ECE 492

Design Proposal

Virtual Reality Program to Help Mason LIFE Students Improve Social Skills and Situational Awareness

Team Members:

Coralia Aguirre-Cruz
Marcela Angulo
Mara Barkley
Gerald Evans
Caitlin Fitzsimmons
Melanie Vu

Date of Submission: 10/04/2018
Faculty Supervisor: Dr. Nathalia Peixoto

Contents

Executive Summary

People who have intellectual and developmental disabilities (IDD) face many more challenges in their lives each day than those without these disabilities. Students face many challenges, such as educational challenges and employment challenges, [1] because they struggle with learning social skills and situational awareness. Tasks and interactions that people without disabilities may not even blink an eye at could potentially cause people with IDD to derail their entire days and need more assistance than usual. Specifically, when students with IDD are faced with an unfamiliar situation, they may not know how to react, creating stress for them and possibly eliciting a negative reaction. Our project involves creating a Virtual Reality (VR) game which places students in a stressful real-life scenario and allows them to practice their decision-making skills. The VR environment creates a safe space in which students can develop their social skills and increase their situational awareness, so they can train themselves to be more comfortable with problems they face in the real world. The VR environment will be created with an HTC Vive headset that the student will wear while being seated in a swivel chair. The student will always be stationary in order to prevent injury. The game itself will be created with Unity and 360° camera footage in order to make the game as immersive as possible. Each event in the scenario will have multiple choices that the student can make by using a joystick specifically created to be accessible for individuals with IDD. Within each scenario, the student uses a joystick designed for individuals with IDD to select from multiple options. Depending on the choices the student makes, it will influence the next scenario shown. This path will continue until they experience an entire module. This will allow the student will either be able to accomplish the task and make decisions that would result in a positive outcome, or result in a non-ideal result, but because they are in a safe environment, there will be no real consequence. The program will also inform the monitoring teacher of the progress the students make, allowing for the them to either assist the students or be able to see a positive growth in them. Our long-term goal is to create a game so useful that the students with IDD will not even need it one day because they will understand, through experience, how to make appropriate choices in daily experiences. Our short-term goal is to get positive feedback from both Mason LIFE students and faculty about the usability and usefulness of our program.

Problem Statement

Motivation:

At George Mason University, Mason LIFE, is dedicated to the success of students with intellectual and developmental disabilities in the professional world [2]. Mason LIFE's academic program coordinator, Dr. Heidi Graff, provided our group with multiple areas of interest to improve the students' classroom and housing experience, but expressed particular interest in helping students practice social skills and situational awareness. Based on Dr. Graff's input, some of the areas in which students need help are resiliency (the ability for students to cope with unexpected problems), communication, and social skills. For example, some Mason LIFE students struggle with distinguishing emotions or reactions that others may have to their actions. In regard to resiliency, some students have difficulty responding to unexpected situations appropriately. Even encountering a problem as trivial as a door being locked can deeply upset some students. Each individual reacts differently; however, Mason LIFE staff have noticed that most their students react poorly to such stressful situations. Seeing that there is no specific class or program for Mason LIFE students to be exposed to such situations, the purpose of our project is to help Mason LIFE students practice social skills in a controlled VR app in a lab environment, which will allow the evaluation of the students' learning progress.

Identification of Need

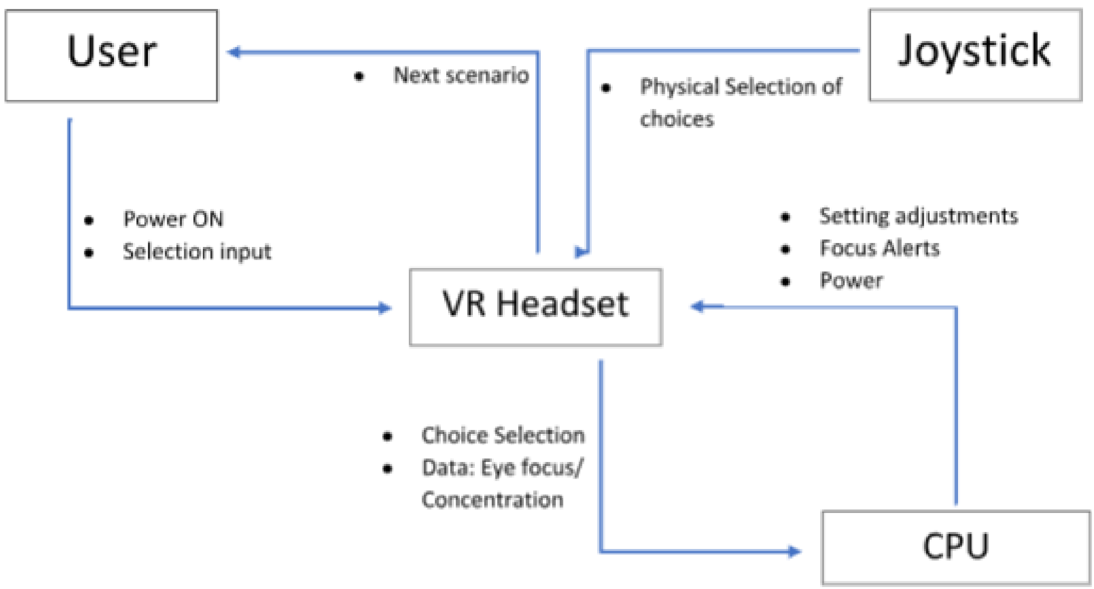
Dr. Graff indicated Mason LIFE needs a device that will help their students learn better decision-making skills. This will help the students with some life and social situations that they might encounter while being students at Mason, in a job setting or even at home. Dr. Graff expressed an interest in this device being used in a lab setting in order to monitor students utilizing it. A lab setting is a safe, controlled environment appropriate for students practicing skills. Another benefit of students being in a controlled environment is privacy: if they react poorly to a situation, they will not have to face stigma from people around them. Also, it will make the students more comfortable to be themselves and be open minded about trying the VR headset system.

Market/Application Review

As mentioned above, students with intellectual disabilities are easily overwhelmed. Based on this fact, there are certain limitations to our design. Some points to focus on based on our audience's limitations are: audio cues, minimum stimulation, and resiliency. For example, some students have the ability to read, but others do not. These audio cues will help the students who have a hard time reading or even have a hard time engaging through text. Another area of interest/improvement is resiliency. Dr. Graff indicated that current and previous Mason LIFE students scored low in this area. Our project aims to help students build resiliency by using modules focused on retention and learning rather than memorizing, helping these students easily overcome challenges during and after their time at Mason. More importantly, many of these students do not like using wearable technology for extended periods of time, according to Dev Dhakshi, one of Dr. Peixoto's Ph.D students. Dev stated that a lot of the current students do not like to wear these devices for more than 15 minutes. This means that our group needs to keep the modules clean and simple, in order to have low stimulation and keep testing under 15 minutes.

