

## ***Week 2 homework***

### ***Due date reminder***

Please email your completed assignment to the course TAs ([mch6@illinois.edu](mailto:mch6@illinois.edu) and [jjc11@illinois.edu](mailto:jjc11@illinois.edu) cc [rlongo@illinois.edu](mailto:rlongo@illinois.edu), subject: '[PHYS371]: Week 2 Homework, Your Name') by Thursday, 5 pm of week 3 (02/03/2023). Each day of delay in turning in the assignment will result in a grade reduction of 10%. We will not grade anything submitted more than one week late. The use of the wildcard should be communicated to the instructor and the TAs before the deadline to turn in the homework.

When your homework submission includes one or more Arduino code files, please use the template **p398dlp\_template.ino** as the starting point for your code. (I have it posted to the course homework web page.) Please fill in *all* of the fields shown in the template file.

In addition, your homework submissions—code, cell phone photos, etc. must include enough identifying information for us to tell who you are! Please compress all the material related to the homework in a .zip or .tar file. If you have questions or points that you need to address, please do not wait for the last day to ask for office hours since it may not be possible to accommodate all the requests on a short notice.

### ***Problem 1.***

Write a brief description of what your project device will do, then list all the breakout boards/modules the device will need to accomplish this and how they enter into the device's ability to record the data you'll need. Please attach sketches of how you imagine your setup to be and other information that is relevant to your opinion. This task will be evaluated on a group basis.

### ***Problem 2.***

In addition to the BME680 and LCD you've already placed on your breadboard, add a keypad, microSD breakout board, and DS3231 real time clock (RTC).

Write/find/appropriate/invent a single Arduino program that does all of the following:

- Sets the RTC to the (approximate) current date and time that your laptop identifies as the date/time when you last compiled our program (do this in `setup()`). There is demo code out there that'll show you how to do this;
- Watches for keypad input and displays the entered key to the LCD whenever a key press is detected (do this in `loop()`);
- Depending on what you've typed on the keypad, your program will either:
  - write the current RTC date and time to the LCD or...
  - open a CSV file (e.g. HW.CSV) on a microSD memory card and write ten lines to it, with each line showing the current (RTC) time and a line number, then close the file or...

- write a message to the LCD, then fall into an infinite loop so that nothing else of interest happens.

There is a program on the code repository web page identified as “the code I used to check the PCBs before distributing them to the fall 2020 class” that was written by Prof. Gollin and does a lot of what you are asked to do. There’s much more code there than you will need, but you ought to be able to lift from it the part you want. Alternatively, you can browse the internet, searching for examples related to each sensor application and porting them to the problem.

We will start this work in class so the TAs and I can help you navigate the challenge; you’ll finish (and document) your work for this homework assignment. Please, when turning in your assignment, attach clear pictures of the breadboard together with a short video of you operating the device.