People

**Policies** 

Help

Photo by Arno Senoner on Unsplash

create a changing light experience that engages a viewer. The application for your show is a demonstration of your microbit's LED array and what you can achieve with it! The assignment builds upon what you have learned in labs 6 -10: • Lab 7: Basic Machine Code • Lab 8: Blinky • Lab 9: Functions, Data Structures and Stack Lab 10 & 11: Interrupts and Wrapping Up If you have not completed the tasks in the above labs or do not understand the content, we *strongly* recommend that you first complete the labs and then start the

Digital media festivals like Canberra's Enlighten Festival and Vivid

Sydney use huge projectors and LED arrays to create a city-sized light

You are going to write an ARM assembly program that uses the LED array on your microbit to

(and sound) show for people to enjoy. Your task in this assignment is

to create a *micro* light show on your micro:bit!

- assignment. **Outline** 
  - Deadline: 26 May 2023, 4:00 pm
  - Assignment template: <u>link</u> Specification: keep reading • Weighting: 25% • Marked out of: \_ / 100

Project name comp2300-2023-checkpoint-1 Fork project

Time Until Deadline (26 May 2023, 4:00 pm):

7:19:55:07

- this is an individual assessment task, ensure you fork your repo as private comp2300 > 2023 > in comp2300-2023-checkpoint-1 > Fork project Don't touch these!

① Internal

#### Forking a repository allows you to make changes without affecting the original Project description (optional) Select your uid Visibility level ?

Fork project you may re-use designs / files from your labs it is your responsibility to ensure any additional files are included in the repo and

The project can be accessed by any logged in user

The project can be accessed without any authentication

Project slug

Project access must be granted explicitly to each user. If this project is part of a group, access will be granted to members of the group.

comp2300-2023-checkpoint-1

Cancel

- additional files should be left under the src/ directory additional files should not contain spaces in their name eg: src/example\_file.S is okay, src/example file.S is not you may use the included library files if you wish
- if you want to make changes to the library files, then we suggest you instead create a new file under <a href="src/">src/</a> and copy what you need there and modify it; this way we won't miss extra work that you're doing • your submission must be in ARM assembly, no C or other language is permitted
- <u>late submission</u> is not permitted without an <u>extension</u> **Specification**
- Here's a technical specificiation for your assignment. Your program:
  - should use scanning on the LEDs to enable displaying of any 5x5 image the light show must sufficiently demonstrate the techincal capabilities of your
  - must never stop (it can repeat or loop) must work when the microbit is powered over USB but not connected to a computer (that is, it works after you upload it and plug into a USB charger) • should use **memory** (data structures) to create a changing and easily modifiable light
    - how you accomplished it why your design choices were appropriate for the task
  - asked of you in less words, please don't feel the need to hit 1000 words. You will end up writing a worse report by reducing the conciseness of it.

Note that we say < 1000 words. If you feel you have addressed all of what has been

2. <a href="mailto:src/\_\_\_.S">src/\_\_\_.S</a> any additional files you wish to include or split your implementation across (optional) 3. <a href="mailto:src/\_\_\_-lib.s">src/\_\_\_-lib.s</a> any files that contain alternative or modified versions of the functions found in <a href="lib/\_\_\_.S">lib/\_\_\_.S</a> (optional)

4. statement-of-originality.md containing your name, uid and a list of references

optional assets/\* containing any images you want to add in your document

Item 1 will be evaluated primarily through your program code. Items 2 and 3 will be evaluated through your report.md and the quality of the writing within. For more information on items 2 and 3, read the design document guide.

For item 1, you can consider the following to be a *part* of assessing the sophistication of your

how easy it is to change what is displaying (a high quality submission should require

includes things like <u>following calling convention</u> and good commenting

little / no changes to the code to change what is being displayed)

your style and adherence to assembly programming standards

# for more information, check the assembly style guide

expecting the difficulty of the grade ranges to look like.

your use of memory for encoding your light show

is, the higher the mark. In saying that though, a single high quality feature is probably better than a few low-quality ones.

