Issued: March 14, 2024                Due: April 9, 2024

Please use this worksheet to organize your thoughts and plans for your final project and develop a brief "technical disclosure" essay or proposal due in lecture on Tuesday, April 9. **Clearly IDENTIFY your proposal for either 6.115 or 6.1151 in the title of your document.**

**For 6.115: Your proposal** should be **at least 3 pages** in length and typically not more than 4. It should contain one page with at least two pictures: an overall system hardware schematic and a software flowchart for your final project concept. It should contain two to three other full text pages (not pictures) of single column, single-spaced, 12-point typed, grammatically correct text with one-inch margins describing your final project. Specific content for these pages is discussed below. Schematics or block diagrams should be drawn with a computer, not hand sketches. We will review your draft submission that you hand in and discuss it with you during your proposal. This proposal is worth 2 of the 20 total points associated with your final project. The remaining 18 points are earned based on your final project report (8) and demonstration (10). **Final project reports should be written in your lab notebook in clear English essay format with full sentences, schematics, scope photos, and other needed documentation summarizing your project with your progress and results during the final project period. Graphics, schematics, and other images go on additional pages of the final report.**

**For 6.1151: Your proposal** should be **at least 4 pages** in length and typically not more than 5. It should contain one or two pages with at least two pictures: an overall system hardware schematic and a software flowchart for your final project concept. It should contain three other full pages of text (not pictures), single column, single-spaced, 12-point typed, grammatically correct text with one-inch margins describing your final project. One page should be dedicated to what your studies of your reference material from your 6.1151 initial proposal at the start of the term have suggested to you for your independent inquiry, and **should summarize your analysis and progress to date.** Specific content for the other pages is discussed below. Schematics or block diagrams should be drawn with a computer, not hand sketches. The proposal and revision are worth 5 of the 40 total points associated with your final project. The remaining 35 points are earned based on your final project report (15) and demonstration (20). **Final project reports should be a PDF document of at least 15 pages of text (12 point font, 1 inch margins, single-spaced), summarizing both your II work and your progress and results during the final project period.** The PDF document should be printed and inserted in your lab notebook. The lab notebook should contain your notes as you worked on the projects. Both the printed report and the lab notebook are turned in together, with separate code listing (not counted in the 15 pages.) **Graphics, schematics, and other images go on additional pages of the final report.**

**For ALL:** There will be a final project proposal interview by sign-up appointment to review your first proposal draft. Based on our discussions, we will ask you to refine your final project idea and hand in a revised proposal on Tuesday, April 23. There will also be a final project progress interview (to be scheduled) during the final project period. Final project demonstration check-offs will occur on Tuesday, May 14 by sign-up appointment. DO NOT WAIT UNTIL THE LAST MINUTE TO START YOUR FINAL PROJECT! Final project reports are due

without in lab no later than 4:30 P.M. on Tuesday, May 14, 2024. KITS MUST BE RETURNED on Tuesday, May 14.

Your final project **must use the PSoC** in a substantial and creative way. For example, **simply using the PSoC as a serial port (a project available on the course website) is not sufficient.** You may also use an 8051-compatible processor that you program in 8051-assembly language. If you do not want to use your R31JP, this is fine, subject to our approval and the requirement that a substitute processor is 8051 compatible and that you program it using 8051 assembly language. We have a small (!) budget to buy some custom components. Be sure to account for shipping time if you plan to order a part, especially if you cannot complete the project without this component. Making sure that you locate needed parts, or working around parts you cannot get, is part of the final project.

The purpose of the final project is to demonstrate your mastery of the skills and techniques we have examined this term. The final project is an opportunity for you to be creative and have fun. As a rough guide, the 6.115 project should involve the effort of two lab assignments. This might mean wiring about 5-8 chips and writing 8-12 pages of PSoC-C code. The 6.1151 project would additionally include your II investigations throughout the term. This document is a guide. That is, more hardware and less software or vice-versa might be appropriate and acceptable for a particular, well-thought-out project.

