

SCC.369: Lab Exercise 4

Mini Project

Aim of the Exercise

The aim of this exercise is to provide you with the opportunity to create your own interactive embedded device. You will be integrating external hardware peripherals with your micro:bit and writing C/C++ software to provide the interactive behaviour.

For this exercise you may also use all the available CODAL classes... so you can also practice using higher level APIs for your embedded software.

Submission: SCC.369 moodle submission, 16:00 Friday Week 10.

Weighting: 25%

The Task

Build an interactive device which uses **external inputs** and an **external display**.

Interactive means that the display should change in response to user input and *external* means using at least one piece of hardware that is **NOT** built into the micro:bit. It's fine to use the on-board micro:bit inputs and display in addition, if you need or want to.

The device you build should be useful in some way, not just test code that proves the inputs and display work. You are free to choose the ultimate purpose, form and functionality of this device... **so get creative!**

Examples devices include:

- A timer/clock/stopwatch. Lots of options here, such as an egg timer which counts up or down for a fixed duration, perhaps displaying the time elapsed or time remaining in minutes and seconds, or maybe using an animated graphic of some kind. Perhaps a timer that displays elapsed time with 'hands' or digits.
- A game. Maybe a single-person reaction timer, or a multi-person "who pressed first" quiz indicator, a 'simon'-like memory game, a bat'n'ball type game, tetris, Casio number invaders (or similar). Anything goes!
- A measurement instrument. A range finder, a spirit level, a compass, a temperature sensor, or a light level indicator. Perhaps you can use an analogue or digital display readout (or both!). A display could plot line that traces a graph, or bar chart that gets larger or smaller, or an arrow that changes where it points...

Assessment

You are required to submit two things via moodle:

- The **source code** for your solution
- A short **video** showing your device working (or the parts you got working). The video should have narration – a voice-over where you describe:
 - what the device is,
 - how to use it,
 - what kind of display you interfaced to,
 - how you structured the display API you created,
 - which external input(s) you used, and
 - the wiring of your prototype as well as its operation.

The video should be up to 3 minutes long.

Marking Scheme

Your work will be marked based on the following six categories. Your final grade will be determined based on a weighted mean of the six weight-bearing grades shown in the table below.

Changing some pixels on the display	20%
An API for controlling the display that is suited to your final application e.g. writing numbers or characters, displaying sprites, moving a line or a pointer.	20%
Interfacing to an external input Show that it works with feedback on the display; use the micro:bit display if needed.	20%
Building a complete, interactive system for a real application Use the micro:bit display if needed.	20%
Good device usability UI design for the interactive device itself.	10%
Code style and commenting	10%

Additional Equipment

For this task you can use the components in your micro:bit kit as needed. We will also provide the external displays you need along with a range of additional user input components, on request during SCC369 labs. Should your chosen design require a different type of component, we will endeavour to supply these to you, but we cannot guarantee availability. Enquire about this early and discuss with Joe or Steve during scheduled SCC369 lab sessions.