Approach

Problem Analysis with External System Diagram



There are three components to our design: (1) the HTC Vive, through which students will view scenarios and choices of how to respond, (2) the game itself, which will be created using the Unity game engine, and (3) the joystick, which students will use to select in-game choices.

Approach Based on Conceptual Design

The design is comprised of three parts: the game, the headset and the joystick. The student will use all three to experience the scenarios we provide. A Mason LIFE staff member will also monitor student progress.

The game itself will be 5 to 10 minutes and use a VR headset to allow students to experience challenging scenarios. The game uses real life 360° footage for the backdrop to give the students a more realistic experience. Additionally, we will use Unity to program the game and insert characters, comments, choices etc. We are focusing on creating one scenario with multiple variations. The variations can include the setting of the scenario and characters used in the scene. Each decision a student makes will have a randomized outcome so that no student can complete the game solely through memorization. A higher difficulty level set by the instructor will result in a higher chance of failure in order to help build the student's resilience. The scenario itself will be chosen after further consultation with Dr. Graff, but our potential ideas include simulating one of the following scenarios:

- Grocery Shopping
- Cooking
- Going to an event (such as movie theater or amusement park)
- Assisting customers in a retail or food service environment
- Asking for directions

Given that our game requires input from the user, we will be designing a joystick controller via MSP430 to let the user select from the choices which are displayed in text and also read aloud. The students will be monitored while using the VR headset, to ensure their comfort and their focus. Proctors will have access to a computer, where they will have the ability to adjust settings in the program to coordinate with the user's needs and track the user's progress as they advance through the modules. A few setting options include difficulty level, audio cues, scenario selection and display options. Similarly, certain data can be displayed on the proctor's computer, such as module progress, the user's choices, focus retention, and the user's emotions, which the user will periodically be prompted to describe. While wearing the HTC Vive headset, the game will present the 360° view of the scenario with a couple choices to resolve the problem they face, along with intermediate questions such as "how are you feeling?" or "what do you think they (the character) are feeling?". For the user to choose their preferred option they will move and hold the joystick to the direction of the corresponding choice. Once they have selected their answer, they will be let onto a path to their next scenario. Alternatively, if the user is unable to focus, an alert will present itself. Through the HTC Vive headset we will be able to detect head movement, giving us the ability to identify if the user is focused on the task in front of them rather than just looking around. To ensure the user is focused on the task the program will notify both, the user and the proctor. Depending on the proctor's comments, they can either adjust the program so the user can proceed to their next challenge or allow the user to take a break.

After our discussions with Dr. Graff, it was very clear that accessibility must be at the forefront of our design. Students should be prompted in multiple ways, such as through text and audio cues, so that students of all reading levels can participate. Text should be minimal, as many students do not have a high-school reading ability. We realized we needed to design our own controller, as many controllers on the market do not have the hallmarks of joystick accessibility: being large in size (so the user can easily handle it) and having tactile feedback (so the user knows their input has been recognized). Tactile switches have not only an audible click, but the users can actually feel they have moved the joystick. Tactile switches are also much less sensitive to movement than analog joysticks are, meaning it is harder for the user to accidentally move a cursor. Understandably, the large size and lack of sensitivity of such a joystick would not make such a controller popular with the gaming population, but for students with IDD, these features can make using a joystick easier.

Alternative Approaches

To accomplish the goal of creating a system in which Mason LIFE students can practice their social skills and decision-making skills, we had two alternative options.

The first option was to create an Augmented Reality system, most likely utilizing a smartphone camera and a headset such as Google Daydream. The focus of this system would have been creating a software program that could recognize objects and/or people in the real world. Our initial ideas included having a facial recognition system built in, which would assist students in identifying the emotions of people around them. Our group then struggled with the ideal environment for such a system: we would not want students walking around with a headset on, as it would be uncomfortable (and potentially unsafe), and yet a lab environment might not be an ideal choice in that someone would have to sit with the student and play the game. It would also be difficult to create a decision-making game in AR, in that we as programmers would not know where in the real-world a student would be. We elected against this system in that Dr. Graff had expressed an interest in a self-contained decision-making module that could be completed in a lab environment, so VR would be more appropriate.

The second option was to create a Virtual Reality system which utilized a smartphone and a headset such as Google Daydream, along with a controller similar to the one described above. While this system seemed quite appealing in that it would be completely wireless, smartphones generally do not have the processing power to create a seamless VR experience. A group member who has experience with VR also indicated that smartphone VR can be somewhat disorienting due to the lower quality. Obviously, we do not want students to become disoriented, since many Mason LIFE students have sensory problems. In conclusion, while a smartphone-based system would have the large advantage of being completely wireless, it also ran the risk of making the game unplayable for some students, which would severely lessen the impact of our project.

In conclusion, we chose VR instead of AR because with VR we can place the student in any environment we want, instead of relying on the student's real-world surroundings. We chose the HTC Vive instead of a smartphone-based system in order to maximize student comfort and provide the most immersive experience possible.

Introduction to the Background/Phenomenology Supporting the Project

There are examples of games created to help people with IDD learn social skills, especially those with autism, who often struggle with maintaining eye contact and interpreting emotions [3]. These games range from low-tech card games [4] to high-tech augmented reality glasses to help autistic people recognize emotions [5]. During research on this project, we came across an example of "virtual reality" to teach social skills to students with autism [6]. However, the game itself is from 2005, and the "virtual reality" within this game is more along the lines of a standard computer game with embedded video. While this game was fascinating to read about, it is extremely text-heavy and so would be inappropriate for most students in the Mason LIFE population. However, the evaluation of this game provided us with excellent ideas for our own game. For example, generalization, or the ability of a player to take skills they learn in-game and apply them to real-life, is aided by providing a player with multiple variations of the same scenario. The variations could include setting, people involved and elements of randomness. Additionally, the reward/correct method of providing feedback to students is shown to be much more appropriate than pass/fail. It is important to give positive reinforcement to students, but simply telling a student that they made a poor choice and forcing them to continue through the scenario will not aid them in learning as much as correction will. More recent sources have also described in-depth the principles from the game described above: teaching generalization through various settings, coupled with the potential for experiential learning, is one of the potential advantages of VR in teaching skills [7].

