EE 14 Lab 1: Getting started with PlatformIO and your Nucleo dev kit

Lab report due a week after your lab session (27-31 January 2025)

1 Introduction

The aim of this lab is for you to get the embedded development environment set up so you're ready to go for future labs.

After successfully completing this lab, you should be able to create an embedded code project from scratch using PlatformIO, write C code, and flash it to the hardware.

2 Getting tools

L1: If you took ES 4 last semester: please ask your TA to trade your UPduino for a Nucleo dev kit. (If you ever need an UPduino in the future for some project, just ask Prof. Bell and he'll happily give you one!)

If you did not take ES 4, please ask your TA for a complete lab kit (with breadboard, wires, LEDs, etc).

L2: Get some sort of note-taking device or document handy, and take notes on what you're doing and what the results are as you work through the remainder of the lab.

There's no formal report to turn in, but we will ask you to submit your notes from this lab.

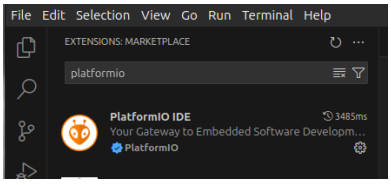
This is especially important if you run into problems! This is our first semester using the Nucleo boards and PlatfomIO. We are hopeful that this will give you the freedom to work outside the lab, but with 70 different computers we're going to run into some problems.

If you do have difficulty installing the software or flashing the dev board, please document exactly what was wrong (error messages, etc), any relevant information about your computer (OS version, VSCode plugins, etc), and what you ultimately did to solve the problem.

L3: Install VSCode on your computer, if you don't have it already. https://code.visualstudio.com/download

L4: Install the PlatformIO extension for VSCode. Click on the "Extensions" button on the sidebar  or type Ctrl-Shift-X.

Type "PlatformIO" to search, and install it.



3 Creating a project

L5: Open the PlatformIO home page (click the PlatformIO icon in the side bar), and select "New Project".

L6: Configure the settings:

- **Name**: Whatever you want, but hopefully something descriptive like `EE14_lab1`!
- **Board**: ST Nucleo L432KC
- **Framework**: CMSIS
- **Location**: Up to you, but you probably want to make a folder for all your EE 14 stuff instead of dumping it in PlatformIO's default location.

PlatformIO will take a few minutes to install all of the software tools to work with the board.

L7: Download the starter code files from the course website, and add them to your project. Header files (`.h`) should go in the "include" folder and C source files (`.c`) should go in the "src" folder.

L8: Click the PlatformIO:Build button (tiny checkmark on the bottom bar) to compile the code.

L9: If you are on Windows, install the ST-Link USB drivers: https://www.st.com/en/development-tools/stsw-link009.html You shouldn't have to register for an account if you use the "Download as guest" option, but you will need to put in your email address to get the download link.

L10: Plug the Nucleo board into your computer. (Make sure to take notes if you have to do anything extra to get your computer to talk to the board!)

L11: Click the PlatformIO:Run button (tiny right arrow next to the build button) to flash the code to your Nucleo board.

L12: Click the PlatformIO:Serial Monitor button (tiny plug icon) to open a serial terminal that receives input from the device.

You should see the output of the code, printing `Hello from a tiny computer!`.

4 Experimenting

L13: This may be the first time you've used `printf()`. If so, take a look at the documentation (online or with `man 3 printf`) to understand how to use it and learn why Prof. Bell likes it so much more than `std::cout`.

Add some code to print out the number of times the code has printed its message, like so:

```
Hello 1
Hello 2
Hello 3
...
```

How long will it take before it starts over at 0?

5 What to turn in

That's it! There is no formal lab report to turn in, just submit the notes you took along the way.