Week 4 homework

Due date reminder

Please email your completed assignment to the course TAs (mch6@illinois.edu and jjc11@illinois.edu cc rlongo@illinois.edu, subject: '[PHYS371]: Week 4 Homework, Your Group Number) by Thursday, 5 pm of week 4 (02/16/2023). Homework that includes only group work should be submitted by one group member, rigorously copying all the other members, the instructor and the TAs.

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, and it does not apply to homework that includes group work only.

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. Please fill in ***all*** of the fields shown in the template file. Please use the template also to start your group code and comment on it constantly when you develop new parts. Quote the main authors of different parts of the code too. **Keep the code up-to-date on the GitLab repository.**

Please compress all the material related to the homework into a .zip or .tar file. If you have questions or points 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 short notice.

Problem 1.

Prepare a presentation (15' in total, leaving at least 2' for questions) about your status and plans for your project. Guidelines for the presentation are available on the slides shown by the instructor in class, and available on the course website. The presentation is due with the rest of the homework on Thursday at 5 PM.

Problem 2.

Each group will have to address specific items that are instrumental for the successful assembly of their project on the breadboard, before outlining the PCB. These tasks, discussed during the informal discussion with each group at the end of Friday's class, are:

Group 1: Complete the migration from Arduino Mega to Arduino Nano and determine data packaging and format. Look up a fan for the back of the Arducam, to be installed on the PCB.

Group 2: Getting the Arducam to work with the Arduino Nano. Test camera w/ trigger from the laser system. Check the size of a single data acquisition (e.g. one collision, not one single picture in the collision). Design holder to be mounted on the colliding pucks.

Group 3: Finalize Frog design by inserting actual 3D drawing of the sensors (or mockup). Provide a video of data acquisition, together with the data acquired by the system during the video.

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Group 4: Characterize the Plantower, in particular its saturation. Build online monitoring with the serial plotter to be used for this purpose. Provide a video of the saturation test. Provide a basic layout of the components for the PCB.

Group 5: Look up small flat breadboards for the mounting of the sensors to be placed on the water balloon. Check each of the LSM9DS1 ones vs each other to determine systematic in the measurement. Design a case for the LSM9DS1.

Group 6: Establish the code to run all the setup together. Calibrate the ultrasonic sensor to measure different positions. TMP vs BME temperature measurement.

Group 7: Save data from the Plantower in the correct format. Include the cup anemometer in the setup and in the data packaging. Determine if the Plantower needs calibration.

Group 8: Fix the connection to the funnel. Figure out the basic layout of the components on the PCB. Show data format with sensor identifier.

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