Zephyr: State Machine Framework Refactor Lab

BME554L - Fall 2025 - Palmeri

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Git Version Control

- Use best practices for version control (branching, commit messages, etc.).
- Do all development on a dedicated branch that is merged into `main` once it is functional.
- Commits should be very specific to the changes/additions you are making to your code. This will help you and others understand what you did and why you did it.

- On a given development branch, try to implement one small piece of functionality at a time, commit it, and then move on to the next piece of functionality.

> **!** Important
>
> You do not want one, monolithic git commit right before you submit your project.

Refactor: State Machine Framework

1. Create a new development branch in your forked repository you have used the last few weeks called `refactor_smf`.

2. Refactor your code to use the Zephyr State Machine Framework (SMF).
    - Use `entry` and `exit` substates to handle state transitions where something should be done "once" when entering or exiting a state.
    - Refactor code to make sure that state-specific things are done in that state. For example, if an error LED should only be on in the `ERROR` state, then the code to turn on the LED should be in the `ERROR` entry state and not done in the exit of the previous state.
    - Make sure that your device initialization is done in an `INIT` state (so that, in the future, a soft reset can allow the device to be completely re-initialized).
3. Make sure that your state diagram is updated to reflect these entry / exit actions. This diagram should exactly match your firmware implementation of the SMF.
4. Qualitatively make sure that your device continues to function as expected.

How do I ask for help?

1. If you have a general / non-coding question, you should ask your TAs / Dr. Palmeri on Ed to allow any of them to respond in a timely manner.
2. Push you code to your GitLab repository, ideally with your active development on a non-`main` branch.
3. Create an Issue in your repository.
    - Add as much detail as possible as to your problem, and add links to specific lines / section of code when possible.
    - Assign the label "Bug" or "Question", as appropriate.
    - Be sure to specify what branch you are working on.
    - Assign the Issue to one of the TAs.
    - If your TA cannot solve your Issue, they can escalate the Issue to Dr. Palmeri.
4. You will get a response to your Issue, and maybe a new branch of code will be pushed to help you with some example syntax that you can use `git diff` to visualize.

What to Submit

1. As with the previous labs, push this development branch to Gitlab and merge it into `main`.
2. Create an annotated tag for that merged commit called `v1.4.0`.
3. Create an Issue assigned to Dr. Palmeri to review your code for `v1.4.0`. (Teaching team will upload a zip archive of your project to Gradescope.)