Researchers and parents of people with IDD alike have seen the value of using games to teach social skills. Some researchers feel that getting experience in social situations and understanding social rules allows for the students to have an easier time socializing [8]. One mother even stated that her "son plays social therapy games at a local social skill group where they let him practice with his peers" and it made a strong positive impact [9]. The ability to educate through its immersive experience has made VR an attractive tool in the education community [10]. In addition, the cyberspace environment allows the users to have a controlled learning process where they will advance at their own pace [10]. Even though there are various applications that use VR for education purposes, there are not many that target individuals with special needs. Researchers have agreed that this technology will allow individuals with specials needs to understand their learning capabilities and strengths better in a specific scenario [11]. There is also evidence that utilizing principles of "gamification," such as positive reinforcement, creation of different paths within a scenario and instant feedback, can help produce behavioral changes [12].

Even the design for the controller we create must be justified in the context of accessibility. Before we decided on creating a VR project, our group did research on adaptive switches which are defined by Tecla, one of the primary manufactures of these switches, as: "...an input-output device that allows the individuals with physical disabilities user to independently activate assistive technology devices and switch-enabled devices such as an iPhone" [13]. Although we are not creating such a device, there are design considerations utilized in adaptive switches which we will use in our controller. For example, tactile feedback is an important aspect of making a controller accessible-- the feedback allows a user to feel that they pressed a button or moved a joystick. Also, tactile feedback tends to make the joystick less sensitive, which will help prevent accidental key presses for students with motor skill issues.

Project Requirements Specification

Mission Requirements

M1. Create a Virtual Reality game in Unity to help students with intellectual disabilities simulate and work through stressful scenarios.

M2. Students are presented with different ways of handling a stressful situation and are evaluated and guided based on their decisions.

M3. The game must be accessible to students who cannot read or have poor reading skills by utilizing voiceovers and minimal in-game text.

Input/Output Requirements

IO1. Students shall utilize a Virtual Reality headset, such as HTC Vive, to play the game.

IO2. Students shall use a joystick interfaced with the MSP430 to make in-game selections.

IO3.·The instructor within the class will be able to pre-program difficulty levels for students and will be able to observe the student's selections through a computer monitor.

External Interface Requirements

EIR1. The MSP430 shall be powered via a USB cable.

EIR2. The joystick used with the MSP430 will be large so students with motor skill issues can handle it more easily.

Functional Requirements

FR1. The game shall provide students with possible ways to handle a stressful situation.

FR2. The game shall track the student's decisions and will produce a progress report at the game's conclusion for the instructor to read.

FR3. The student progress report provided to faculty at the end of the game should consist of multiple factors, such as the decision they made, the time it took for them to make the decision and how many times it took for them to respond appropriately.

FR4. The game shall not lag (response time should be << 1s).

FR5. The peripheral device (joystick) will use the MSP430 microcontroller.

FR6. The joystick will be charged via USB cable.

FR7. The game shall be approximately 5-10 minutes long.

FR8. The game will have multiple variations of a single scenario for students to encounter.

FR9. The game should be able to communicate the student's progress to the appropriate faculty member.

FR10. The game should exhibit good qualities of "gamification" (including positive reinforcement) to encourage students.

Technology and System Wide Requirements

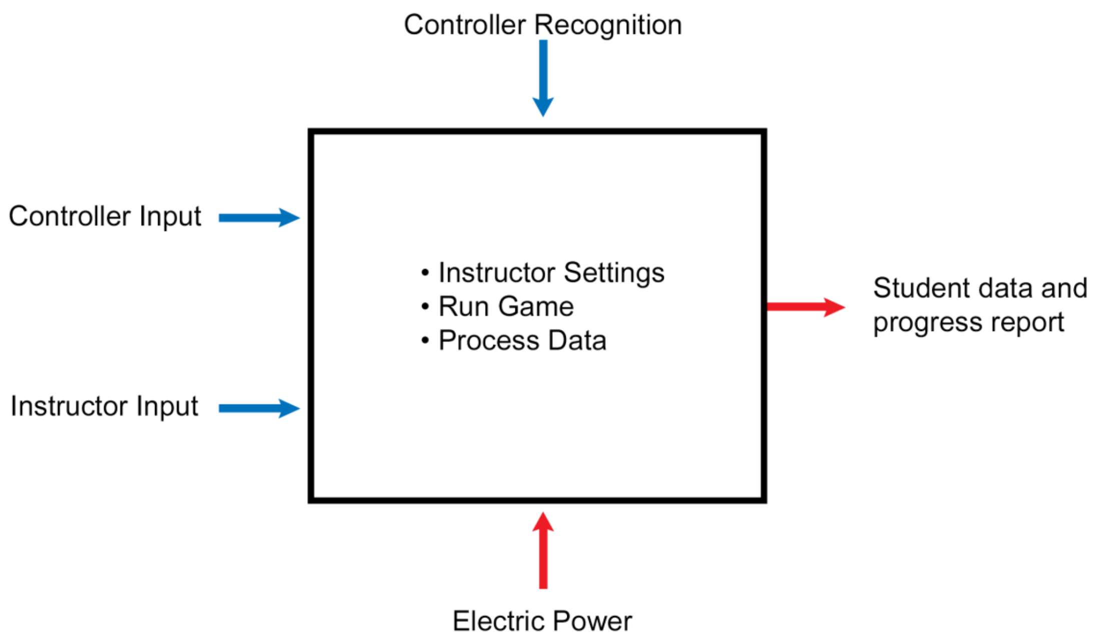
TS1. The MSP430 microcontroller will be used to interface the peripheral joystick with the game.

TS2. The game will be created using the Unity game engine (which uses C++ for scripting).

