# MEDICAL WRISTBAND BODY TEMPERATURE MONITOR

## The problem to be solved and why is it important to address?

The measurement of body temperature plays an important role in our everyday life (especially in the pandemic we find our-self in) since several diseases are characterised by a change in body temperature.

- Invasive measuring methods may be uncomfortable and unhygienic.
- Exsisting non-invasive measuring devices (Infrared Thermometer) may not be as accurate as the invasive devices since readings may be affected by external factors such as direct sunlight.

Therefore, the problem is that a non-invasive body temperature device is needed that can measure core body temperature, without the readings getting affected by external factors.

## What is the solution?

To design and implement a non-invasive body temperature measuring device that can accurately measure core body temperature, whilst being simple, low-cost, lightweight, and energy-efficient.

## The approach to create this solution?

- Gather information on available techniques to accurately estimate core body temperature from skin temperature.
- Gather information on temperature sensing elements, display technologies as well as power supplies (primary and secondary batteries).
- Select the required components.
- Determine the best core body temperature estimation technique.
- Design, implement and test the Body Temperature Measuring device.

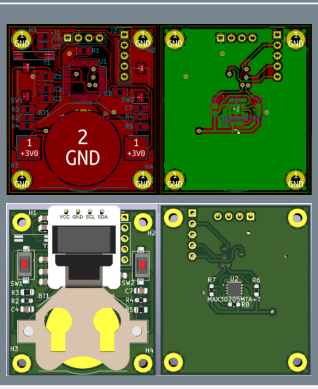
## Overview of the solution

The following were part of the design:

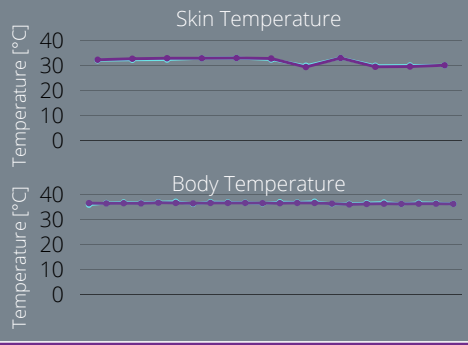
- Schematic design.
- PCB layout and design.
- Embedded software design.

The Body Temperature Measuring device consists of:

- STM32 Microcontroller.
- MAX30205 digital temperature sensor.
- CR2032 Battery.
- Small OLED Display.
- 2 Push Buttons.




## Analysis and Conclusions




- The device can measure skin temperature with **98.32%** accuracy.
- The maximum absolute error when measuring skin temperature is **0.5°C**.
- The device can estimate body temperature with **98.39%** accuracy.
- The maximum absolute error when estimating body temperature is **0.58°C**.
- The estimated battery life of the device is **212.34 days** or **0.58 years.**

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