**GNG2101 Deliverable B**

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# Abstract

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# Introduction

In this document, we discuss the need statements, benchmarking, the metrics of the product and target specification. After meeting the client we were able to gather the customers statements, and sort them into a list of prioritized need statements. Need statements are more specific and positive restatements of the client’s statements. The metrics table below gives us measurable values to ensure the product meets the clients needs. These metrics can then be used in the benchmarking process where we compare competitive products to evaluate qualities in each type of existing controller, and determine which qualities are favoured. This list of metrics is also used to define a list of target specifications, which outlines the target value for each metric listed, as well as a marginal value to help account for trade-offs that may need to be made in order to reach targets for higher priority metrics.

# Main Subject Body of the Report

## List of client statements and observations obtained from client interviews.

This interview was conducted by a video call with Marc-André’s wife, Ms. Sauve. The next client meet will likely be in person with Marc-André also present.

* Marc-André is currently 44 years old, married, and has a daughter who is 11 year old.
  + Marc-André has been gaming for about 12-13 years.
  + His daughter has also got into video games, so a controller that can keep up with a normal controller in multiplayer games is also something to consider.
* Marc-André has had two major strokes which left him with only proper movement on the left arm and left leg. He has little movement on his right leg, and no movement on the right arm.
* His favourite games are the Final Fantasy series games, Division 2, Destiny and Destiny 2.
  + For The Division 2, Destiny and Destiny 2 are fast-paced, input-heavy shooter games whereas the Final Fantasy series games are an RPG which aren’t as input heavy.
  + It is important to consider the controls which involves shooting and camera movement, which focuses on using the right hand.
* Marc-André’s preferred platform is the Playstation 4, however, he sometimes plays games on the PC.
* He has tried or considered trying multiple other models of controllers such as the Grifta controller, the Xbox One Assistive controller, and the attempt on the project from last year.
  + **Grifta Controller** - He liked the handheld aspect of this controller as opposed to the standing controller, however the second button below the trigger kept getting accidentally triggered because it is so close to the other button. Also, the Grifta controller only has one joystick.
    - Grifta controller works with Xim Apex adapter.
    - The client has the Grifta controller and is willing to let us use it use it as a baseline to adapt.
  + **Xbox One Assistive Controller** – He had not tried this controller because it was very component heavy, and switches are complicated to deal with for cross compatibility.
  + **Last Year’s Attempt** – He liked the feel and concept of the controller, it was a comfortable size and shape for him, but he was not able to test playing with it since the group did not have a functioning prototype and left before they were given the chance.
  + The other types of controllers were too expensive for them.
* Marc is open to creativity in shape, type and playstyle for his controller and is not attached to any typical forms of controllers. Innovation is encouraged, and email clients about ideas to see what kind of direction they like.
  + He has to be able to either hold it easily in his hand or have it supported on either a small table, his lap or the armrest of his chair.
    - His chair is a Lazyboy Lift Chair recliner.
    - The movement in his left hand is strong, so a standing controller design would need either some form of counterweight or strap/tether to prevent him from moving the entire controller when trying to move his character.
* They are open to going over the budget for the controller, if it benefits both parties.

## Need statements

|  |  |  |
| --- | --- | --- |
| # | Need Statement | Importance |
| 1 | The controller has 2 joysticks or similar | 5 |
| 2 | The controller is PS4 compatible | 4 |
| 3 | The controller has as many inputs as a PS4 controller | 4 |
| 4 | The controller is affordable | 3 |
| 5 | The controller is portable | 2 |
| 6 | The controller is compatible with APEX XIM | 3 |
| 7 | The controller is comfortable | 3 |
| 8 | The controller performs at the same level as a typical controller | 4 |
| 9 | The controller can be used without the use of the right side | 5 |
| 10 | The controller is simple | 2 |
| 11 | The controller is wireless | 1 |
| 12 | The controller responds quickly to inputs | 5 |

Table 1. Need statements

## Problem Statement

Design a controller for a PS4 that functions as well as a mainstream two-handed controller without the use of the right hand for Marc-André, a father who has had two strokes in the past 3 years.

## Competitive or Related Products



Fig 1. Grifta controller

The Grifta is a modular gamepad system. The controller provides a left unit, a right unit, and a connector module. When combined, it creates an advanced gamepad for maximum performance. It has a soft silicon rubber hand grips, and will have a size that will provide a proper fit for the hand. The features such as triggers, buttons, joystick, and D-Pad are placed to suit the ergonomics of the human hand. Other features include customizable grip, bumper button, and mechanical switch D-Pad.



Fig 2. Xbox Adaptive Controller

Designed for Windows PC and Xbox One, this controller targets the gamers with limited mobility, it is a way to make gaming more accessible. The Xbox Adaptive controller has connect external devices such as switches, buttons, mounts, and joysticks to create a custom controller, and with assistive devices such as button, thumbstick, and trigger inputs.

