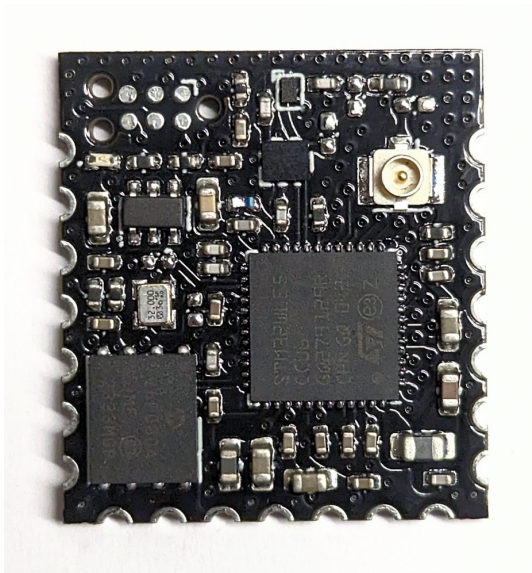
May 28, 2024

Live Demo

(or visit the link)

Motivation

Goals

Generic LoRa Module

- ▶ Design the PCBA
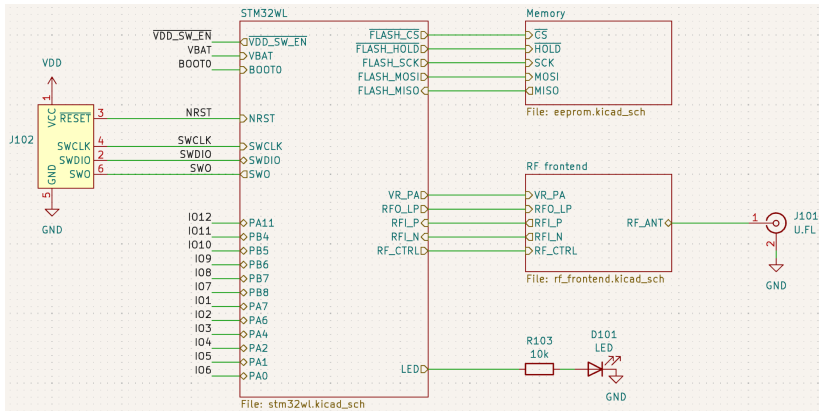- ▶ Implement OTA update
- ▶ Validate wireless performance

Soil Moisture Sensor

- ▶ Find suitable form–factor
- ▶ Design measurement circuit
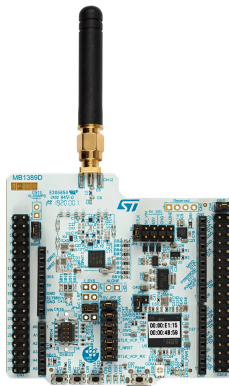- ▶ Design power management

Implement and Test the MVP
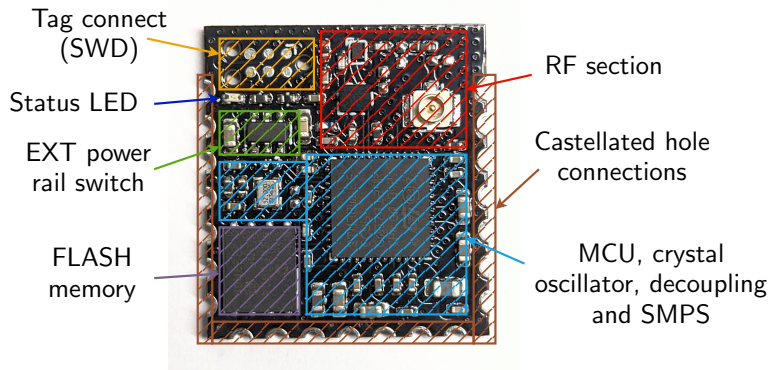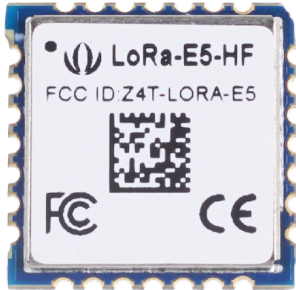
LoRa Module

LoRa Module

STDES-WL5U4ILH

Nucleo-WL55JC

LoRa Module

- Tag connect (SWD)
- Status LED
- EXT power rail switch
- FLASH memory
- RF section
- Castellated hole connections
- MCU, crystal oscillator, decoupling and SMPS

- ▶ STM32WLE5CC
- ▶ 868 MHz, 13 dBm
- ▶ 20.32 × 22.48 mm

- ▶ 1 MB FLASH
- ▶ 2.3–3.5 V
- ▶ 16 IO pins

Existing solution?

>

?