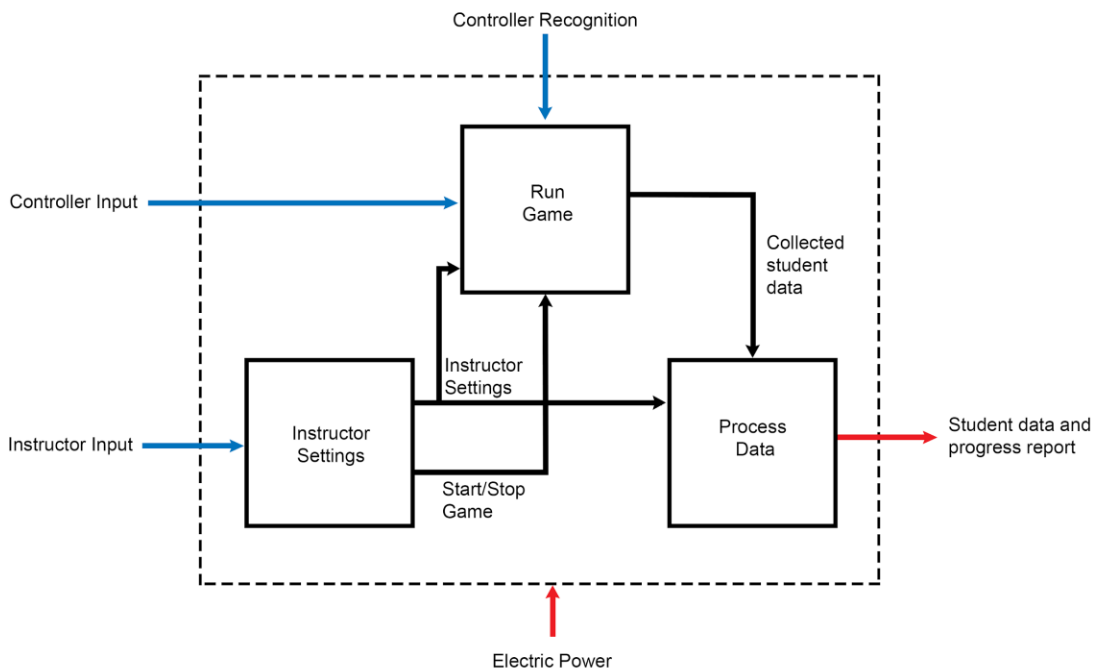
System Design

Functional Decomposition

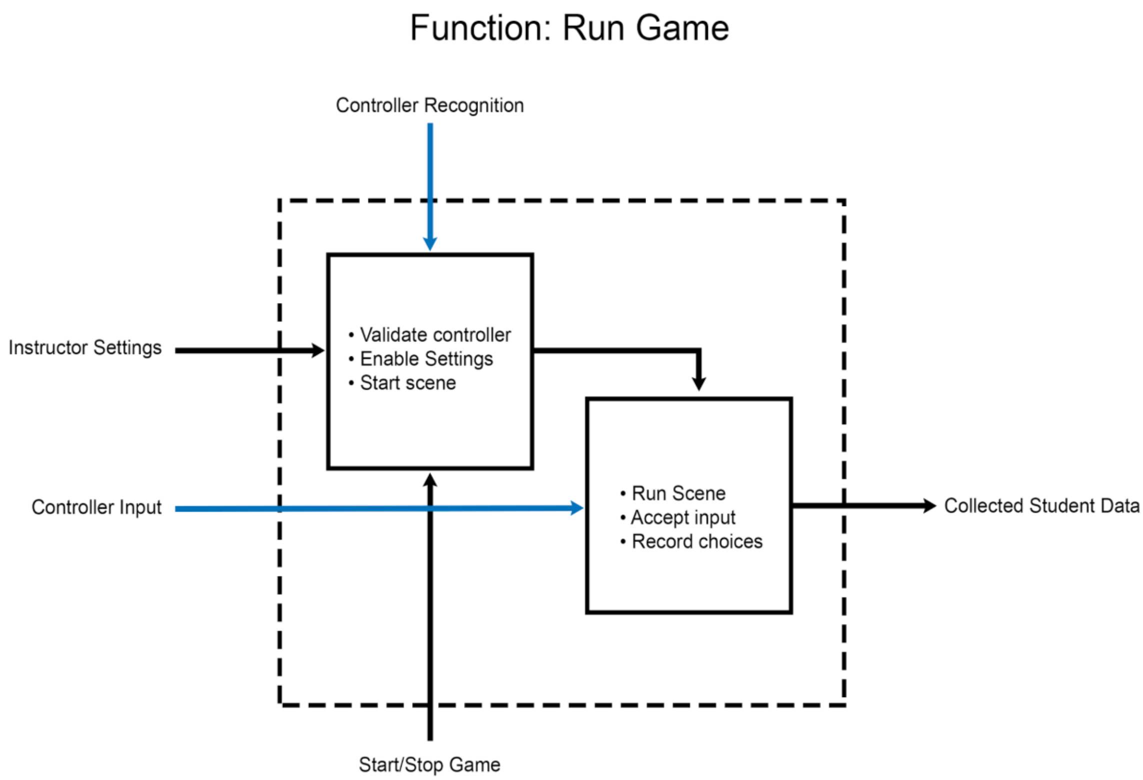
Level 0



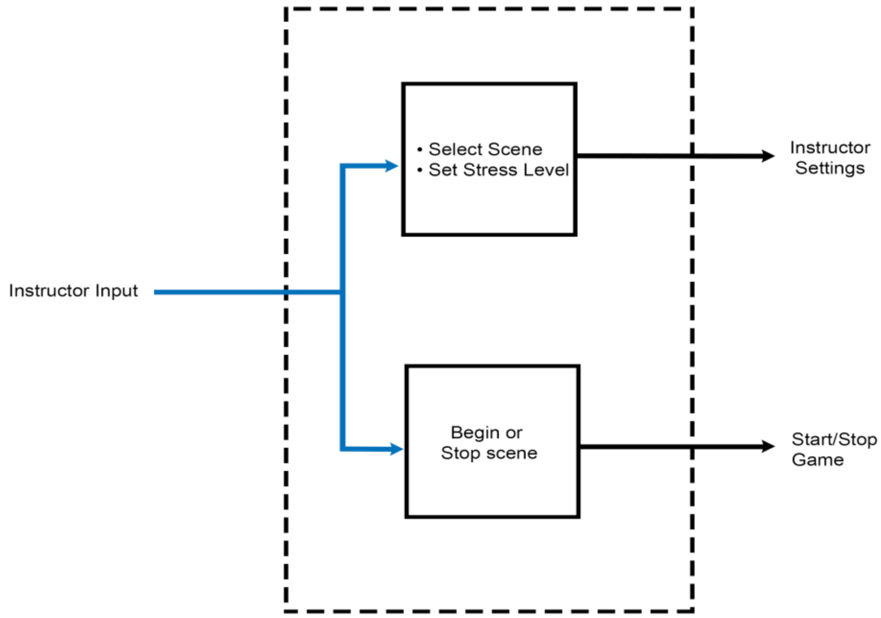
Level 1



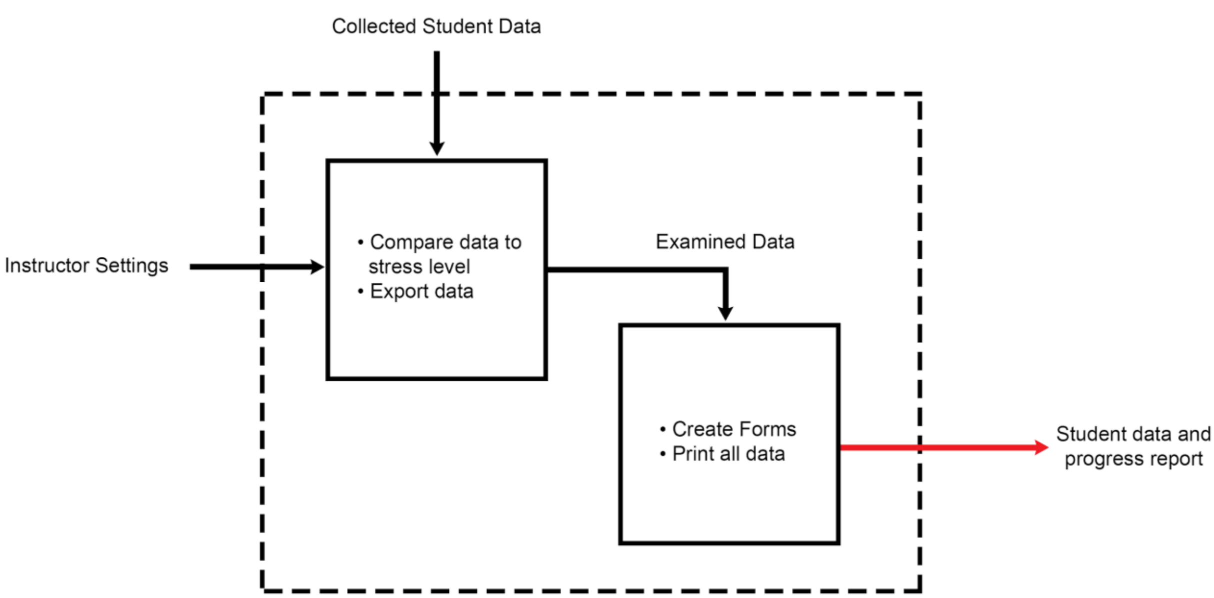
Level 2


Function: Run Game
Controller Recognition
Instructor Settings
• Validate controller
• Enable Settings
• Start scene
Controller Input
• Run Scene
• Accept input
• Record choices
Collected Student Data
Start/Stop Game