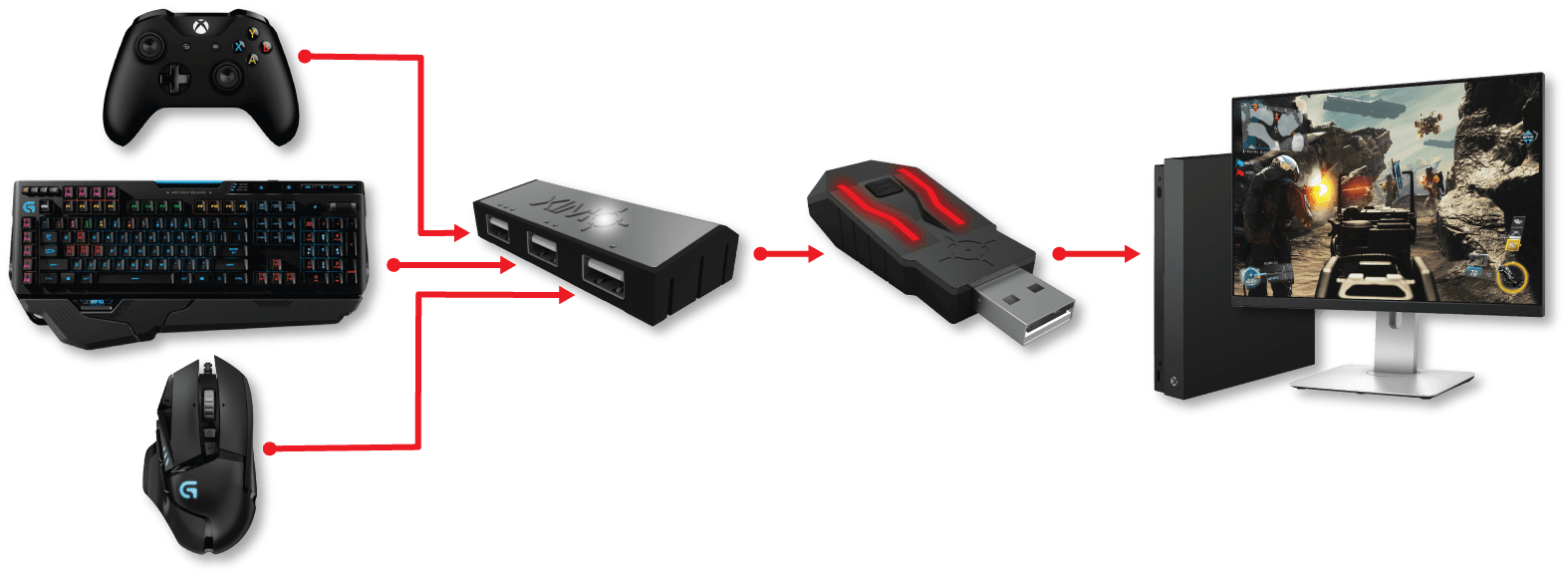


Fig 3. Xim Apex

The Xim Apex is an adapter for a PC, PS4, PS3, Xbox 360 or Xbox One that allows controllers for one console to be used with another. It’s a wireless USB plug-in that allows controllers such as even the Grifta controller to play games that the client likes to play.



Fig 4. Game Controller developed by a previous team

Last year’s group created joystick type controller for one hand. Marc-Andre stated that he enjoyed the feel and concept of the controller, and it provided a comfortable size and shape. However, he did not get the chance to test the prototype because the prototype was not fully functional.



Fig 5. Wii Remote

The Wii Remote or Wiimote is a controller designed for one-handed use. It supports a motion sensing capabilities using an accelerometer and optical sensor. This allows the gesture controls as well as pointing. The motion detected from pointing the wii remote at the motion sensor placed near the screen, and motion inputted on the directional pad allow for an easy delineation between character movement and camera movement from games that require both to act independently.

## List of metrics

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| # | Need | Metric | Units | Importance |
| 1 | 1 | Number of Joysticks or Similar Inputs | List | 5 |
| 2 | 3,8 | Number of Buttons | List | 5 |
| 3 | 5 | Weight | Grams (g) | 2 |
| 4 | 12 | Input Lag | Milliseconds (ms) | 5 |
| 5 | 11 | Wireless | Binary | 1 |
| 6 | 4 | Total Cost | Canadian Dollar (CAD) | 3 |
| 7 | 2,6 | Compatible with XIM APEX | Binary | 3 |
| 8 | 7 | Comfort level | Subjective (x/5) | 3 |
| 9 | 9 | One-handed Use | Binary | 5 |
| 10 | 2,8 | Comparable to PS4 Controller | Subjective (x/5) | 1 |
| 11 | 8 | Has rumbling controller feedback | Binary | 4 |