Each point is an example of a submission, meaning that you only have to do one point from

that grade range (unless otherwise specified). However, the more featured your submission

Pass (50 - 59%) Moving Display, Non-scanned, Good use of memory Moving Display, Scanned, Poor use of memory

### Generative or changing light display using the hardware Random Number Generator Using the timer interrupt(s) as an integral part of your display

**Distinction (70 - 79%)** 

- Everything from Credit level and *at least one* of:

Moving Display, Scanned, Good use of memory

eg: screen level brightness (all LEDs)

Everything from Credit level and *at least one* of:

Basic PWM (Pulse Width Modulation)

#### Complex PWM (Pulse Width Modulation) • eg: per-LED brightness control that can be programmed with memory and change with the display Using multiple hardware interrupts (buttons) to control and change what is being

displayed

**Submission** Submission is through GitLab, the most recently pushed commit of your fork of the

External peripherals such as gyroscope, compass, etc, (warning: VERY DIFFICULT,

ensure you fork your project as private

comp2300-2023-checkpoint-1

Project description (optional)

Visibility level ?

3. plan your assignment and what your are going to implement

The project can be accessed by any logged in user. The project can be accessed without any authenticatio Select Private

comp2300-2023-checkpoint-1

Cancel

 you have filled out, committed, and pushed your statement-of-originality.md you have filled out, committed, and pushed your report.md you have checked the <u>report pdf artifact on gitlab</u> to ensure it is correct you have checked the gitlab ci tests and they are passing Report pdf Artifact Your repo will be packaged into a report pdf for marking purposes. As such it is important that you see what the result of the pdf job is and make sure the output makes sense.

capture

(✓) svgs

host=gitlab.cecs.anu.edu.au id=3661722 responseStatus

[1] Example Author. 2023. example code video. Retrieved from <a href="https://example.com/video">https://example.com/video</a>

References

render

**( ✓ )** pdf

Tags: comp2300

! Pipeline #545174 for main ြ

5/12/23, 2:28 AM

 $\rightarrow$   $\bigcirc$  pdf

pdf - passed

Ū S

take your name and uid from the statement-of-originality.md

• take references from the statement-of-originality.md

take the code from all of your src/\_\_\_\_S files

#### filecheck test (!) file:ex1.dig (!) test:ex1.dig file:ex2.dig

Pipelines Using Docker executor with image charlepm/pandoc-latex-libertine:0.3.0 ... Editor These artifacts are the latest. They will Jobs Pulling docker image charlepm/pandoc-latex-libertine:0.3.0 ... Using docker image sha256:ec65f85988c0b08fb3c0dfcfc6f63fa098949119c8284cd491fbeffef8f7425c for charlepm/p not be deleted (even if expired) unti Schedules andoc-latex-libertine:0.3.0 with digest charlepm/pandoc-latex-libertine@sha256:f977de0e213850d01878b07639a newer artifacts are available 325a7976d85d6e0d752f5cdbdb383dea13eb0 ... Security & Compliance Keep \_\_\_\_ Download Running on runner-c5c8e869-project-184393-concurrent-0 via courses-runner.. Packages and registries 00:02 Commit bb436031 Fetching changes with git depth set to 1000 Fix namespace including slashes

14 Initialized empty Git repository in /builds/comp2300/2023/comp2300-2023-checkpoint-1/.git/

This will download a zip file containing your pdf. Which should look something like this.

5/12/23, 2:28 AM

on comp2300 c5c8e869, system ID: s\_812a7cd4a197

16 Checking out bb436031 as detached HEAD (ref is main)

Downloading artifacts for svgs (3661722)..

Downloading artifacts from coordinator... ok

Preparing the "docker" executor

17 Skipping Git submodules setup 19 Downloading artifacts

=200 OK token=Vd2fDSNJ

There is more general info about gitlab ci here. **FAQ** Can I make a game? Like snake? Yes! As long as the display is still based off the game state which is stored in memory. And you will still need to use scanning on the display. But otherwise this is a good example of what you can do by combining buttons and things like the Random Number Generator.

What does sufficiently demonstrate the techincal capabilities of your

This means that your light show, what is actually being displayed on the LEDs, doesn't need

to be long or visually complex. But, it needs to be able to demonstrate what you have

However, if you're aiming for a grade of Distinction or High Distinction then the

Below are some examples of implementation quality and how this loop could be used to

This would already be sufficient, assuming that you have encoded the display in

• Generative or changing light display using the hardware Random Number Generator

LEDs when the heart beats, so that the outer LEDs are dimmer, but grow in

Yes! 50% of the marks for this assignment are evaluated through the design document. If you

map, controlling a game, exploring a menu (think gameboy menu here).