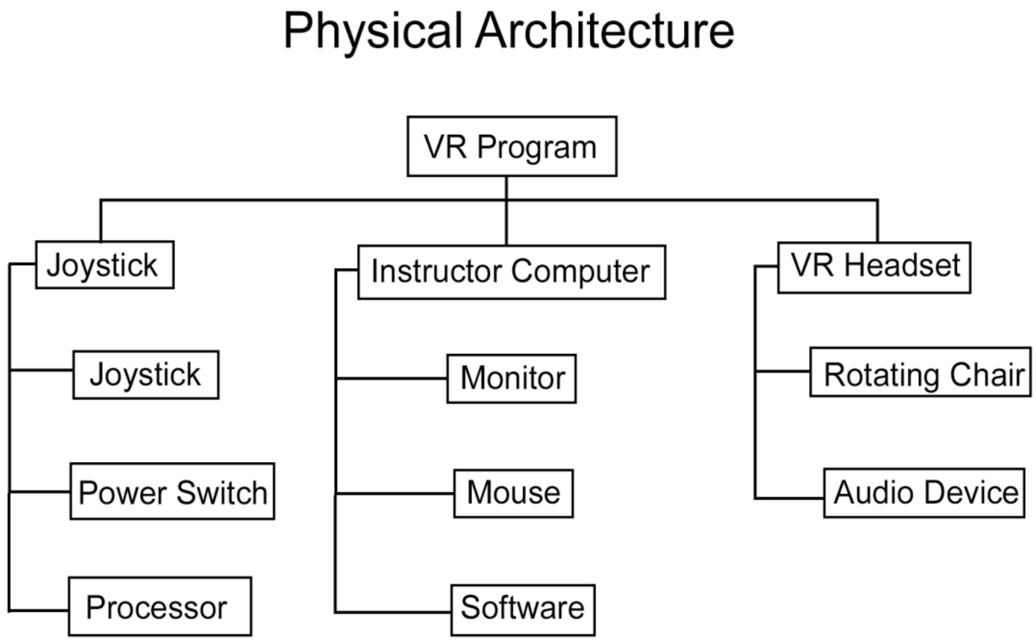
Function: Instructor Settings

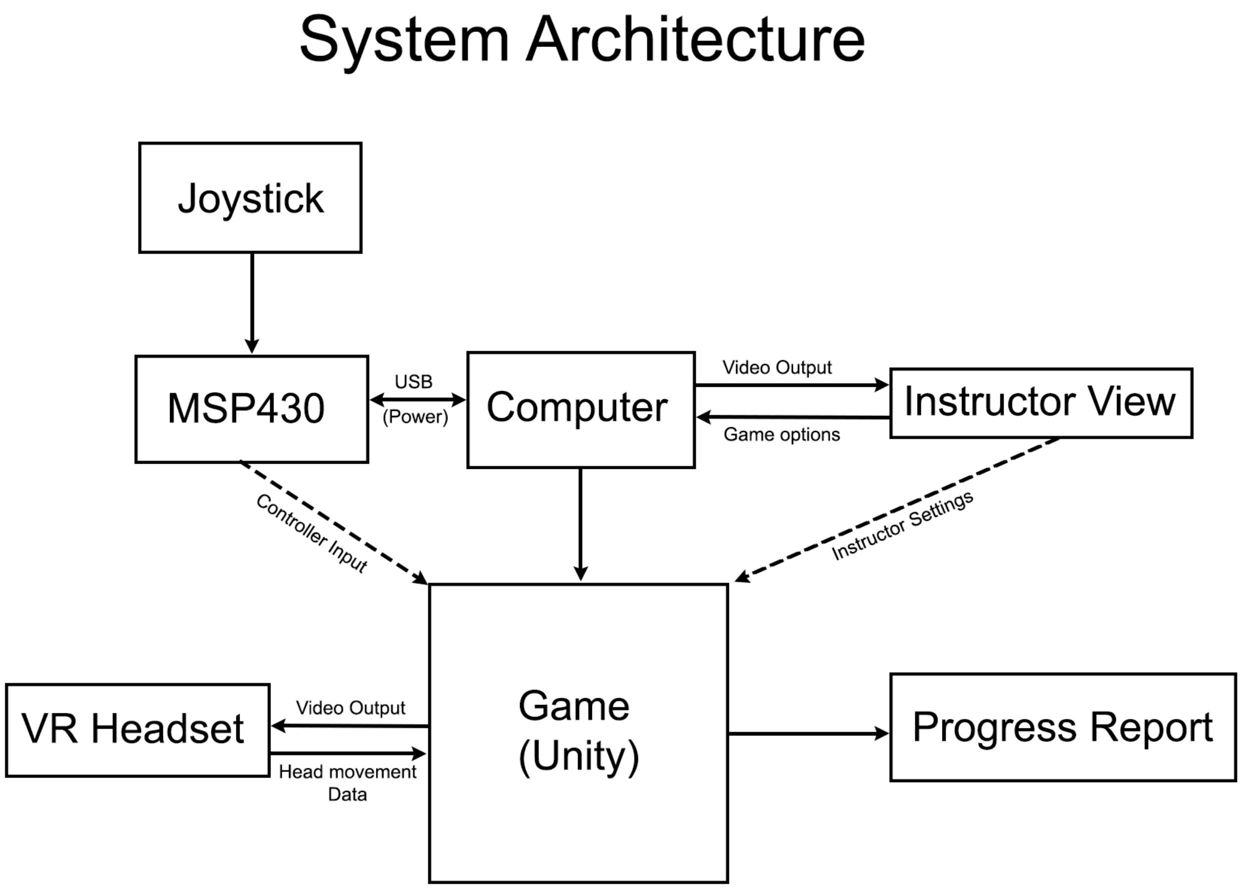


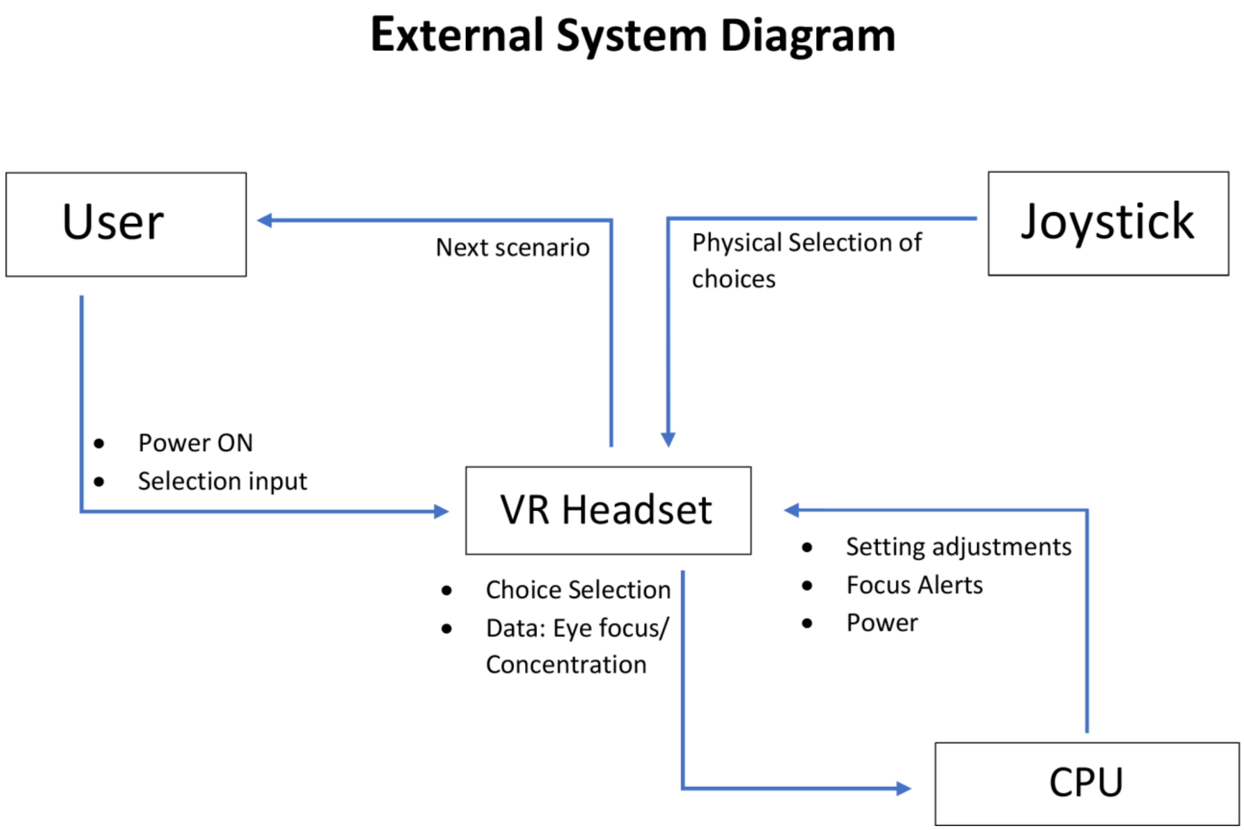
Function: Process Data



System Architecture







Component Selection

To create our controller, we are using the MSP430 because of its versatility and the fact that more of our group members have experience with it than any other microcontroller.

Since we would prefer to interface the MSP430 joystick to the game via Bluetooth connection (rather than using a wired connection), we need a Bluetooth module which can be used with MSP430. The JY-MCU (HC-06) would be an appropriate choice. There are other options available, such as RN-4020, but the RN-4020 is a little more expensive and complicated, so we will try JY-MCU first.

There are also many types of joysticks available. The two most popular options seem to be analog joysticks and four or eight way joysticks. Analog joysticks are better suited for applications when smooth movement is needed. Four or eight way joysticks provide a set number of directions a player can move. Based on research our group did on the use of adaptive switches, tactile input/output devices are generally most appropriate for people with intellectual disabilities, as they can “feel” when they have given the system input. In light of that information, we will elect to use either a 4 way or 8 way joystick. We will experiment with both of them to see which one is more usable.

Preliminary Experimentation Plan

Experiment 1: Controller Testing

The controller created with the MSP430 will be tested in-game. The controller must be accurate and must be intuitive. Issues with button debouncing and responsivity will have to be addressed through the testing cycle. If necessary, a logic analyzer or oscilloscope may need to be used for debugging purposes. This will be an iterative process which must occur before the focus group test described in Experiment 3.

