

# **Tracking player in a game-field**

**Internet of Things Project**

**Elias El Yandouzi & Lucas Chaloyard**



# Gather all the game data

**Project's motivation**

# Ultra-wide band

**Enable precise localisation**

# Bluetooth Low Energy

**Much less accurate**

# Let's have a closer look

Technology	Ultra-wide band	Bluetooth low energy
Location accuracy	< 20 cm	< 5 m
Range	Up to 100m	Up to 200m
Frequencies	2.4 GHz	3.1 - 10.6 GHz

# A point about schedule

## From thinking to demonstration

3-ish months project

November

January



- Thinking and design
  - Research and implementation
  - Test and debug

qorvo™



# Thinking and design

**Portable Devices**

**Localisation using triangulation**

**Web application to visualise  
data**



# **Research and implementation**

**Make embedded cards  
communicate**

**Triangulation using RSSI**

**Push to and fetch from server**



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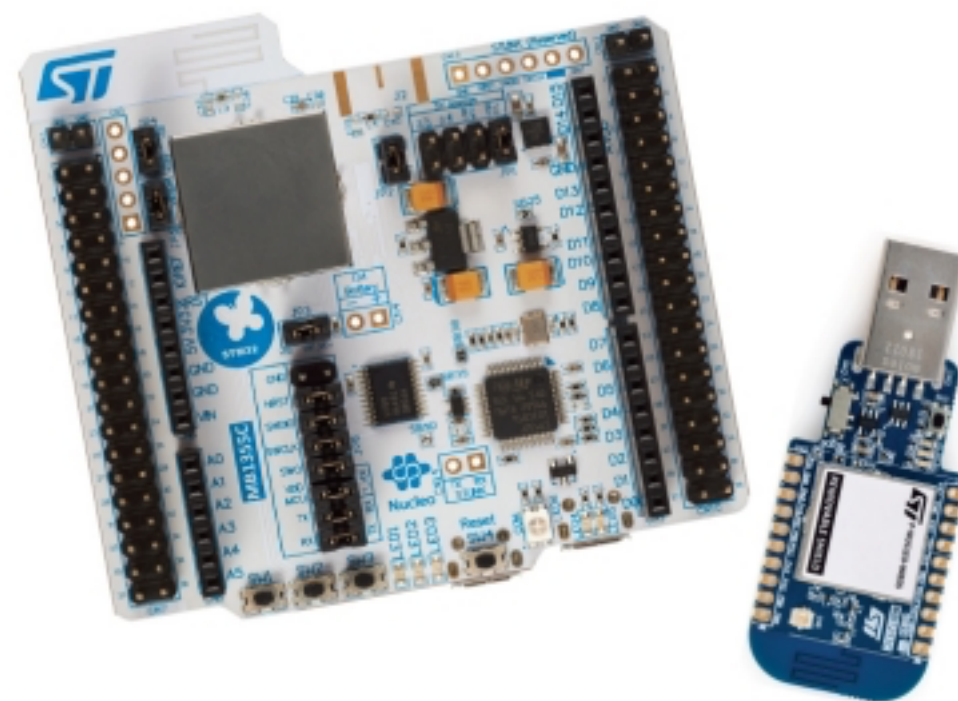
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# Provided equipment

