

Dr Edward Powley

Introduction

In this assignment, you are required to design and prototype a novel game controller device. Your prototype should function as an input device, either for the game you developed in COMP130 last semester, or for the game you are developing in COMP150 this semester. Your prototype should use a hardware platform such as *MaKey MaKey*, *Arduino*, *Raspberry Pi* etc, to convert user actions into game inputs.

Computing for Games combines technical and creative skills in equal parts. All of your assignments involve a mixture of the two; in this assignment the emphasis is more on creativity. You will build upon the technical skills you have learned so far, combined with your own creativity and innovation, to produce a unique creative artefact.

This assignment is formed of three parts:

- A. **Design** a novel game controller device.
- B. **Build** a prototype of your game controller. Prepare **at least five** weekly reports (one per sprint), including images and short videos as appropriate, that document your iterative design and prototyping process.
- C. **Integrate** the controller into your game, and prepare a practical demonstration.

Submission Instructions

Part A (Formative)

On Trello, create a task board that defines the high concept and key requirements (in terms of components and user stories) of the controller. Arrange a meeting with your tutor to discuss your task board.

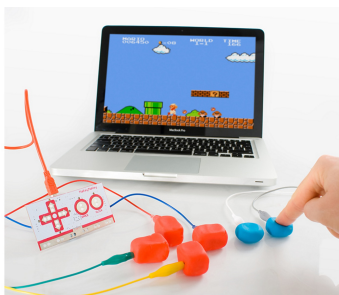
Part A (Summative)

Take screenshots of your Trello task board, and include them in the summative submission of your weekly reports (Part B).

Part B (Formative)

Fork the GitHub project at the following URL:

TODO repository URL



The *MaKey MaKey* allows a multitude of materials to be used to create videogame controllers.

Write your weekly reports in the `readme.md` file. Also use this repository for any other digital assets you create (e.g. source code for firmware or software, illustration files, circuit diagrams etc.), checking them in regularly as you work on the project.

For the reports, images should be embedded directly in the `readme.md` file. Videos should be uploaded to a video sharing site (e.g. YouTube, Vimeo, Vine) and linked from the `readme.md` file.

Part B (Summative)

Compress the contents of your GitHub repository as a zip file, and upload it to the appropriate submission queue on LearningSpace. If you have used images and videos, ensure that they are included in the zip file. Videos should be compressed in `avi` or `mp4` format.

Materials that are not included in the zip file will not be considered for marking. In particular, please remember to add any videos to your zip file before submission, as otherwise they will not be marked.

If you include video material, its **total combined length** must not exceed **three minutes**. Exceeding this limit will be subject to the same penalties as detailed in the course's word count policy, available on LearningSpace. There is **no limit** on words or static images for this assignment.

Part C (Formative)

No formal submission is required. Attend the demo session (date and time to be confirmed in class) with your prototype and an executable of your game, and be prepared to discuss it with your tutors and peers.

Part C (Summative)

TODO physical submission?

*"Alive with new thinking,
buzzing with opportunity,
connected with the best in
the business, Falmouth
University is the perfect place
to start shaping your creative
career. Thousands of people
from around the globe come
to us every year, graduating
to become the brightest stars
in art, design, media,
performance and writing
industries.*

*"(...) Falmouth has forged its
position as one of the most
highly regarded creative arts
institutions across the globe."*

— Falmouth University website

Additional Guidance

Falmouth University is nationally and internationally renowned as an arts institution. Despite the fact that you are studying for a Bachelor of Science degree in a technical discipline, you are still expected to strive for the same level of **innovation and creative flair** as your fellow students in other departments. All assignments on this course involve a mix of technical and creative activities; this assignment is more heavily weighted towards the creative than the assignments you have completed thus far. On this assignment, a competent execution of an unimaginative idea is unlikely to achieve higher than a C grade overall, as opposed to an imperfect execution of a unique and ambitious concept — bear this in mind when working on your design.



Rhythm games such as *Guitar Hero* and *Rock Band* are excellent examples of games which make use of unique input devices to enhance gameplay.

Your **design** should be motivated by user stories. The history of video games is littered with failed peripherals which consumers simply did not want, which were perceived as expensive gimmicks rather than legitimate enhancements to gameplay. For higher marks you should demonstrate **commercial awareness**: your user stories and design should be informed by your research into products that have succeeded and failed in the past, and what unexplored niches exist in the present.

We have given you some of the materials you need: a MaKey MaKey kit, crocodile clip leads and conductive paint. You will need to add your own materials to produce a **functional** physical prototype. A “Blue Peter” style prototype made from household items is fine, as is something made out of modelling clay, construction toys etc. However you should still choose your materials carefully, as overly flimsy construction may lose you marks on the functionality criterion.

You may also wish to connect electronic components such as LEDs, buzzers, photoresistors etc to the MaKey MaKey, or even use a different, more flexible hardware platform such as Arduino. However you are discouraged from spending large sums of money on extra hardware, and doing so is **not required** to achieve a high mark. If you choose to go down this route, it is possible to purchase an Arduino and a selection of electronic components online for around the price of a textbook (£20 – £30).¹

You should aim to demonstrate a high level of **sophistication** in the technical execution of your prototype. An important part of sophistication is having the insight to choose the right tool for the job: if a simpler technique fulfils all the requirements, use it. The use of unnecessarily complicated techniques, serving only to showcase one’s own cleverness, is a dangerous habit for a software developer.

Your **weekly reports** should document the iterations you make on your design and prototyping. The emphasis in this assignment is on creativity and rapid iteration, so do not be afraid to “go back to the drawing board” if a prototyped idea does not work as well as anticipated. However it is important to document (and learn from) your failures, even more so than your successes.

