

HACKING HARDWARE

Version 1.0
BSc Computing for Games
COMP140 & GAME160

Brian McDonald and Alcwyn Parker

Introduction

In this assignment you will work as an individual to develop a game which supports a novel alternative controller. At this stage you will be focusing on the design and the development of the game using object orientated concepts. You will also create a concept for alternative controller which will be used with the game.

Experimentation, ingenuity, and creativity are at the heart of everything that professional game developers do. To this end, building your own custom game controller is the perfect place to exercise these characteristics. However, you will also gain invaluable exposure to working with computer hardware. In recent years, there has been considerable growth in the development of new fabrication technologies, such as 3D printers. In addition, electronics, from primitive transistors to complex computer chips, have all become much cheaper. Accessibility to these tools has, therefore, unveiled an unprecedented opportunity to invent and innovate in this space. Increasingly, app developers are augmenting mobile software with new wearable devices, and so will game developers with the advent and increasing popularity of augmented reality games.

Hacker definition: "A person who enjoys exploring the details of programmable systems and stretching their capabilities, as opposed to most users, who prefer to learn only the minimum necessary."

— Jargon File

This assignment is formed of several parts:

- (A) **Write**, a proposal for a game that uses an alternative controller which contains:
 - i. **describe** the game
 - ii. **describe** the core game mechanics
- (B) **Write** a proposal for an alternative controller which contains:
 - i. **research** into existing alt-Controllers
 - ii. **description** of the physical controller
 - iii. **design** of physical controller
- (C) Practical **demonstration** of the game, this should
 - i. **demonstrate** your understanding of Object Orientated concepts
 - ii. **reflection** of your performance to date
 - iii. **description** of tasks to completed
 - iv. revised **design** of physical controller

Assignment Setup

Fork the GitHub repository at:

<https://github.com/Falmouth-Games-Academy/comp140-game160-game>

Use the existing directory structure and, as required, extend this structure with sub-directories. Ensure that you maintain the `readme.md` file.

Modify the `.gitignore` to the defaults for **Unity** or **Unreal**. Please, also ensure that you add editor-specific files and folders to `.gitignore`.



Arduino is an open-source prototyping platform based on easy-to-use hardware and software.

Part A

Part A consists of a **single formative submission**. This work will be assessed on a **threshold** basis. The following criteria are used to determine a pass or fail:

- (a) Submission is timely;
- (b) Choice of game is feasible;
- (c) Design is distinctive and has creative merit.

To complete part A, write your proposal in the `readme.md` document. This should use the **markdown** syntax, for additional guidance, please read the following

<https://github.com/adam-p/markdown-here/wiki/Markdown-Cheatsheet>

Show this to your tutor in-class. If acceptable, this will be signed-off.

Part B

Part B is formed of **single formative submissions**. This will be assessed on a **threshold** basis. The following criteria are used to determine a pass or fail:

- (a) Submission is timely;
- (b) Research activities are exhaustive which are well referenced
- (c) Description of the controller
- (d) Design is distinctive and has creative merit.

To complete Part B, write your proposal in the `readme.md` document using markdown syntax.

You will receive **informal feedback** from your **tutor**.

Part C

To complete Part C, implement your prototype game utilising a fast, iterative development process. Prepare a practical demonstration of the game. Ensure that the source code and related assets are pushed to GitHub and a pull request is made prior to the scheduled viva session. Then, attend the scheduled viva session.

You will receive **immediate informal** feedback from your **tutor**.

Additional Guidance

Falmouth University is internationally renowned for the arts. Despite the fact that you are studying for a BSc degree in a technical discipline, you are still expected to strive for the same level of innovation and creative flair as your peers. 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 a high grade, as opposed to an imperfect execution of a unique and ambitious concept, which will be seen favourably by examiners. Consider this when working on your design. One approach to promote creativity is divergent thinking: generate ideas by exploring many possible solutions. Often the most interesting ideas are subversive: they deliberately go against the accepted or most obvious solution.

The history of video games is littered with failed peripherals. They were perceived as expensive gimmicks rather than legitimate enhancements to game-play. Your creativity should be balanced by commercial awareness: your design should be informed by research into products that have succeeded and failed in the past, and what underexploited niches exist in the present. A great project will be highly divergent, but one that has clear commercial

viability. Do not be discouraged if you fall short: professionals find it difficult!