<
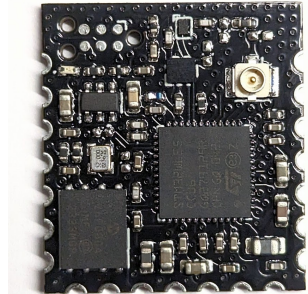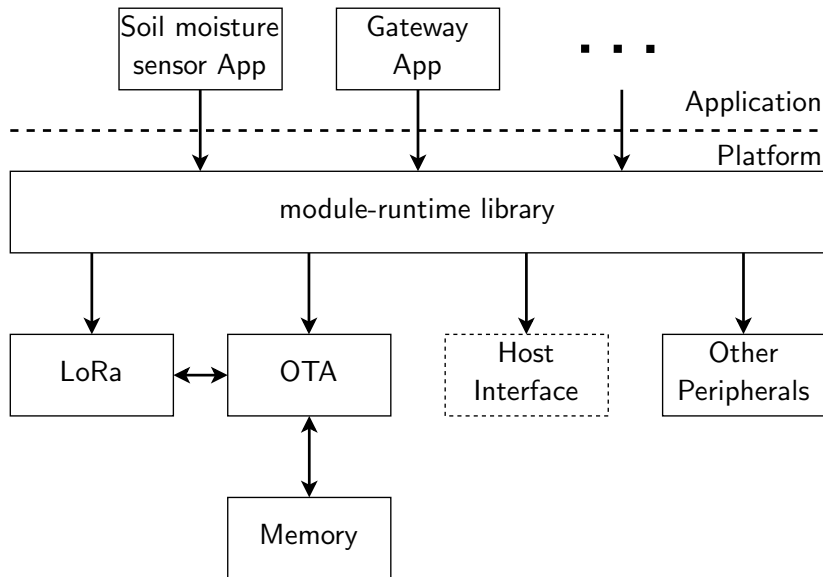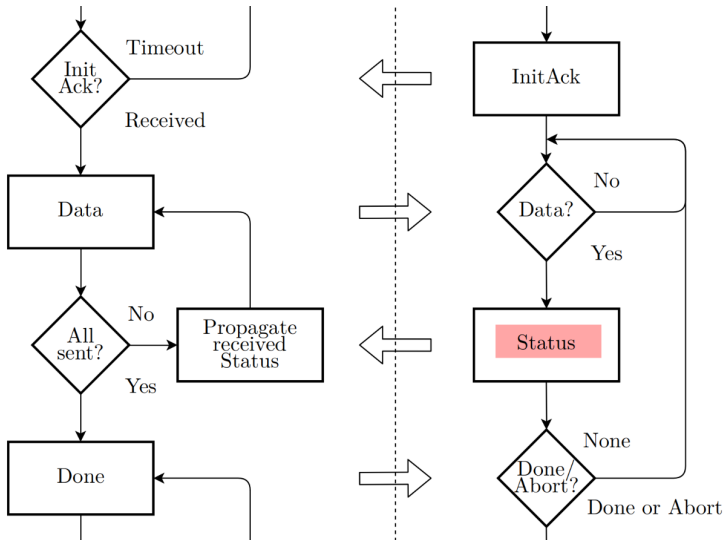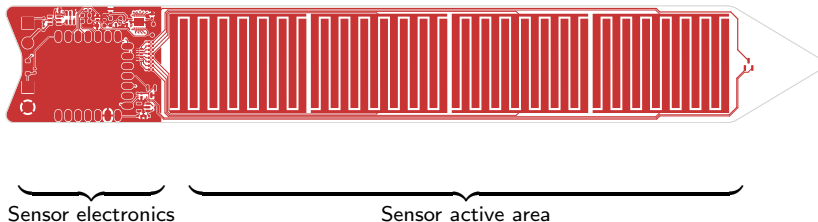
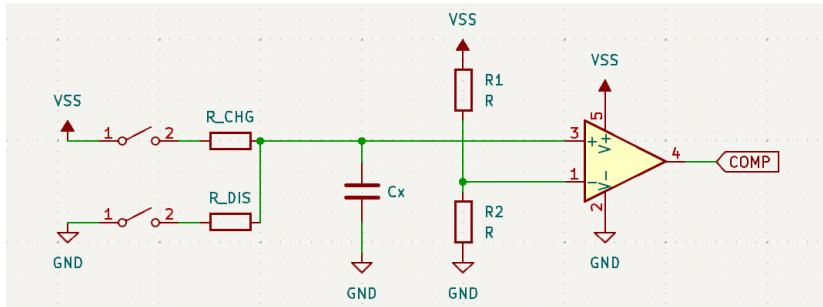Seeed Studio Wio-E5

My LoRa Module

Firmware

Over The Air Update

Page 36, Figure 4.9

Soil Moisture Sensor

- ▶ PCB construction
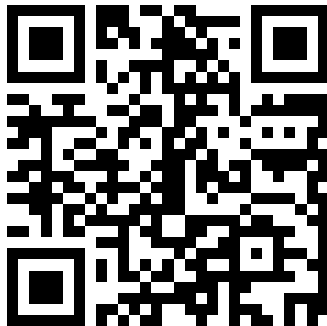- ▶ 4 capacitive zones (15 cm total depth)
- ▶ Solar powered

Sensor electronics   Sensor active area

Soil Moisture Sensor

Soil Moisture Sensor

Live Demo

(or visit the link)

Thank You

LoRa Module

- ▶ 2.8–3.3 V nominal voltage range,
- ▶ low power design - support for switchable power rails,
- ▶ target the EU868,
- ▶ wide temperature range
- ▶ minimize the amount of specialized hardware,
- ▶ support for OTA updates,
- ▶ integrated RF,
- ▶ host communication interface,
- ▶ minimal footprint,
- ▶ low cost.