BLE connected GPS collar for small animals

Type de projet	Travail de master
Planification	aucune planification
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Etablissement	HES-SO Valais
Spécialisations concernée-s	EIE / Puissance (courant fort) EIE / Signal (courant faible)
Lieu de travail	école
Mandant	HES-SO Valais / Wallis IoT Laboratory 23N309
Contact	Rieder Medard
Confidentiel	non

Descriptif

This project has as goal to prepare the development of the version 3 of a portable sound recorder / tracker. The important specifics of this recorder are the following:

- 10 days of operation on a rechargeable Lithium battery
- Remote control by Bluetooth
- GPS tracking
- USB connectivity
- Waterproof for rain
- Mechanical strength
- Simplicity of use
- Temperatures up to 50° Celsius

A first prototype has been built and tested under real conditions in South Africa. A PI has studied possible optimizations of mechanics, electronics, and software. A PA is under realisation that is testing the GPS modules and preparing electronics for the use in field measurements as specified for the TM.

Based on the results of the above-mentioned prototype and PI, the production prototype of the version 3 of this device must be realized.

Travail demandé

1. Produce the PCBs with microphone, SD card and connectivity for data transfer and charging, as well as other required electronic modules. These must be the small sizes that are required for the final prototype, ready for field tests.
2. Using the GPS modules as prepared in the associated PA to integrate with the rest of the electronics
3. Write firmware for the embedded processor that acquires GPS coordinates in an energy conscious way.
4. Doing sufficient outdoor tests to verify the functionality and consumption of the module
    1. The correct parameters for the GPS receptions must be decided on to allow for functioning within the energetic limits of the battery.
    2. GPS reception will have to be implemented based on a daily charge budget, rather than a fixed time interval

Awareness of the current battery status must be considered and GPS functionality disabled when the battery is too discharged.

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Connaissances préalables

- C / C++ programming
- RTOS such as Zephyr
- Electronic skills to design the necessary interface circuits for measurements
- Bluetooth protocol
- GPS and NMEA protocol
- Mechanical skills as a nice to have

Mots-clés

CS Bluetooth Low Energy; CS Embedded Software Engineering; CS Embedded System Design; CS Embedded System Programming; CS GPS; EIE Embedded System Design; EIE Low Power