

DESN2000 (Computer Engineering) 2025 T2
Project Brief: Prototype of a Smartwatch

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Assume you are in a company, and your team has been asked to develop an early prototype of a smartwatch. Assume your manager has given you a brief description of the project. Such a description is going to be open ended and at this stage we are trying to simulate such a realistic scenario. You will spend the first few weeks drafting and brainstorming your design. If anything is unclear or you have any doubts, please post a question on the ED forum under the project or ask your lecturer/tutors (this is a simulation of discussing with your manager for clarity). If there are reasonable assumptions you can make, feel free to do so.

1. Project Description

Your project is to build an early prototype of a smartwatch on the coaST Development Board (STM32 ARM) provided during the course. The smartwatch firmware is to be written in C and/or assembly language. The guidelines for the smartwatch prototype are provided below:

- The LCD panel on the development board will be used as the display of the watch. The LCD panel can print limited characters, so think about how your design would make best use of it.
- The smartwatch will have only four buttons. You can select four buttons or keys of your choice from the development board. Using only 4 buttons, how would you build an easy-to-use system? This is something that you need to consider in your design.
- The “home screen” will show information such as time, day and other information of your choice (e.g., simulated step count or heart rate). The LCD has limitations, so design the home screen under these constraints.

- Using buttons, it should be possible to scroll through different activity tracking screens, such as the step count, heart rate, and floors climbed. Since the board does not include actual sensors, you may simulate data creatively for demonstration purposes.
- An option should be present to enable/disable sounds when buttons are pressed i.e. a mute button.
- An option should be present to enable haptics (vibrational feedback) for button presses (implemented using the stepper motor).
- The smartwatch will have fake solar charging. In the prototype, you just need to use the two light-dependent resistor readings and show the light intensity values over the last few minutes.
- Flashlight feature, which lights up all the LEDs on the development board.
- The smartwatch should have basic watch functions: time of the day, alarm, stopwatch and countdown timer.
- The smartwatch should be responsive - keep in mind that a microcontroller is not as powerful as a CPU or has a large amount of RAM, so your firmware should be designed efficiently.
- Once you've covered the above, you must add advanced features to make it outstanding. For instance, you can figure out and use the accelerometer on the board for something. Or else, you can use the QWIIIC port to connect a sensor. You do not have to limit yourself to these examples; it is totally up to you to use your creativity, as this is a design project. But please DO NOT try to power the board with batteries, as incorrect handling of batteries can be dangerous.

2. Teamwork

This is a group project, and you will work in a group (same as lab groups). It is important to work efficiently together as a team to achieve timely deliverables and to complete this project. You are free to collaborate via any means you prefer.

3. Deliverables

The whole course and its assessments revolve around the project. You will be given the assessment tasks in due course.