

Games Development Project

Proposal

**Name:** Alex Wood

Enrolled Course: Computer Gameplay Design and Production BSc (Hons)

Student Number: 22013321

**Beyond Buttons; Rethinking Control**

Contents

[What Problem are you trying to solve? 3](#_Toc179568593)

[How does this Project help your employability? 3](#_Toc179568594)

[Embedded Systems Engineer / Designer 3](#_Toc179568595)

[Game Technician 4](#_Toc179568596)

[Areas for Research, Investigation and Methodology: 4](#_Toc179568597)

[Different Input & Outputs 4](#_Toc179568598)

[Data Management Theory 5](#_Toc179568599)

[CPP 5](#_Toc179568600)

[Unreal Engine 6](#_Toc179568601)

[What are the deliverables? 6](#_Toc179568602)

[General Deliverables 6](#_Toc179568603)

[Current Game Ideas 7](#_Toc179568604)

[NFC based storage system: 7](#_Toc179568605)

[Ultrasonic based Flappy Bird: 7](#_Toc179568606)

[Receipt Printer text output: 7](#_Toc179568607)

[Planning Documentation 7](#_Toc179568608)

[Gantt Chart 7](#_Toc179568609)

[Plugins Required 7](#_Toc179568610)

[Sample of work you have completed to this date (relevant to project): 8](#_Toc179568611)

[Experimental Games Production 8](#_Toc179568612)

[Summer Project 8](#_Toc179568613)

[My Own Games 8](#_Toc179568614)

# What Problem are you trying to solve?

The goal of this project is to create a series of technical demos showcasing different input and output methods; Testing their feasibility in game development with the possibility of expanding the ways a player can interact with the game and hopefully how the game interacts with the player.

This involves creating various architectures and frameworks that interface with peripheral devices that I create, which have uncommon or new methods of input and output not traditionally used.

The problem this project aims to solve is that in game development today, developers are constrained to keyboard and mouse, or gamepad traditionally, however whilst efficient as it can be used for a wide variety of applications, this does not create an immersive experience for the user and can be limiting to the things a developer can do when creating a game.

# How does this Project help your employability?

This project has a wide variety of skillsets required for its completion, I aim to create a series of small technical demonstrations which will showcase the peripheral devices I am also creating; this requires not only game development skills involving high level & efficient programming and comprehensive design skills but also electrical skills, as the controllers I will be developing will use raw components in order to create unique experiences.

As such this project gives me that wide area of employability in the following areas:

## Embedded Systems Engineer / Designer

Embedded Systems Engineers develop both the hardware and software for various applications, below are some examples.

[Electronics Design Engineer @ Mutech LTD](https://uk.indeed.com/viewjob?jk=29ce437dfac4e003&q=embedded+software+engineer&l=manchester&tk=1i9rq3v7mkdqr81v&from=web&advn=7151361908327877&adid=437250399&ad=-6NYlbfkN0A-uZIiS0lI1ozxSli3Rpduaks-UWWdAf7ZtovYrP48lxdphJDuy3OD3gs3RSJjpUXHVPlx5CHe41W4LLwZy3lOtS3tx2LYixNB8DhB5XXk3vaMdNnQcRADWQprEFFldq1Nv31DaUyto8mK583dMEIproFVzfh8tBwOydR6hQKOgBFRQoZxkthRWc6Kr0ZizhXxO32MxC2okBKzQQKg4fghASiBDfiGYMEXEMEjD1aUU0wVJ4ynTTPMZAs076z55NNqIIMHkhiTcT5rHDm97YZRMPXVZFwEdSu2ui1BUuDHCjxQDh4sVUBUQTcap978_emIUhMksWL65c3R5fzksKL8v-jcWHg4HIneYGogcwHpJHbNhAKRhtsUUnM9pQHOOxQeK-V4CcWt_owprRIGNxHNWACk7-TXszaHW5wOMjZb-tHoYj0H9tk5tK1DvVUuXq-NJTYr25CFu5Klj0P6kWktukcxlZ_7AyEuBHx0gxuQiPnU_xaPtTRWh3_ibiwvVglu2FX201EslSdYAmUibMF-&pub=4a1b367933fd867b19b072952f68dceb&camk=nUmJqO2E8rjoxSA3QM5t3A%3D%3D&xkcb=SoAC6_M3778AMMQkhZ0LbzkdCdPP&xpse=SoAJ6_I3779EJm3XpZ0IbzkdCdPP&xfps=90c15238-ca1f-40e6-a88e-6e547c5d70b3&vjs=3)

* Some software: mostly embedded C or C++. some PC support applications in C#
* Hardware development of electronic industrial equipment including microprocessors, analogue processing, power supplies, RF etc.
* Writing and working with detailed technical documentation

This career path would be something available following this project as it has a lot to do with creating hardware and accompanying software to go with it.