Experiment 2: Testing Report Creation

A debug menu will be created so a tester can walk through each scenario and each possible outcome. At the end of each scenario, we will ensure an accurate progress report is created for each student. Throughout the process, the tester will make notes of any problems with functionality they encounter, such as:

- Controller responsiveness
- Headset responsiveness
- Inaccurate evaluations – were you given positive feedback for a “bad” decision, or vice versa?

This will be an iterative process which must occur before the focus group test described in Experiment 3.

Experiment 3: Focus Group

Dr. Graff at Mason LIFE will help us to assemble a focus group of both students and faculty to test the game. Considering that the focus group is intended to give our group feedback on the success of our project, we will choose our selection criteria to obtain the most feedback from students and faculty [14].

We will only utilize students who meet the following selection criteria [15]:

- Students must be enrolled in Mason LIFE
- Students must be able to move their head freely.
- Students must feel comfortable viewing screens and should not have eye problems that preclude them from using a computer, watching TV, etc.
- Students should feel comfortable with the idea of trying on a VR headset (i.e. students with anxiety about putting something over their eyes should not be included). If necessary, we can bring a VR headset with a different game and allow students to try it before we conduct the focus group.

Priority will be given to students nominated as good candidates by Mason LIFE faculty. Criteria which would be helpful for the focus group include:

- Ability to express themselves, whether verbally or by writing.
- Prior positive experience with using VR headsets.

We will ask for feedback from both students and faculty about the following criteria. Potential focus group questions are also listed:

Students

- Accessibility
    - What did you think about the game controller?
    - What did you think about the headset?
    - What did you think about the words on the screen?
    - What did you think about the voice you heard?
- Usefulness
    - How did this game make you feel?
    - What did you like best about this game?
    - What would make this game better?

Faculty

- Accessibility
    - How do you think the students interacted with the game?
    - Did students express frustration with the game?
- Usefulness
    - What did you think about the progress report created at the end of the game?
    - How do you feel about VR systems, such as this one, being used in a classroom setting?

- What would improve this system, from the standpoint of a faculty member?
- What would improve this system, from the standpoint of a student?
- What problems do you see with students utilizing a VR system?

Preliminary Project Plan

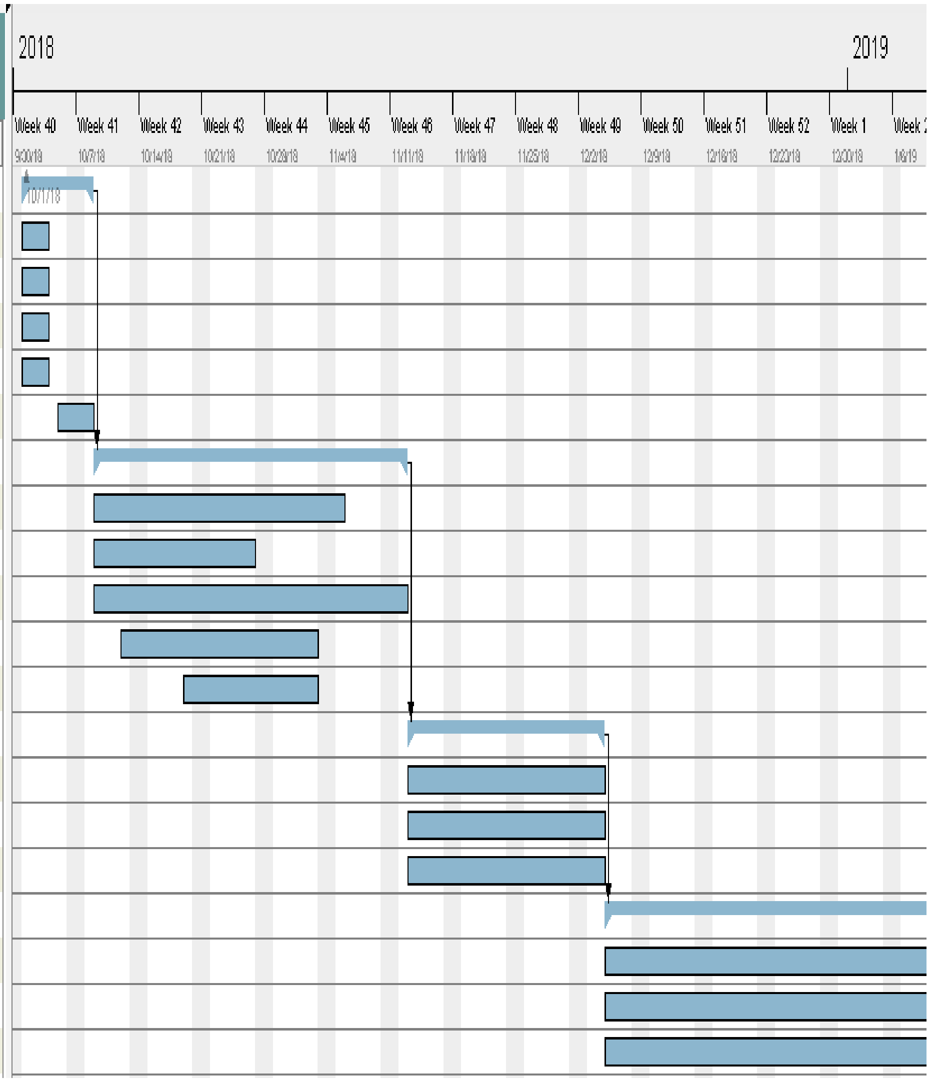
List of Tasks

ECE 492 Tasks

- · Component Research and Purchasing (10/01/18-10/10/2018)
  - Research Joysticks — Caitlin, Gerald, Melanie
  - Research Bluetooth Modules — Caitlin, Gerald, Melanie
  - Research Unity Assets — Caitlin, Gerald, Melanie
  - Research Battery Packs for MSP430 — Caitlin, Gerald, Melanie
  - Research 360° Video Technologies — Mara, Coralia and Marcela
  - Research 360° Video in Unity — Mara, Coralia and Marcela
  - Purchase Components — Caitlin
- · Early Prototyping and Learning (10/10/2018-11/12/2018)
  - Test Different Controllers with MSP430 and Bluetooth — Caitlin, Melanie
  - Pseudocode for Scenario — Coralia, Mara, Marcela
  - Learning to Take and Edit 360° camera footage — Coralia, Mara, Marcela
  - Learning Basic Unity Tutorials — Gerald, Coralia, Melanie
  - Importing Sample 360° Video into Unity — Gerald, Caitlin, Melanie
- · Prototyping (11/13/2018-12/04/2018)
  - Begin Utilizing Pseudocode to Create Game Framework — Gerald, Melanie
  - Connecting and Reading Controller Input in Unity — Caitlin, Melanie
  - Start Taking and Editing 360° Video Footage — Coralia, Mara, Marcela
- · Continuation of Prototyping (Over Winter Break) (12/05/2018-01/21/2019)
  - Continue Utilizing Pseudocode to Create Game in Unity — Gerald, Melanie
  - Edit 360° Video Footage for use next semester — Mara, Coralia and Marcela
  - Continue Interfacing Breadboard Controller with Game — Caitlin

