

OSES ASSIGNMENT ON EMBEDED LINUX Heart Rate Monitor

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Goal

- The goal of this assignment is implementing a heart rate monitor, which is made of two components:
 - A Linux character-based driver (cDD) used to access a “virtual” Photoplethysmography (PPG) sensor
 - A Linux user application (APP)
- The APP performs an endless loop, where it samples the PPG sensor, and every 2048 acquired samples it performs a 2048-points FFT, it computes the Power Spectral Density (PSD), it identifies the base frequency of the signal (the frequency where the PSD is maximum), which is the heart rate in Hz, and it prints the heart rate in beat-per-minutes
 - Sampling frequency 50Hz
 - Number of samples to be acquired: 2048
- The cDD provides access to the virtual PPG sensor
 - Each time the read function of the cDD is invoked a pre-defined value is provided to the user application

Goal

- A reference implementation of the behavior, that does not consider the timing neither the interaction with the device driver, is provided:
- `heartrate.c`: source file containing the processing algorithm
- `data.h`: predefined samples for the virtual PPG sensor implementation

Evaluation criteria

- The evaluation is based on the following criteria
 - Max 15 points: the solution shall provide the requested behavior
 - Max 9 points: code complexity (the simpler, the better)
 - Max 6 points: memory occupation (the least, the better)
 - Extra bonus, max 3 points: hardware implementation
 - As making the code running on hardware is more complex, 3 extra points will be granted to the solutions running correctly on Raspberry Pi

Deliverable

- You are asked to deliver a Yocto layer including the two recipes: one for building and deploying the APP and one for the cDD
- The layer shall be delivered via email as link to a public GitHub repository that can be cloned for testing purposes
- The layer GitHub repository shall contain a README.md file describing how to clone the repository and how to integrate the layer in a Yocto-based distribution
- Deadline 15/01/2021 24:00