Seneca Polytechnic
School of Software Design & Data Science
SEH500 – Course Assignment – Fall 2025
Proposal Due: Wednesday, Oct 29, 2025, 11:59PM
Presentation Slides and Report Due: Nov 30, 2025,11:59PM
In-class Presentation: Dec 3, 2025

READ THIS: Academic Integrity Policy
https://www.senecapolytechnic.ca/about/policies/academic-integrity-policy.html
This includes but is not limited to the following:

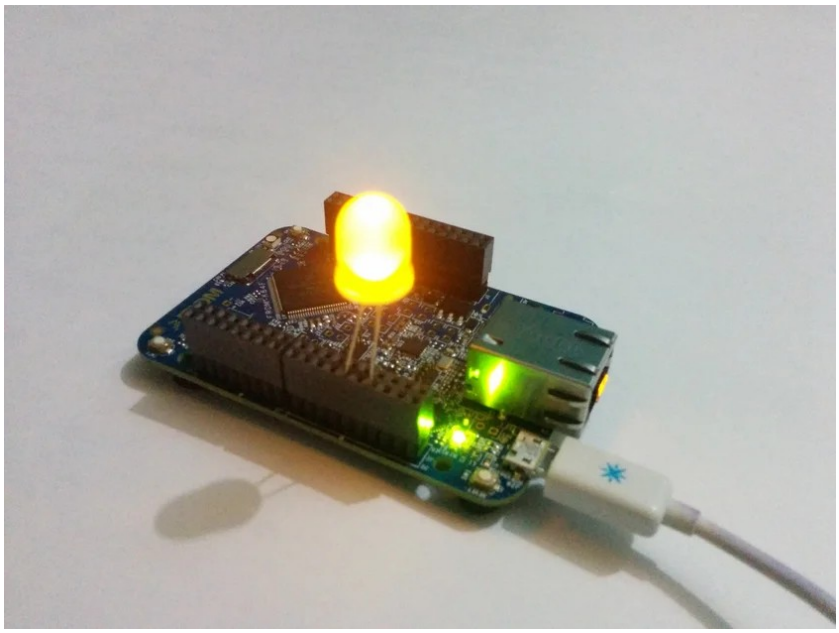
- Everything you put into your report must be your own work and you must be able to explain how and why you put that into your report.
- All code that you write must be your own work and you must be able to explain how and why you put that into your code.

Background

In this assignment, you'll be applying the concept you've learned in class and lab to the design of a program for a microcontroller board to assist person with medical disabilities. Perform the necessary background research to define a problem statement to solve. Your solution must try to solve that problem with a tangible and measurable result.

Medical disabilities encompass a wide range of physical, sensory, cognitive, and neurological impairments that can significantly affect a person's ability to perform everyday tasks, communicate, or live independently. These challenges often require tailored solutions to support mobility, interaction, and health monitoring. Traditional assistive devices—such as wheelchairs, hearing aids, or prosthetics—have long played a role in improving quality of life. However, the integration of electronics and microcontrollers has opened up a new frontier in personalized, intelligent, and responsive assistive technologies [1].

The Government of Canada created three "Federal disability report" from 2009 to 2011 [2]. You may use them as a starting point in identifying an area you might want to address with the project.



Instructions

1. This assignment must be done in groups of up to TWO (2) students. You may work individually. A group of THREE (3) or more is NOT allowed.
2. You must use the NXP Freedom K64 or K66 board as your development platform.
3. Design an application using the Cortex M4 processor on the Freedom K64 or K66 board along with any onboard or external peripherals.
4. **100 lines of your code must be written in GNU Assembler code.** It could be inline assembly code or in separate files across different functions. The assembly code must form a functional block and NOT just independent inline assembly instruction.
5. Your program must use one type of interrupt.
6. Your program must use at least three type of the following peripherals:
    a. Serial Communication (must transmit and receive)
    b. Onboard LED
    c. Onboard Button
    d. General Purpose I/O (ie. external LED, button or sensors)
    e. Accelerometer (No longer available on new K64 board)
    f. Magnetometer (No longer available on new K64 board)
    g. Ethernet
    h. USB as HOST (ie. another USB device attached to the board)
    i. SD Card
    j. Audio
7. All code must be submitted in a github repository with proper comment.

Project Proposal [300 words max] – 10%

Prepare a short description of your project plan such as the problem to solve, the proposed solution, and which peripherals you are planning to use.

Presentation [5 minutes max] – 40%

Prepare a presentation that is 5 minutes in length. The presentation can be a pre-recorded video (you must play it in person) or a live presentation with slides (and other visual aids).

In your presentation, you must cover the following:

- The problem statement you are trying to solve
- The solution you are proposing to solve the problem
- How did you come up with the solution and what issue or obstacles did you face when developing your solution
- A prototype of your solution

Mark will be awarded based on the clarity of the delivery and the content presented.

The presentation should be targeted to a technical audience who understand microcontrollers, electronics, and programming. The audience's interest is in the technology used and the method on how to solve the problem.

	5 marks	**4 marks**	**3 marks**	**2 marks**	**1 marks**
Content and Clarity	World-class presentation. Ready for a sales pitch.	Very clear and very good content. Good as is for internal customers.	Clear and good content. Need minor improvement.	Need major improvement.	Content is confusing or very unclear.
Time and Flow	Right within limit and smooth transition.	Within time limit and smooth enough for internal customers.	Outside time limit OR some inconsistent flow in presenting.	Way outside time limit OR presentation is not smooth.	Way over or under time limit with no flow control.

Solution, Code and Report [1500 words max] – 50%

Prepare a report that is no more than 1500 words in length (including figures captions and appendices). Use figures (such as photos, diagrams, and screenshots) to conveyor messages as a picture is worth a thousand words.

In your report, you must cover the following:

- The problem statement you are trying to solve.
- Background research on the problem, ie. what solution exists today.
- The solution you are proposing to solve the problem.
- Block diagram of your code and explanation of each block/module
- How is your solution better than existing solutions or what concept did you validate?
- How did you come up with the solution and what issue or obstacles did you face when developing your solution?
- Future work that can be done with your solution.

Mark will be awarded based on the complexity of the solution (ie. a solution that is based on just example codes or closely resemble an example code will be awarded a mark of zero) and the clarity of the report in explaining the solution.

All code must be submitted in a github repository with proper comment.

Proper Citation, both inline and at the end of the report

Any report without proper citation will be awarded a **mark of zero**. Remember, any idea that is not your own (ie. example code you found from the IDE or online, solution to problem you found online, facts, etc.) must all have proper citation using a recognized citation format. The commonly used citation format for electrical and computer engineering document is the IEEE citation format [3].

Late Submission

50% mark deduction within 24 hours after the deadline, no mark will be rewarded afterwards.

Late presentation will only be accepted in video format.

Reference

[1] GenAI use: Copilot for generating the background paragraph

[2] https://publications.gc.ca/site/eng/9.505762/publication.html

[3] https://journals.ieeeauthorcenter.ieee.org/wp-content/uploads/sites/7/IEEE_Reference_Guide.pdf