[Games Console/Controller Engineer @ Tech Centre](https://uk.indeed.com/viewjob?jk=3db8bf72f2f13e32)

* Work as part of a team to identify and repair fault(s)/damage on Sony PlayStation, Microsoft Xbox and Nintendo controllers.
* Experience (professional or informal) in repairing consumer electronics is desirable.

This career path would involve figuring out the construction of consoles and controllers, and then repairing them, a career path that would benefit from this project as that is precisely what I’m doing.

Game Technician

A game technician would create all manner of systems regarding frameworks, all of which would have to be orientated towards a videogame and player experience.

[Principal Gameplay Programmer @ Behaviour Interactive](https://uk.indeed.com/viewjob?jk=d25d6360b7cc0697&tk=1i9ucbg17ghhm83r)

* Write clear, maintainable and well-documented code.
* Debug and optimize your code at a low and high levels to ensure optimal performance and quality.
* Assess and communicate around the possible impacts of a change in the code.

This career path would benefit as this is programming but orientated towards game development environments with a focus on more frameworks and foundations.

[Senior Gameplay Programmer @ BULKHEAD](https://uk.indeed.com/viewjob?jk=a13dec4e46479c8b)

* Write extensible, stable, efficient code.
* Design, architect and implement complex gameplay systems that are extensible, scalable and intuitive for non-programmers to use.
* A methodical mind and the ability to think outside the box.

This career path would be suitable as it is to do with creating frameworks that are easy to use for non-designers, and as I am creating systems where the aim is for them to be commonplace, creating those systems using simple architectures would be helpful.

# Areas for Research, Investigation and Methodology:

## Different Input & Outputs

The main idea of the project is to research different ways to interact with the player, this will involve doing research into the different devices available, that can be fitted onto an Arduino and interfaced with the game, this will then form the primary interaction method and thus be the thing I’m researching.

The key areas I want to cover during the project are input methods that stray away from buttons, so inputs like sonar, thermal, light, sound, NFC for example. I would also like to cover different output methods away from the traditional screen, so this could include small LED displays, printers, motors, 7 segment displays & speakers, this list is not exhaustive as the project goal is to determine which is available, is fun and works.

My plan for research in this area mainly involves looking for different circuitry components, through places like YouTube, AliExpress & talking to people in electronics, and once I have found a few components that look interesting and I feel would be a good fit for the project,

Next is figuring out how best to get it to interface with the Arduino, this will be done through searching for libraries, datasheets and similar projects using the same components.

This expands on my current level of research by increasing my knowledge of different components and the data processing required to get them interacting with not only the Arduino but also the game engine itself.

A few places I will use for that research are as follows:

[Arduino.cc](https://arduino.cc/)

[YouTube @ 8BitGuy](https://www.youtube.com/@The8BitGuy)

[Reddit @ /r/Arduino](https://www.reddit.com/r/Arduino)

## **Data Management Theory**

On the project I would like my devices made to be as efficient and as fast as possible, since Arduinos are small cheap devices, they do not carry much processing power, so learning how to be efficient with my code is ideal, compacting data into readable yet small packages to be sent over to the computer

This will also include learning how existing peripheral systems use their data and send it to their master device.

The research in this key area will be conducted by consulting computer science documentation, looking at similar projects code and using programming theory.

This expands on my current level of research by expanding my knowledge of data processing and storage techniques whilst also learning efficient programming techniques.

A few places that are ideal for this kind of thing are:  
<https://www.reddit.com/r/programming>

[YouTube @ Fireship](https://www.youtube.com/@Fireship)

## CPP

On the project, the Arduino I’m using will be programmed using C++, I have some experience with both C++ and Arduino libraries however there is still much to learn, and since I will be doing a lot of data manipulation using the devices and interesting storage techniques j expect to use more complex C++ skills than what I have used previously.

This key area of research is imperative to the project as the systems involved will use the Arduino as a central hub.

This expands on my current level of research as my main prior experience with C++ is involved in rendering and simple in and out data.

Some useful resources for C++ and C++ theory are:

[Arduino.cc](https://www.arduino.cc)

[CPP Reference](https://www.cppreference.com)

## Unreal Engine

Using new input types will fundamentally change how I design and make games, as such I will have to adapt to new control systems, as well as learning how to send data from unreal engine that is compact and easy to interpret.

Since this project is about creating the peripherals and the process involved research surrounding that will be consistent throughout the project. The aim is to get a few prototypes out however since development has not started yet, it is hard to say how long each prototype will take, as such time allocation for any specific topic would not be suited to this project.

