Overview

The task for this homework is to create a short academic lab report (4 pages max) that presents the photointerrupter you investigated experimentally in lab 1. You will first need to find the best way to organize and plot the data and present it understandably, adhering to the formatting guidelines (see "***Report Formatting Guidelines***" in moodle and recall **Lecture 2**).
The report has to provide a sufficient level of detail i.e. describe the measurement process, and explain the experiment setup, including electrical connections and placement of other functional components (a light source, the blade, the light-sensitive element, etc.) that constitute together a photointerrupter. Try to include all additional information (list the names and characteristics of all the used equipment) that would be necessary for another person from the same field to acquire identical results. The challenge is to find a balance between what is essential and what is not. For example, in this particular task, the lighting conditions are important to specify, but probably barometric reading had a negligible effect on your results and should be avoided as it will introduce excessive clutter for the reader.

Requirements for the report of Homework 1:

- General formatting
    - The report is written on a proper template and contains information about who, where, and when did the work.
- Introduction to the problem.
    - What was investigated and with which methods?
- Level of detail
    - The report provides enough details for another person in the field to be able to repeat the measurement.
    - Hardware & software (models/versions) are described.
- At least one graphical item (schematics, picture, etc.) that describes the experiment set-up (the instruments and their connections). Please annotate the graphical item.
- At least one graph (with at least three data points) that describes the blade movement.
    - The graph(s) combines data from both low- and high-speed acquisition methods.
    - A suitable graph type and data framing are used
    - The graph(s) use annotations to unambiguously present the important characteristics of the blade movement. The choice of parameters is yours, as long as the movement of the blade is described and bright/dark regions can be distinguished
    - A caption exists and makes the graph self-explanatory.
    - Scaling, units, font size, resolution, significant number of digits, no excessive information
- The report has to demonstrate your understanding by the following key points:
    - justification for the input range chosen for measurements.
    - discussion on why the measurements with the lowest sampling periods took far more than the expected 10 seconds.

    - considerations on choosing the optimal sampling rate for the high-speed measurement

An extra point is available if you address the following in your report:

1. Have a look at the "wait until next ms multiple" help and include a discussion on how the first iteration of the on-demand low-freq sampling differed from the following iterations. Which impact it had on the measured total execution time?
2. Assuming the blade width of 20 mm, find the distance of the phototransistor from the blade's rotational axis.

Uploading the homework

Upload the report in a **pdf** format using the following naming pattern:

- **FirstName_LastName_HW1_report.pdf**

Make sure your **portfolio** contains:

- the original measurement data (.txt, .csv, ...) that was used in the report;
- any VI-s or other source code that was created to acquire or process the data.