# OSES Assignment #1

## Purpose

Implement a proximity alert system.

## Assignment

A proximity alert system must be designed and implemented using the following elements:

- The HC-SR04 Ultrasonic Ranging Module;
- The FRDM-K64F board;
- The Micrium μC/OS.

The FRDM-K64F shall read the distance of any object located in front of the HC-SR04 sensor, and then it shall operate the RGB led as follows:

- If the distance of the nearest object is equal or greater than 2 meters the GREEN led shall blink with a period of 2.000 ms;

- If the distance of the nearest object is between 1 and 2 meters the BLUE led shall blink with a period inversely proportional to the distance, according to the following table:

| Distance [m] | [1.0 – 1.2) | [1.2-1.4) | [1.4-1.6) | [1.6-1.8) | [1.8-2) |
|---|---|---|---|---|---|
| Period [ms] | 200 | 400 | 600 | 800 | 1.000 |

- If the distance of the nearest object is smaller than 1 meter the RED led shall blink with a period inversely proportional to the distance, according to the following table:

| Distance [cm] | < 10 | [10-25) | [25-50) | [50-75) | [75-100) |
|---|---|---|---|---|---|
| Period [ms] | ∞ | 400 | 600 | 800 | 1.000 |

## Deliverable

You are asked to provide using “Portale della didattica/Elaborati” a **ZIP** file containing:

- A Word document (3 pages maximum) describing the software you developed (pin assignment, adopted software architecture, how to guide to use your project, etc.).
- All the source files containing code you modified with respect to the micrium.zip file available on “Portale della didattica/FRDM K64F” folder.

## Rules

1. The project is individual, you may collaborate with colleagues but the code and the document you send shall be the result of your own work.

2. The first assignment shall be uploaded on “Portale della didattica/Elaborati” no later than **December 18th 2015**. Discussion of the assignment will take place on **January 11th 2016** at LABINF, where you will be asked to demonstrate the operations of your assignment, and you will be questioned about the code you developed.
3. The assignment will be evaluated with a grade ranging from 0 to 33, taking into account:
    a. The compliance of your solution with the assignment specification (including the deliverables);
    b. The quality of the solution you devised (accuracy of the measure, determinism of the behavior, quality of the code);
    c. Your knowledge of the code.

## Final remarks

The management of the HC-SR04 can be implemented using polling, or interrupt. A third option is to use the hardware event counter available on the K64F (FlexTimer Module, or Low-Power Timer Module, see Freescale “K64 Sub-Family Reference Manual”).
**In case your solution makes use of the FlexTimer Module, or the Low-Power Timer, 3 additional points will be added to the evaluation of your work.**