Some useful places to look for documentation are:

[Unreal Engine Documentation](https://dev.epicgames.com/documentation/)

# **What are the deliverables?**

## General Deliverables

At the end of the project I will have a few experimental peripherals, of which will all have accompanying tech demos / games to showcase their feasibility in the games industry. Along with this I will have abundant testing and feedback to understand which peripherals worked and which didn’t, and why too.

For input devices I would like one main input system per prototype, with that input system being not seen in controllers today.

For output devices I would like for them to add to the game without being distracting, increasing immersion and game feel without removing from the game itself.

And for all peripherals I make, I would like them to be hot-swappable, so they can be plugged into any game and function, this will be done using a keyboard / mouse interface.

These objectives outline the core idea of the project and aim to solve the problem set out in the brief, to expand the realms of possibility with how to interact with a game and how the game interacts with the player.

I am also going to be creating documentation along with the peripherals I create, this will include their datasheets, the wiring diagrams and also their feasibility testing graphs in the game development environment.

## Current Game Ideas

Some examples of peripherals that I would like to create are:

### NFC based storage system:

An NFC reader system where different NFC cards store different commands; this could be used for a card game that bridges real cards with a digital game.

### Ultrasonic based Flappy Bird:

This would involve creating a controller where a sensor detects how far it is from the table, or whatever object it is calibrated to, and then a simple game where the player must move an object precisely through gaps using said controller.

### Receipt Printer text output:

The game would send information to the Arduino to print out receipt tickets with text relevant to the game on them, current ideas include getting some kind of large language model chat response system to make it feel like the computer is alive, or having some game where you are being fed secret instructions by a spy network to solve a puzzle.

# **Planning Documentation**

Since this project revolves around rapidly creating prototypes of peripherals, planning documentation will be created prior to the peripherals themselves.

## Gantt Chart

[Gantt Chart.xlsx](https://staffsuniversity-my.sharepoint.com/:x:/g/personal/w013321m_student_staffs_ac_uk/EbkKLJjjuWtJgzCNAYYpVHMB3g9R-UhCTh9WV9RQeTTjcQ)



## Plugins Required

* [RAW Input](https://dev.epicgames.com/documentation/en-us/unreal-engine/rawinput-plugin-in-unreal-engine)
  + This lets me take raw controller encoded input, and interface it with Unreal Engine, so for anything that is interpreted as a games controller this will make that process a lot simpler.
* [SerialCOM](https://github.com/videofeedback/Unreal_Engine_SerialCOM_Plugin)
  + This lets me send serial communication to Unreal Engine via USB port, this is essential for running the Arduino and getting it to talk to the computer.
* [ExtraWinFunc](https://www.unrealengine.com/marketplace/en-US/product/extra-win-function)
  + This plugin will expose windows functions that will be useful for creating experimental games such as changing the system volumes, setting default output devices, and creating files.

# Sample of work you have completed to this date (relevant to project):

## Experimental Games Production

During the Experimental Games Production last year I was introduced to Arduinos, during the module I developed a controller which used a variety of different input methods to operate a kitchen, this included ultrasonic ranging, a binary based button input system and an LCD screen, I used a rough way of getting it to communicate but it worked and was a success

[Digital Academy Forum](https://digitalacademy.staffs.ac.uk/forum/index.php?/topic/63704-wood-alex-w013321/)

## Summer Project

During the summer I wanted to expand my abilities with Arduinos and input devices, as such I purchased a broken Philips CD-I Roller Controller, the cable was mangled and it didn’t work, so I took it apart and with some help managed to map the circuit board inside, this was then interfaced with and Arduino to turn it into a mouse that can be plugged directly into a computer and used, with no extra coding or modification.

This project worked so well it was promoted on one of the universities social medias.

[CD-I Controller GitHub Project](https://github.com/Astarrix/CDI-Controller)

[Staffs Uni Instagram](https://www.instagram.com/smarttech_staffsuni/p/C_lIMCnNSKR/)

My Own Games

Whilst being at university I have developed numerous games which have expanded my abilities with both design and unreal engine techniques, these games have varied in genre and skill level, giving me a good all-around ability with designing and making different games and which I feel will benefit this project as right now the project doesn’t have any specific components decided, as such the complimenting tech demo / game can’t be decided yet.

<https://astarrix.itch.io>

[Digital Academy Forum](https://digitalacademy.staffs.ac.uk/forum/index.php?/profile/7278-alex-wood/)

I believe these projects have given me a reasonable background in what this project aims to accomplish, and as such this project is within scope and feasible.