## Embedded cards



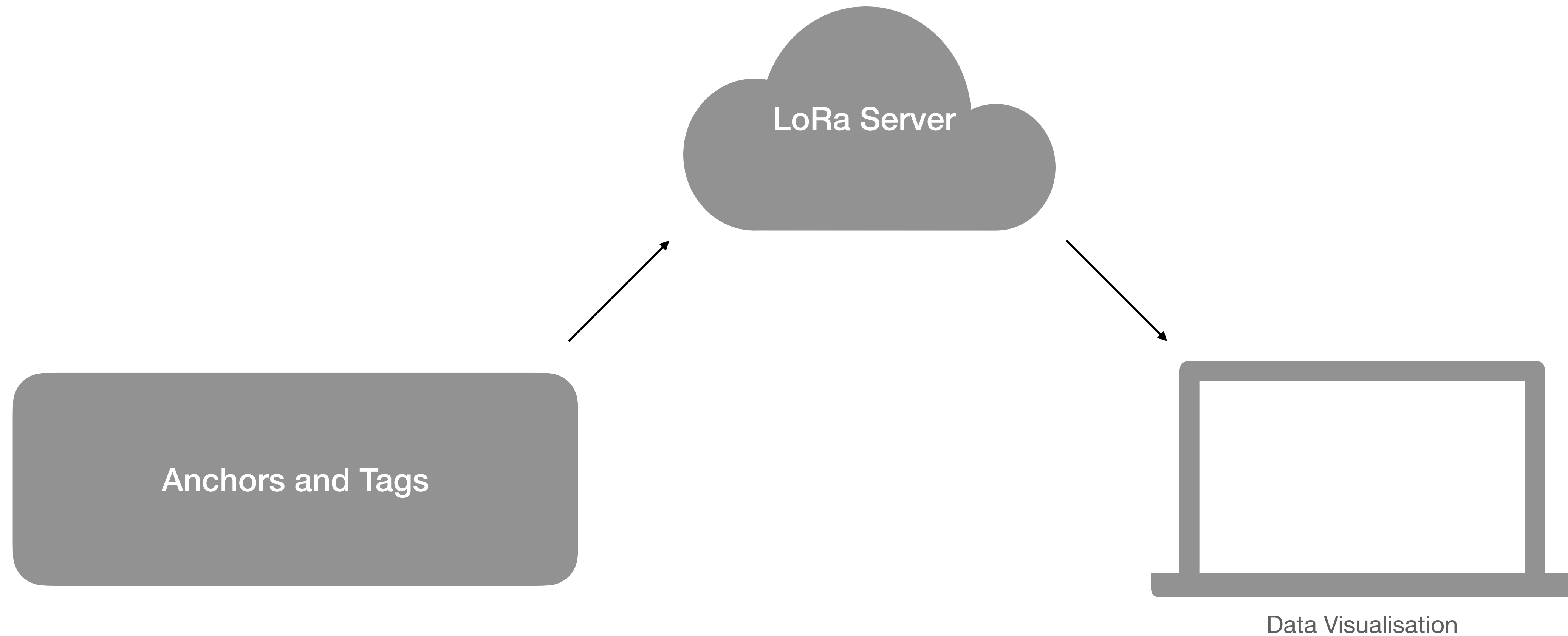
Tags and anchors - BLE only



Gateway - BLE and LoRa

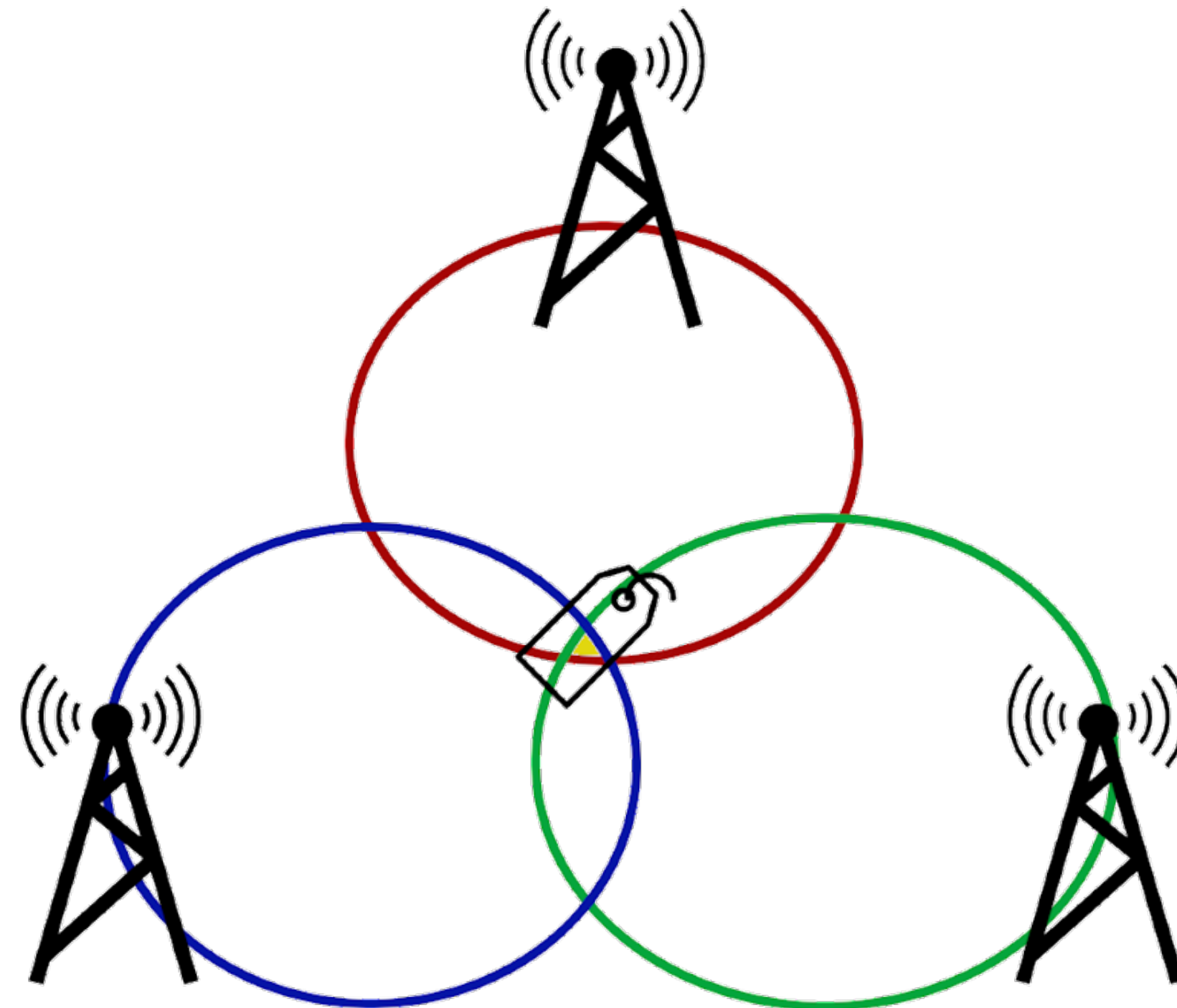
# Orchestra's articulation

## From tag to visualisation



# A focus on locating tag

## Position estimation using triangulation



# RSSI? What do you mean?

## Received Signal Strength Indication

$$d = 10^{\frac{RSSI(d_0) - RSSI(d)}{10 \times n}}$$

Estimating the distance

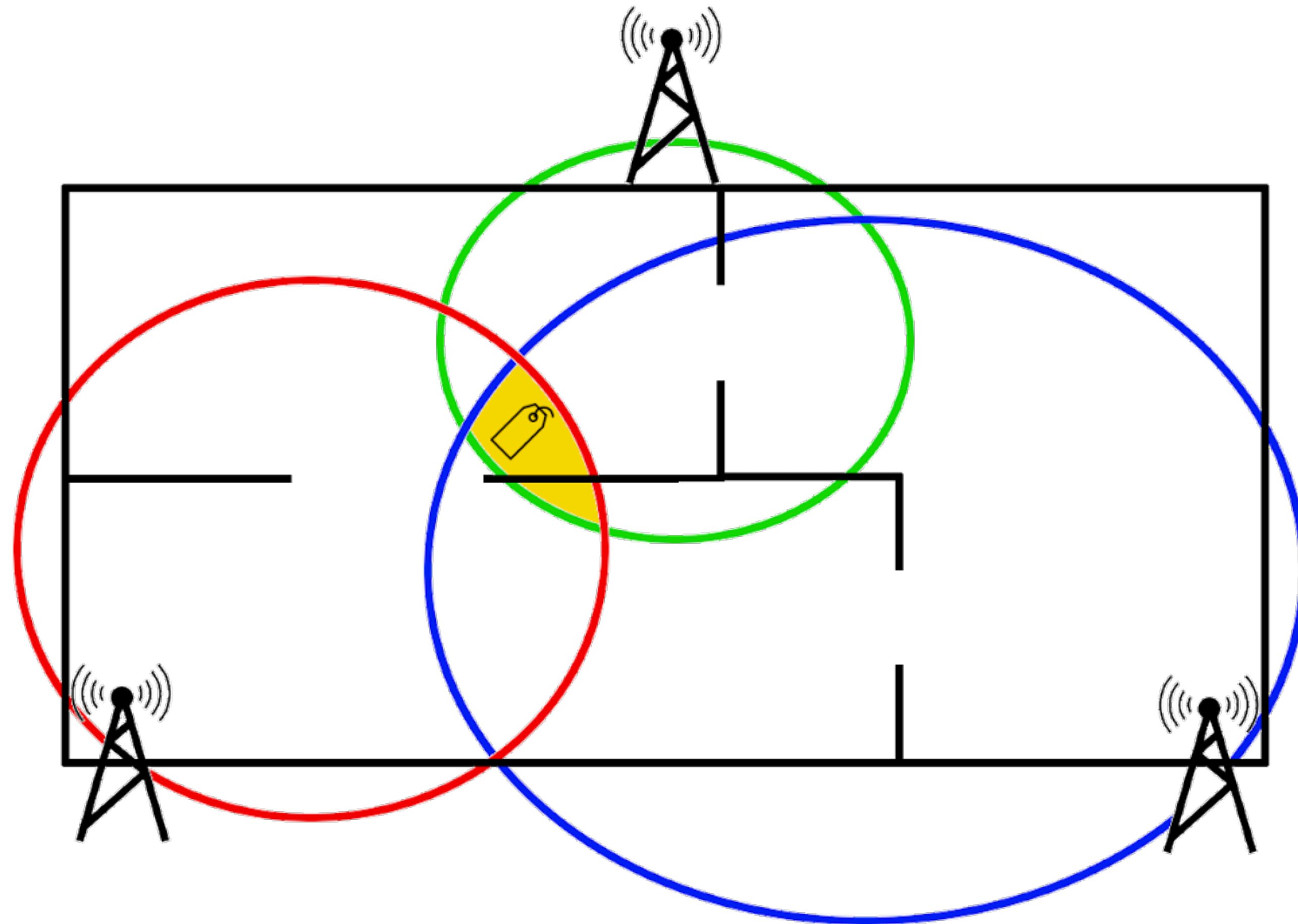
$$n = \frac{RSSI(d_0) - RSSI(d)}{10 \times \log\left(\frac{d}{d_0}\right)}$$

Auxiliary formulae



# A focus on locating tag - cont'd

Position estimation using triangulation





# Encountered problems

# Encountered problems

## A long list, very long list

- Heterogeneous environment
- Awful BLE library with a poor to inexistent documentation
- Communication issue between STM32 and SODAQ
- Covid-19 (here again)
- No dedicated budget to purchase appropriate equipment