CM Projects

BLE

- Exploration of BLE implementation with Gatt and sensors, possibly with microcontroller
- Different services running and connection establishing with them
- Maybe positioning with BLE
  help

UWB and BLE

- ESP32 with UWB module, to detect UWB emitting devices and establish accuracy
- Can also use BLE for higher range detection and UWB to locate with higher precision
- This would have been handy for when a friend lost his phone while escavating in a 15m long 30cm deep pipeline and the only help was satelite tracking which gave a 10m error (audio coundn't also be heard when calling). This could work with our phones, since they already have the necessary components
  help with microcontroller system

LORA 2.4 GHz

- Analyze LORA 2.4 capabilities, with range and bitrate depending on spreading factor and fixed or variable packet size
- Implement a proof-of-concept WIFI video transmission system using esp32cam or with cached data (in SD card) with both microcontrollers. Use ffmpeg and compress the data with
  - Evaluate resolution, compression quality and different bitrates and find a good sweet spot for the system to work
- Replace WIFI with LORA 2.4 GHz
- We already have ESP32 and STM32 ODYSSEY although a raspberry would probably be more handy for processing. So we would only need to buy SEMTECH 2.4 LORA SX128 chipsets

LORAWAN 1

- Geocaching has always had a problem with bad actors finding treasures and not leaving anything for the next contestant or doing something bad to the place that it was stored
- What if we implemented a LORAWAN enabled device that worked with
  - RFID and for a contestant to see the contents of the box, he would need to pass his card, that would communicate with our application in the things network
  - BLE and the contestant needed to open an app and identify himself

- In this way, accountability could be had

LORAWAN and LORA 2.4 or WIFI

- The current fleet management systems rely on:
  - constant connection to internet
    - continuous membership model
    - pay for the system but without the membership it's useless -> right to repair and own
  - centralized data management system
    - bad for security and data responsibility
- Most users don't need real time tracking of this system, just to know some information at the end of the day, week or month about the car, such as:
  - driving habits (acceleration and braking ratings, etc.)
  - fuel spent
  - a-normal behavior (break ins)
  - seeing the trajectory of the vehicle or just if it went outside of it's assigned path
  - Other metrics (driver attention, pauses...)
- Some companies have a lot of vehicles that pass between them
- What if there was a distributed system to connect them
- Use LORAWan to trade small information between vehicles or things network
- When vehicles arrive at home base, this data is offloaded to the company server/database and stored (using wifi or lora 2.4)
- This meant that if a vehicle didn't go to the headquarters for the day but passed by a vehicle that went and some information was exchanged, some metrics could still be had