Table 2. List of metrics with importance

## Benchmarking

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | Need # | Metric | Units | Imp. | Grifta | Xbox | Wii Remote | Last Year’s |
| 1 | 1 | Number of Joysticks | list | 5 | 1 | 2 | 0 | 2 |
| 2 | 3,8 | Number of Buttons | list | 5 | 9 | 5 | 8 | N/A |
| 3 | 5 | Weight | g | 2 | 150 | 552 | 89.6 | N/A |
| 4 | 12 | Input Lag | ms | 5 | N/A | 17.4 | N/A | N/A |
| 5 | 11 | Wireless | bin. | 1 | Yes | No | Yes | No |
| 6 | 4 | Total Cost | CAD | 3 | 30 | 130 | 15-20 | > 100 |
| 7 | 2,6 | Compatible with APEX XIM | bin. | 3 | Yes | Yes | No | N/A |
| 8 | 7 | Comfort level | subj. | 3 | 5 | 3 | 3 | 5 |
| 9 | 9 | One-handed Use | bin. | 5 | Yes | Yes | Yes | Yes |
| 10 | 2,8 | Comparable to PS4 Controller | subj. | 2 | 4 | 1 | 2 | N/A |
| 11 | 8 | Has rumbling controller feedback | bin. | 4 | Yes | No | Yes | No |

Table 3. Benchmarking

## Target specifications

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| # | Metric | Unit | Target specification | Marginal Values |
| 1 | Number of Joysticks | List | 2 | 1 |
| 2 | Number of Buttons | List | 12 | 8 |
| 3 | Weight | Grams (g) | 200 | 500 |
| 4 | Input Lag | Milliseconds (ms) | <20 | <100 |
| 5 | Is wireless | Binary | Yes | No |
| 6 | Total Cost | Canadian Dollar (CAD) | < 100 | <200 |
| 7 | Compatible with APEX XIM | Binary | Yes | No |
| 8 | Comfort level | Subjective(x/5) | 5 | 3 |
| 9 | One-handed Use | Binary | Yes | Yes |
| 10 | Comparable to PS4 Controller | Subjective(x/5) | 5/5 | 4/5 |
| 11 | Has rumbling controller feedback | Binary | Yes | No |

Table 4. List of metrics with target specification

## Impact of the client meeting

The client meeting provided insight on the client’s limitations in his movements, as well as information about what kind of games he likes to play, what platforms he likes to play on, and how his strokes have impared his ability to play these games. Using the knowledge gained from the interview, we now also know what other controllers he has tried in the past and what he liked or disliked about each controller, which we can use to design an all-around quality controller which meets his particular needs.

# Conclusions and Recommendations for Future Work

After talking to the client and gathering more information about what should be included in a controller to better suit his needs and wants, we were able to benchmark similar products that are on the market. These products include both controllers that he has tried in the past, as well as controllers that he hasn’t tried, along with descriptions of what he likes and dislikes about each controller.

We know what the client is looking for, as the major concerns for him are things such as the ability to move the camera and character in a game independent from one another which is normally done with two joysticks, however this may be done with other techniques. The Wii Remote solves this issue with a D-pad as well as motion tracking in order to independently move as two joysticks would; possibly providing one solution to the problem. Similarly, a computer mouse is a simple one-handed controller that also uses motion tracking by moving the mouse around on a flat surface. Other simpler avenues leading to a solution could include having two joysticks near one another that can both be easily accessed and used separately.

Another concern about the controller is its compatibility with other consoles - namely the PS4 and a PC. This can be done simply with a wired USB input, but to provide an alternative and more favourable wireless design, we can ensure that the product is either compatible with the PS4, PC or the XIM APEX. Compatibility with the APEX XIM would be the best outcome since it alone adapts controls between both the PS4 and the PC already, as well as with other consoles.

Having a properly developed list of target specifications as well as a knowledge of qualities of other competitive controllers will allow us to come up with a conceptual design that is comfortable and fully functional, and is competitively viable among other controllers.

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# Bibliography

*“Controller Lag”* Rocket Science. “XLSX.” 7 July 2018.

*https://onedrive.live.com/view.aspx?resid=F0182A0BAEBB5DFF!15335&ithint=file%2cxlsx&authkey=!ACpxr1WBk51xW78*

*Grifta - Morphing Gamepad. (2017, April 9). Retrieved from*

*https://www.kickstarter.com/projects/1384390939/grifta-morphing-gamepad*

*Microsoft Corp. (n.d.). Xbox Adaptive Controller: Xbox. Retrieved January 18, 2020, from*

*https://www.xbox.com/en-CA/xbox-one/accessories/controllers/xbox-adaptive-controller*

*XIM APEX. (n.d.). Retrieved January 19, 2020, from https://xim.tech/*