Let's use an example: a 7 second loop of a beating heart

Moving Display, Scanned, Good use of memory

extension will need to be paired with the show in some form of significant way. This

means that if you were adding a button for example, then doing something with state

where the buttons have some kind of impact would be required, eg: scrolling around a

### it beats based on the result from the random number generator (> 5 variations) You make the heart transition through different states (beating, broken, stopped, irregular) based on the result from the random number generator Complex PWM (Pulse Width Modulation)

brightness with the beat

If you're unsure then post privately on the forum and ask!

don't write one you will get zero for that half of the assignment.

Do I have to write a design document?

How do I write a design document?

way we are able to help.

any individual assessment task).

steps which you can do yourself.

Have a look at the design document page for advice.

limit. Writing a clear and concise document is a challenge, but we believe in you.

Make sure you are answering the questions in the specification and stay within the word

Jobs aren't finishing! Unfortunately on the day that an assignment is due, when many students are pushing updates at once, the CI servers can't keep up. You may not see your CI jobs finish before the

It's [5 minutes, 60 minutes, 12 hours] before the deadline and my CI

- If there's any issues with your git repository after the deadline. Please let us know (after the deadline) through a private forum post and there may be something we can do. How do I know my assessment has been submitted?
- 2. the time is before the deadline then your assessment has been submitted (well done!). Please don't ask us to "check", we would be just doing exactly the same thing as the above

On this page <u>Outline</u> **Rules and Policies Specification** 

Labs

Assessments

Assignment 2: Light Show

Create a light and sound show on your micro:bit

COMP2300/6300/ENGN2219 / Assessments / Assignment 2: Light Show

Resources

Lectures

- **Completion Checklist** Can I make a game? What does scanning capabilities of your Do I have to write a design document? design document? My program doesn't It's [5 minutes, 60
  - **Rules and Policies** before the deadline and my CI Jobs aren't finishing! How do I know my assessment has been submitted?
    - - Select Private
      - pushed to gitlab correctly
      - must be written in ARMv7 assembly using the <u>assignment template (link)</u> must use the LEDs to create a light show that changes over time <u>implementation</u>

show

• must include the submission of a <1000 words design document describing: what your design is (and how it meets the assignment specification) this is the code design, not what light show you're displaying

for **any** work that is not your own

**Marking Criteria** 

program:

**Deliverables** To successfully complete this assignment, the following files must be submitted: 1. src/main.S containing your implementation

5. report.md containing your <1000 word design document

Your assignment will be evaluated on the following criteria:

2. Sophistication of your design and how it meets the assignment specification (25/100) 3. Sophistication of analysis and evaluation of why your implementation is correct and appropriate for your design and what limitations it might have (25/100)

1. Sophistication of your implementation in ARM-v7 assembly language (50/100)

**Ideas For Implementation** This list is non-exhaustive and is only provided as a guide to give you an idea of what we're

uploading it to the board again to view those changes.

your level of extension beyond a basic scanning display

"Good use of memory" This means that the program is easily changeable and controllable by modifying data structures in memory, without, or with very little, modification of the code and then

These are just provided as a guide and as mentioned, other aspects such as the

means that just because you have successfully implemented something in grade

range X, does **not** mean that you are **guaranteed** a grade in range X.

quality of the report, quality of the programming, etc. also factor in to the grade. This

Credit (60 - 69%)

## **High Distinction (80% - 100%)** An HD is a mark of 80+, not 100. Just because you do something in this range, doesn't mean that you can expect full marks.

assignment template before the deadline is taken to be your assignment submission. **Getting Started** 

Forking a repository allows you to make

Select your uid

consult with your tutor first)

- 1. read this assessment page completely 2. fork and clone the assessment template o do NOT change the hamour path by the texa, mit hay get missed by our software
- 4. think of how the data structures are going to look and work 5. think of how the program is going to fit together 6. read the microbit tips and tricks page 7. work on each part, debugging, testing, committing and pushing as you go 8. make a mistake or get stuck, then ask your tutor in your lab or a good question on the course forum. **Completion Checklist**  you have submitted the files <u>listed above</u> you have wrote all of your code using good practice you have saved, committed and pushed your assembly files to gitlab

#### To view the pdf, first click the ci icon on your most recent commit (as above), then click on the pdf job. Needs Jobs 9 Failed Jobs 7

Stage

file:ex3.dig

the Download button.