Allocation of Responsibilities

Name	Begin date	End date
Component Research and Purchasing	10/1/18	10/8/18
Research Joysticks	10/1/18	10/3/18
Research Bluetooth Modules	10/1/18	10/3/18
Research Unity Assets	10/1/18	10/3/18
Research Battery Packs for MSP430	10/1/18	10/3/18
Place Order for Parts and Assets	10/5/18	10/8/18
Early Prototyping	10/9/18	11/12/18
Test Different Analog Controllers w MSP430 and Bluetooth	10/9/18	11/5/18
Pseudocode for Scenario	10/9/18	10/26/18
Learning to Take and Edit 360 camera footage	10/9/18	11/12/18
Learning Basic Unity Tutorials	10/12/18	11/2/18
Experiment with Importing Sample 360 Video into Unity	10/19/18	11/2/18
Prototyping	11/13/18	12/4/18
Begin Utilizing Pseudocode to Create Game Framework	11/13/18	12/4/18
Connecting and Reading Controller Input in Unity	11/13/18	12/4/18
Start Taking 360 Video Footage	11/13/18	12/4/18
Continuation of Prototyping (Over Winter Break)	12/5/18	1/21/19
Continue Utilizing Pseudocode to Create Game	12/5/18	1/21/19
Edit 360 Video Footage	12/5/18	1/21/19
Continue Interfacing Breadboard Controller with Game	12/5/18	1/21/19



Potential Problems

Knowledge and Skills to be Learned

Our group will have to learn the following skills:

- Utilizing Unity
    - Learning or brushing up on basic C++
- 360° video filming and editing
- MSP430
    - Two group members have completed ECE 447 and so have had experience with the MSP430. Another member is currently enrolled in ECE 447.

Risk Analysis

The mark of our project's success is the positive reception from Mason LIFE students and faculty. Therefore, the biggest risk to our project's success is being unable to deliver a system that is suitable for Mason LIFE students. For example, if the students in our focus group become frustrated at the game because the it is not responsive, or they cannot understand what the game is prompting them to do, our project will be less successful.

An additional concern is that our project may be accessible and usable by Mason LIFE students, but there is no marked improvement in student scores over time. If students' scores do not increase, it may indicate that the game itself is not teaching students or is not evaluating them in a meaningful way. Clearly, the provided game evaluation to faculty is as important as students learning from the game.

Since Virtual Reality applications are not widely used in special education programs, our project is exploratory in nature and even some degree of failure can be useful to future groups who desire to create similar games. Even though there is some risk involved, our project has the potential to explore a new application of assistive technology.

References

[1] Afia, "Current Issues and Opportunities for Individuals Living with IDD," 21 May 2018. [Online]. Available: https://afiahealth.com/current-issues-opportunities-individuals-living-idd/. [Accessed 30 September 2018].

[2] George Mason University, "Overview | Mason LIFE," Helen A. Kellar Institute for Human disAbilities, [Online]. Available: https://masonlife.gmu.edu/overview. [Accessed 27 September 2018].

[3] Autism Speaks, "Why is it so hard for someone with autism to make eye contact?," 17 July 2015. [Online]. Available: https://www.autismspeaks.org/expert-opinion/why-it-so-hard-someone-autism-make-eye-contact.

[4] National Autism Resources, "Social Skills," [Online]. Available: https://www.nationalautismresources.com/social-skills/. [Accessed 30 September 2018].

[5] Brain Power, LLC, "Empowered Brain™ by Brain Power™," 01 October 2018. [Online]. Available: http://www.brain-power.com/autism/.

[6] Virtual Reality Aids, Inc., *Video Enhanced VR for Teaching Restaurant,* Virtual Reality Aids, Inc., 2005.

[7] *Virtual Reality: A Possible Social Skills Intervention for Students with Autism.* [Film]. Arkansas State University, 2017.

[8] Autism Society, "Social/Relationships - Autism Society," [Online]. Available: http://www.autism-society.org/living-with-autism/autism-through-the-lifespan/adulthood/socialrelationships/. [Accessed 27 September 2018].

[9] Autism Speaks, "Social Skills and Autism," [Online]. Available: https://www.autismspeaks.org/social-skills-and-autism. [Accessed 27 September 2018].

[10] T. Jeffs, "Virtual Reality and Special Need," *THEMES IN SCIENCE AND TECHNOLOGY EDUCATION*, pp. pp. 253-268, 2009.

[11] V. Dekker, M. H. Nauta, E. J. Mulder and A. de Bildt, "A randomized controlled study of a social skills training for preadolescent children with autism spectrum disorders: generalization of skills by training parents and teachers?," *BMC Psychiatry*, vol. 14, no. 189, 2014.

[12] A. Pandey, "6 Killer Examples Of Gamification In eLearning," eLearning Industry, October 6 2015. [Online]. Available: https://elearningindustry.com/6-killer-examples-gamification-in-elearning. [Accessed 2018 01 10].

[13] Tecla, "Introduction to 7 Common Adaptive Switches," 03 October 2017. [Online]. Available: https://gettecla.com/blogs/news/introduction-to-assistive-switches. [Accessed 30 September 2018].

[14] Eliot & Associates, "Guidelines for Conducting a Focus Group," 2005. [Online]. Available: https://datainnovationproject.org/wp-content/uploads/2017/04/4_How_to_Conduct_a_Focus_Group-2-1.pdf. [Accessed 27 September 2018].

[15] Center for Innovation in Researching and Teaching, "Effective Focus Group Questions," [Online]. Available: https://cirt.gcu.edu/research/developmentresources/research_ready/focus_groups/effective_questions. [Accessed 29 September 2018].