You are strongly encouraged to make use of sketches, diagrams, photographs, screenshots and short videos to document your design and prototyping process. Many indie game developers use such work-in-progress material as an important tool for promotion and community engagement; for example, search Twitter for the hashtag #screenshotsaturday. Videos should ideally be short (5–30 second) demonstrations of functions of your prototype; you may narrate if you wish, but it is not required.

Additional Resources

- Wilkinson, K. and Petrich, M. (2014) The Art of Tinkering: Meet 150 Markers Working at the Intersection of Art, Science & Technology. Weldon Owen: London.
- Alicia Gibb. Building Open Source Hardware: DIY Manufacturing for Hackers and Makers. Addison Wesley, 2014.
- Jeremy Blum. Exploring Arduino: Tools and Techniques for Engineering Wizardry. John Wiley, 2013.
- Kelly, K. (2014) Cool Tools: A Catalogue of Possibilities. Cool Tools.
- Hatch, M. (2013) The Maker Movement Manifesto: Rules for Innovation in the New World of Creators, Hackers, and Tinkerers. McGraw Hill: New York.
- <http://makeymakey.com/howto.php>

“The first 90 percent of the code accounts for the first 90 percent of the development time.

“The remaining 10 percent of the code accounts for the other 90 percent of the development time.”

— Tom Cargill

“Hofstadter’s Law:

“It always takes longer than you expect, even when you take into account Hofstadter’s Law.”

— Douglas Hofstadter



The Dreamcast Fishing Controller, released as a peripheral for the game *Sega Bass Fishing*. Even peripherals which appeal to only a small audience can enjoy moderate commercial success.

TODO more resources?

¹Note that the MaKey MaKey kits provided in class are version 1.2, which, unlike earlier versions, is not based on Arduino. Any tutorials you may find online for reprogramming the MaKey MaKey firmware using the Arduino IDE are unfortunately not applicable to this version.

Marking Rubric

Criterion	Weight	F (0 – 39)	D (40 – 49)	C (50 – 59)	B (60 – 69)	A (70 – 79)	A* (80 – 100)
Design of the solution	15%	User stories are not provided, or the design does not correspond to the user stories.	Few user stories are distinguishable and easily measured. The correspondence between design and user stories is tenuous.	Some user stories are distinguishable and easily measured. The design somewhat corresponds to the user stories.	Most user stories are distinguishable and easily measured. The design corresponds to the user stories. Some commercial awareness is demonstrated.	Nearly all user stories are distinguishable and easily measured. The design clearly corresponds to the user stories. Much commercial awareness is demonstrated.	All user stories are distinguishable and easily measured. The design clearly and comprehensively corresponds to the user stories. Exemplary commercial awareness is demonstrated.
Weekly reports	20%	Fewer than three weekly reports are submitted, and/or the weekly reports are inappropriate.	At least three weekly reports are submitted. The reports document the design and prototyping process in a basic manner. Images and/or videos are not used.	At least four weekly reports are submitted. The reports document the design and prototyping process in a satisfactory manner. Images and/or videos are used.	At least five weekly reports are submitted. The reports document the design and prototyping process in an effective manner. Images and/or videos are used in a satisfactory manner.	At least five weekly reports are submitted. The reports document the design and prototyping process in a very effective manner. Images and videos are used in an effective manner.	At least five weekly reports are submitted. The reports document the design and prototyping process in an exemplary manner. Images and videos are used in a highly effective and compelling manner.
Innovation and creative flair	30%	Demonstrates no evidence of innovation and/or creativity. The brief has not been followed.	Demonstrates evidence of emerging innovation and/or creativity. The solution is purely derivative of existing products.	Demonstrates evidence of progressing innovation and/or creativity. The solution is mostly derivative, with some attempts at innovation.	Demonstrates evidence of partial mastery of innovative and creative practice. The solution is an interesting and somewhat innovative product.	Demonstrates some evidence of mastery of innovative and creative practice. The solution is a novel and innovative product.	Demonstrates much evidence of mastery of innovative and creative practice. The solution is a unique and innovative product.
Functionality of physical prototype	10%	A physical prototype is not produced, or the prototype is completely non-functional.	The physical prototype is barely functional. There are serious technical and/or constructional flaws.	The physical prototype is somewhat functional. There are obvious technical and/or constructional flaws.	The physical prototype is mostly functional. There are minor technical and/or constructional flaws.	The physical prototype is functional. There are superficial technical and/or constructional flaws.	The physical prototype is functional. The technical execution and physical construction are flawless.
Sophistication: Software Electronics Physical construction	20%	The solution lacks even a basic level of sophistication in any of the three areas.	The solution is basic and unsophisticated in all three areas. Little insight has been demonstrated in any area.	The solution is moderately sophisticated in one of the areas, but lacking in the other two. Emerging insight has been demonstrated in at least one of the areas.	The solution is moderately sophisticated in two of the noted areas, but lacking in the third. Much insight has been demonstrated in at least one of the areas.	The solution combines somewhat sophisticated software, electronics and physical construction. Significant insight has been demonstrated in at least two of these areas.	The solution combines highly sophisticated software, electronics and physical construction. Exemplary insight has been demonstrated in all three areas.
Professional practice	5%	GitHub has not been used.	Material has only been checked into GitHub when required for review or submission.	Material has been checked into GitHub at least once per sprint.	Material has been checked into GitHub several times per sprint.	Material has been checked into GitHub several times per sprint. Commit messages are clear, concise and relevant.	Material has been checked into GitHub several times per sprint. Commit messages are clear, concise and relevant. There is evidence of engagement with peers (e.g. voluntary code review).