

Title: The mobile heart box - personal monitoring solution on the move

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## Motivation:

Nowadays, you can have multiple sensors in the environment around you. You can monitor your activity and heart rate with the help of smartphones, smartwatches and other small sensors.

- WHY not use this information to help you live?
- WHY not explore these options to aid you when you are on the move, like driving, hiking

Last year a group of [PECI used this motivation to propose and deploy a system for monitoring person when doing exercises is a fixed bike](#) - although the initial objective was to “monitor person” on the move.

## Objective

This project aims to migrate the previous project to a bike rider/hiker scenario. The work can/should depart from previous work and propose a “mobile solution” to monitoring human. This can use or extend the sensors and devices previously used to provide a modular and mobile solution -mobile heart box - that can monitor you and your surroundings while you are on the move,

- while driving and want to be warned when you are sleepy or your environment is “heavy” (e.g. inside a car )
- while hiking or hiking, the “box” warns you when you are physically stressed ( heart rate high ).

Scenarios?

## Challenge

integrate a simple sensor to monitor heart rate and other physiological measures ( smartwatch, off-the-shelf breakouts ) and the environment within a solution that fits a box that you can place in a car or in a backpack and, depending on the scenario,

give helpful “feedback” - either to ensure comfort or avoid risky situations. The autonomy and size will be critical

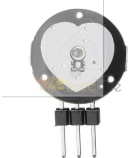

## Starting point



The main starting point is the previous work on PEGI where the solution was supported on ESP32 for local / person nodes to collect, process and relay monitoring information. As in the previous work, smartwatches and mobile phones will be part of the user interface ( visible part of the system).

Some motivations for the initial project:

- [The previous project poster on Studens@DETI\( reports are available\)](#)
- Heart Rate Detection using a Piezoelectric Ceramic Sensor: Preliminary results
  - <https://revistabionatura.com/files/2022.07.03.30.pdf>
- PPG2ABP: Translating Photoplethysmogram (PPG) Signals to Arterial Blood Pressure (ABP) Waveforms
  - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9687508/>
- ThermoDroid: Android based solution for temperature physiological assessment
  - <https://ria.ua.pt/handle/10773/29642>

Some sensors

<p>Pulse Heartbeat Heart Rate Sensor Bluetooth Compatible Module</p> <p><a href="https://www.elecbee.com/en-25287-Pulse-Heartbeat-Heart-Rate-Sensor-bluetooth-Compatible-Module">https://www.elecbee.com/en-25287-Pulse-Heartbeat-Heart-Rate-Sensor-bluetooth-Compatible-Module</a></p>	
<p>SGP41 (SGP41-D-R4)   SENSIRION</p> <p>Volatile Organic Compounds (VOC) + NOx sensor</p> <p><a href="https://www.soselectronic.com/en/products/sensirion/sgp41-sgp41-d-r4-359695?gad_source=1&amp;gclid=CjwKCAjw6c63BhAiEiwAF0EH1FkzJAurc7sKymzo0Qs3_sefasGot5BEFkfQR0T33iPBpKkF3ojAlBoC_GQQA_vD_BwE">https://www.soselectronic.com/en/products/sensirion/sgp41-sgp41-d-r4-359695?gad_source=1&amp;gclid=CjwKCAjw6c63BhAiEiwAF0EH1FkzJAurc7sKymzo0Qs3_sefasGot5BEFkfQR0T33iPBpKkF3ojAlBoC_GQQA_vD_BwE</a></p>	

<p>S8 - Senseair S88, CO<sub>2</sub> sensing compliance made easy</p> <p><a href="https://senseair.com/product/s8/">https://senseair.com/product/s8/</a></p>	
<p>Multi-Sensor module with 133MHz Raspberry Pi RP2040 MCU</p> <p><a href="https://www.electronicsspecifier.com/products/multi-sensor-module-with-133mhz-raspberry-pi-rp2040-mcu">https://www.electronicsspecifier.com/products/multi-sensor-module-with-133mhz-raspberry-pi-rp2040-mcu</a></p> <ul style="list-style-type: none"> <li>• Sensirion SHT40 temperature and humidity sensor</li> <li>• Sensirion SGP40 air quality (VOC) sensor</li> </ul>	
<p>SparkFun 6DoF IMU Breakout - BMI270</p> <p><a href="https://thepihut.com/products/sparkfun-6dof-imu-breakout-bmi270">https://thepihut.com/products/sparkfun-6dof-imu-breakout-bmi270</a></p>	
<p>Far infrared thermal sensor array (32x24 RES) MLX90640 ( some models )</p> <p><a href="https://www.melexis.com/en/product/mlx90640/far-infrared-thermal-sensor-array">https://www.melexis.com/en/product/mlx90640/far-infrared-thermal-sensor-array</a></p>	