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.

The sole purpose of the recorded demonstration is to aid the external moderators and examiners. Furthermore, any photos and/or videos submitted do not need to be entertaining or highly polished.

FAQ

- **What is the deadline for this assignment?**

Falmouth University policy states that deadlines must only be specified on the MyFalmouth system.

- **What should I do to seek help?**

You can email your tutor for informal clarifications. For informal feedback, make a pull request on GitHub.

- **Is this a mistake?**

If you have discovered an issue with the brief itself, the source files are available at:

<https://github.com/Falmouth-Games-Academy/bsc-assignment-briefs>.
Please raise an issue and comment accordingly.

Additional Resources

- Dawson, M. (2014) Beginning C++ Through Game Programming. CENGAGE Learning Custom Publishing
- 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.
- <https://twitter.com/SakeThatButton>
- http://www.gamasutra.com/view/news/288079/Heres_the_lineup_of_games_playable_at_GDC_2017s_AltCtrlGDC_showcase.php

Marking Rubric

Criterion	Weight	Refer for Resubmission	Basic Competency	Basic Proficiency	Novice Competency	Novice Proficiency	Professional Competency
Basic Competency Threshold	40%	At least one part is missing or is unsatisfactory. There is little or no evidence of an iterative development process and no improvement over time in regards to the quality of the design and build of the game.	Submission is timely. Enough work is available to hold a meaningful discussion. Clear evidence of a 'reasonable' iterative development process Clear evidence of programming knowledge and communication skills. Clear evidence of reflection on own performance. No breaches of academic integrity.				
Design of the solution	15%	No evidence of design.	Some evidence of design.	Little evidence of design.	Much evidence of design.	Considerable evidence of design.	Significant evidence of design.
Commercial awareness	10%	No commercial awareness is demonstrated.	Some commercial awareness is demonstrated. There is no evidence of market research.	Little commercial awareness is demonstrated. Market research is present, but with significant gaps.	Much commercial awareness is demonstrated. Market research is extensive, but with some gaps.	Considerable commercial awareness is demonstrated. Market research is comprehensive.	Significant commercial awareness is demonstrated. Market research is comprehensive and insightful.
Innovation and creative flair	5%	No evidence of innovation and/or creativity.	Some evidence of emerging innovation and/or creativity. The solution is purely derivative of existing products. There is no evidence of divergent thinking.	Little evidence of emerging innovation and/or creativity. The solution is mostly derivative, with some attempts at innovation. There is evidence of an attempt at divergent thinking.	Much evidence of emerging innovation and/or creativity. The solution is an interesting and somewhat innovative product. There is some evidence of divergent thinking.	Considerable evidence of mastery of innovative and creative practice. The solution is a novel and innovative product. There is much evidence of divergent thinking.	Significant evidence of mastery of innovative and creative practice. The solution is a unique and innovative product. There is significant evidence of divergent thinking.
Functionality of game prototype	15%	A game is not produced, or the prototype is completely non-functional.	The game has no functionality. There are serious technical flaws.	The game has some functionality. There are obvious technical flaws.	The game has much functionality. There are minor technical flaws.	The game has considerable functionality. There are superficial technical flaws.	The game has significant functionality. The technical execution is flawless.
Sophistication: Game Design Controller Design Object Orientated Concepts	10%	The solution lacks even a basic level of sophistication in any of the three areas.	The solution evidences some sophistication in one or more of the three areas. Some insight has been demonstrated in any area.	The solution evidences little sophistication in one or more of the three areas. Little insight has been demonstrated in at least one of the areas.	The solution evidences much sophistication in two or more of the three areas. Much insight has been demonstrated in at least one of the areas.	The solution evidences considerable sophistication in all three areas. Considerable insight has been demonstrated in at least two of these areas.	The solution evidences significant sophistication in all three areas.. Significant insight has been demonstrated in all three areas.
Use of Version Control	5%	GitHub has not been used.	Source code has rarely been checked into GitHub.	Source code has been checked into GitHub at least once per week. Commit messages are present.	Source code has been checked into GitHub several times per week. Commit messages are clear, concise and relevant..	Source code has been checked into GitHub several times per week. Commit messages are clear, concise and relevant.	Source code has been checked into GitHub several times per week. Commit messages are clear, concise and relevant.