

Université d'Ottawa
Faculté de génie

École de science informatique
et de génie électrique



University of Ottawa
Faculty of Engineering

School of Electrical Engineering
and Computer Science

**CEG4166/CSI4141/SEG4145 Real Time System Design
Winter 2024**

To be submitted via <https://uottawa.brightspace.com/> on March 1st at 11:59 p.m.

Lab2: Digital voltmeter

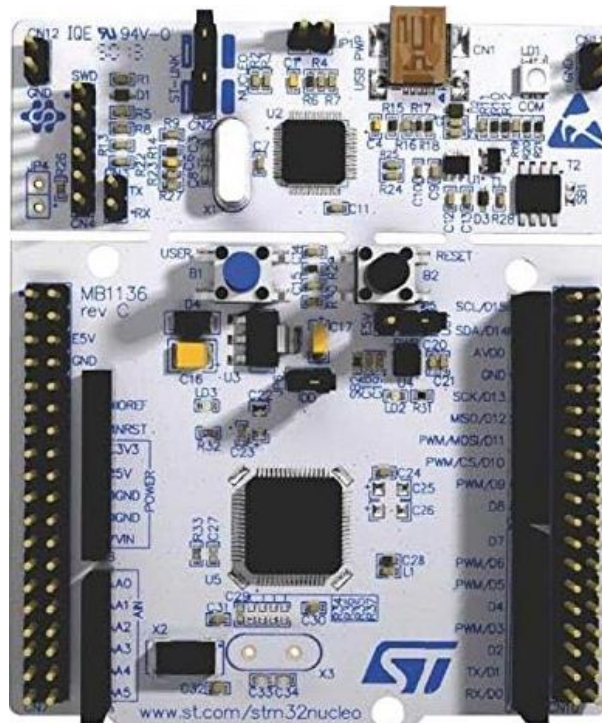
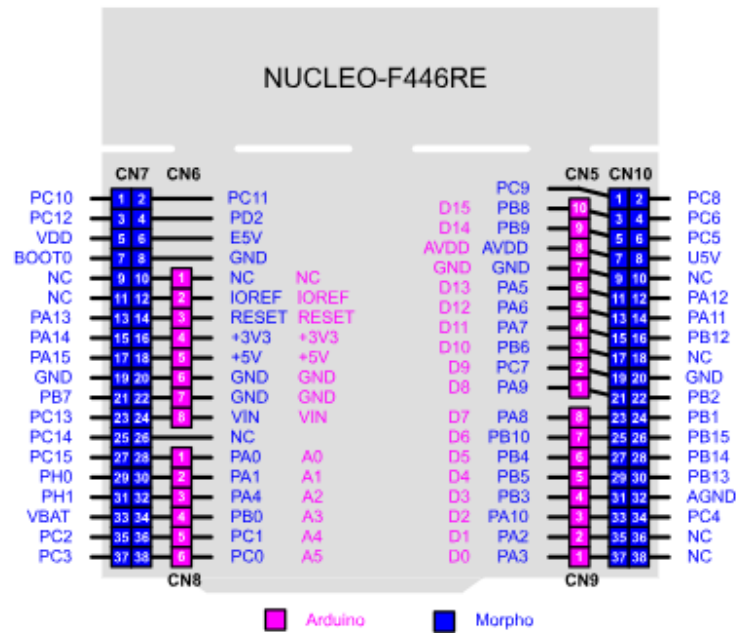
1. Objective

In this lab, students will develop two measurement systems in a digital voltmeter system application using the FreeRTOS real-time kernel in conjunction with the STM32CubeIDE integrated development environment.

2. Development



In this laboratory, students will use the nucleo-F446RE development board shown below. This board is equipped, among other things, with three ADC channels for reading voltages and three I2C channels for interfacing LCDs to display measurements.

Note that this application can be realized with a super loop, but it is mandatory to use tasks and choose their number correctly. To carry out this lab, students can use the files ADC_Single_Channel_Potentiometer.rar and OLED.rar, which contain a start-up program for potentiometer-controlled voltage reading and a program for displaying it on the LCD. Both programs need to be integrated into the FreeRTOS kernel. You'll need to dissect these two programs to find the GPIOs used by the ADC and I2C to implement your application.



Required components

This assembly requires the following components.

Component	
1. UKCOCO 10K Ohm potentiometers	
1. OLED LCD Display Module SSD1306 IIC 128x32 LCD OLED Display 3.3V ~ 5V 4-pin from Teyleten Robot 0.91 inch	

3. Deliverables

- Brief description of the purpose and theory of the problem ;
- Brief explanation of your solution algorithm;
- Design document ;
- Screenshots of the application demonstration ;
- Discussion;
- Conclusion.

4. Evaluation

- Points awarded for correct operation of the application: /50.
- Points awarded for the laboratory report: /50.