Please include the following sections of information in your draft proposal using informative section titles. That is, the topics listed below constitute a rough outline of what we would like to see in your proposal. You may add additional information or deviate from this outline as needed to make your project concept clear. You might imagine that your proposal is an "elevator pitch" for your startup idea or a graduate thesis. A reasonable way to evaluate the quality of your proposal writing might be to ask: "Would someone fund or supervise this project?" based on this written description:

**Requested Outline:**

**Background/Introduction**: Please briefly describe your project. Why is it interesting and creative? What interested you in the idea?

**Hardware description**: Draw a block or functional diagram of the hardware system you will develop. Describe how it works in this section, and refer to the diagram.

**Software description**: Draw a flowchart or outline of the software you will develop to bring your system to life. Describe how it works in this section, and refer to your flowchart or outline.

**Project scope and management**: A critical part of 6.115(1) is learning to get a system that you imagine built and working correctly. Part of the project development process is managing your time and project risk level carefully to ensure that you can deliver something that works. In this section, consider three different levels of completion for your project: first, discuss project goals with a modest risk level that will in all probability lead to a working project that we would both agree is worth at least a "B" or "reasonable and competent" grade evaluation; second, add project goals that might involve more work or risk that would make the project exciting, e.g., more

likely to be a commercial success or illicit a "wow" from your friends and colleagues (an "A" level or "excellent" grade evaluation); third, add project goals that might be high risk but would make the project spectacular (worthy of a journal publication in an education or research periodical) that you would tackle if you find yourself with tons of spare time ☺. Discuss your different levels of goals in the context of your hardware and software diagrams. For example, you may wish to put dashed boxes around hardware subsystems, indicating "core" hardware essential for your project at any level, and then indicating "bonus" or "additional" subsystems you'll add to expand the project capabilities and excitement.

**Special component needs:** *What special integrated circuits will you need?* Avoid this if possible. We have loaded your kit with goodies that are "in addition" to what we used in the lab. You are welcome to use anything in your kit for the final project – there is a lot of great stuff, sensors, the robot cart, additional breadboard, and so on. If you think you have additional needs, give part numbers for chips you plan to use. *What special components do you need?* Where do you plan to locate them? Be as specific as possible. This section refers to items that you might want, somewhat like our LED lamp fixture, e.g., magnetic card reader, modem, motors, LED displays, computer and display peripherals like disk drives monitors, and televisions. *What special mechanical components will you need?* Where do you plan to locate them? This includes items like gears, wheels, wood, plastic boxes, zero-insertion-force chip carriers, etc.

**Timetable:** Please give a complete timetable of your work plan. Describe:
During the week starting April 15 I will complete:
During the week starting April 22 I will complete:
During the week starting April 29 will complete:
During the week starting May 6 I will complete:
During the week starting May 13 I will complete:

**Addendum: Information about the final project writeup component in your lab notebook for both 6.115 and 6.1151:**

We often get questions about the final project writeup. Please refer to the final project proposal sheet above and the FP project lecture handout for the basic points. Here is a summary of the salient points we discuss in the final project lecture:

1.) The final report should be clearly presented in your LAB NOTEBOOK. Pick a nice clean fresh area in the notebook to start the report, and clearly indicate it as your final project report. The 6.115 report is written in the lab notebook. The 6.1151 II report is printed and inserted in the lab notebook with your project notes (as you worked) written in the lab notebook.

2.) Please include your code in a removable printout pack.

3.) Use standard 6.115 "demolab" writeup procedures: full schematics, commented code, explanations, scope photos, and experimental results in the lab notebook report.

4.) The FP report is DIFFERENT from a lab report in this sense: In the case of the labs, we already knew what you were doing. So, we accepted clearly presented, grammatically correct "solutions" to the lab without a lot of preamble or story. In the case of the final project, you need to tell the story of your project. If you did a good job with your final project proposal, you should expect to reuse an introductory paragraph or two from the proposal, making sure that you clearly explain what your project was. Use a high-level overview diagram of the hardware, and another for the software, to explain the project overall.

Present your usual lab-style results in an essay that clearly explains what you did, i.e., that sets clear context for the results. Remember, there is no "lab" from which you are answering questions. You are responsible for clearly explaining what you were trying to do, and what you did.

In the body of your report, be sure to have:
- Hardware Description
- Software Description
- Hardware/mechanical schematics
- Commented, clear code

Please turn in your lab notebook with FP report at your checkoff no later than the last day of classes.