₩ Monito

X Snippets

Assignment 2

Report

statement-of-originality

take your report from report.md

combine all of them into a single pdf

Job dependencies

It will:

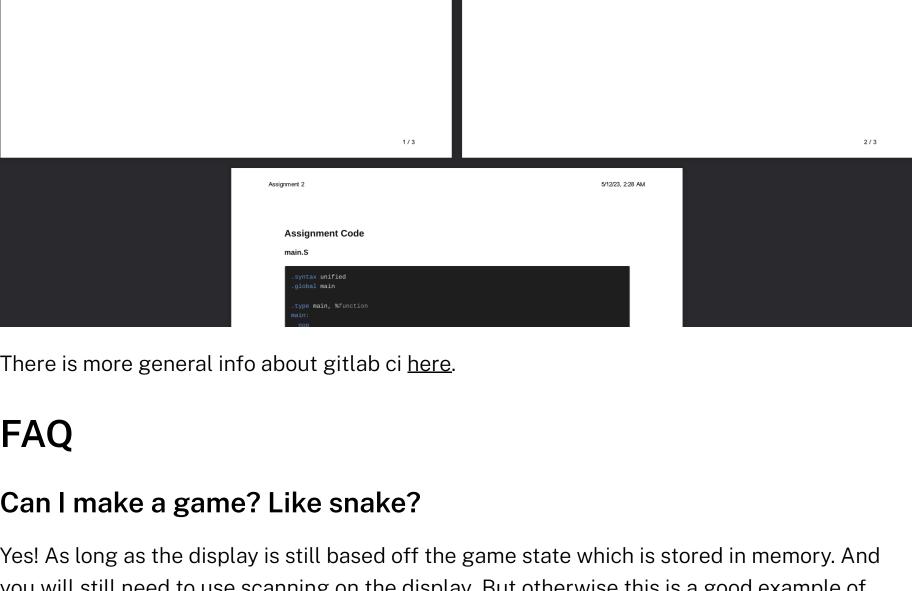
Group jobs by

comp2300 > 2023 > comp2300-2023-checkpoint-1 > Jobs > #3661723 C comp2300-2023-checkp... pdf Project information opassed Job pdf triggered 3 minutes ago by Brent Schuetze Repository Finished: 4 minutes ago Q ? = + + Search job log ໃ Merge requests Timeout: 1h (from project) Running with gitlab-runner 15.9.0 (c20f0bec) Runner: #38 (c5c8e869) comp2300

Then, you'll be taken to the job page, where you should see a "Job Artifacts" section, click on

test:ex2.dig

test:ex3.dig



## You modify the beating heart loop to change the size and shape of the heart when You modify the beating heart loop to also include a change in brightness for the

demonstrate the capability:

memory

What does scanning mean?

There is a <u>lab exercise</u> for this.

implementation mean?

implemented.

My program doesn't work, can I email you for help? Sorry, you won't get help over email or Teams. We provide a course forum which is the only

Forum posts related to your assignment submission **must** be "private to instructors" (as for

- deadline. You will just have to manually check that your files have been submitted correctly. The best way to avoid this issue is to start early and finish early 😇
  - lf: 1. the files in your fork of the assessment are correct (i.e., the files you intend to submit) when checking on the gitlab website
    - CAPRU IARU ECX
- cultures in human history. Contact ANU | Copyright | Disclaimer | Privacy | Freedom of Information +61 2 6125 5111 | The Australian National University, Canberra

**Acknowledgement of Country** 

Australian

University

**National** 

- TEQSA Provider ID: PRV12002 (Australian University) | CRICOS Provider Code: 00120C | ABN: 52 234 063 906
- The Australian National University acknowledges, celebrates and pays our respects to the Ngunnawal and Ngambri people of the Canberra region and to all First Nations Australians on whose traditional lands we meet and work, and whose cultures are among the oldest continuing