Abstract

Our goal is to create an interactive exhibit that allows the user to control and view a game while providing him or her with a unique, immersive experience.

Why

As video games gain popularity, gamers are looking for better ways to play, not only in terms of graphics, but how the game is played. Over the years, companies have been developing means to engage gamers (e.g. the wii with Nintendo's motion controllers, and the Microsoft's Kinect by eliminating the need for a controller). More companies are developing newer, better ways to interact with these games. As the interest in new platforms expand, the opportunity to pursue such developing technology is greater.

Where

This kind of installation would be usable in many different settings. It would be an excellent exhibit for attracting attention at New Media shows similar to Without Borders or the Senior Capstones. It would be an interesting addition to public gaming scenes, such as tech/ gaming entertainment expositions presented in major cities throughout the year. Also, if this kind of interface could be commercially available, then it could be something that people would like to have at home to improve their respective gaming experiences, inspire do-it-yourself projects, and allow for open-source game programming for contribution. If we can establish ourselves with this project and really produce something successful, then people will see that this evolving technology stemmed from independent developers rather than a large corporation, then it might ignite some further interest among the gaming community along with the industry.

What

The concept is to make a Virtual Reality game of Minecraft. Virtual Reality is a completely simulated environment that replaces the real world. Minecraft, created by Markus Persson (@notch on Twitter), is a sandbox-type computer game made entirely of cubes (or

blocks) that allows you to create literally anything you can imagine. The game is all virtual, being that it is a computer game, but our goal is to turn it into a multimedia experience. The final objective of Minecraft is to slay the Ender Dragon, but you are by no means required to pursue this objective. You can choose to create anything you want for as long as you want. By having an extensive amount of materials (wood, stone, glass, water, lava, etc.), you can alter your environment and build structures as wide and as tall as you wish. The game has a large fan base, and people across the world have made some impressive things in it.

We aim to provide a smooth, intuitive way to interact with this game and give people an immersive experience. Our long term design is to make a Virtual Reality game using the two pieces of technology to control the game with physical movement.

How

The first tool is the Microsoft Kinect for the Xbox 360. The Kinect is a motion-sensing input device that allows users to interact with the Xbox with natural gesture recognition and even spoken commands. The Kinect employs an infrared projector, a camera, and a microchip which together allow for position tracking in three dimensions. This aspect of the Kinect makes it extremely useful for our project because it will allow the user to control the game with their physical position, orientation and even gestures in a natural-feeling manner. Turning and looking will be taken care of by the Kinect, while leaning will be handled by the second piece of technology, the Wii Balance Board from Nintendo. The Balance Board uses Bluetooth technology and contains four pressure sensors that are used to measure the user's center of balance. The sensors in it allow for much more accurate measurements than would be possible by a typical bathroom scale. We plan to use this device to allow the user to lean in the direction they wish to travel in the game. Coupled with the Kinect, which simply requires a USB connection, it has the ability to track turning of the body and head orientation; the Wii Balance Board will allow for a natural, immersive gaming experience. These tools will eliminate the need

for buttons.

The user will wear an Oculus Rift, developed by Oculus LLC, the first consumer-based Virtual Reality Head-mounted display (HMD). It will cover the user's field of view, shielding them from outside light, and a first person perspective of the game world will be displayed. All of the pieces of technology mentioned will be connected to a central computer which will receive all the data and send information back to the user via the Rift.

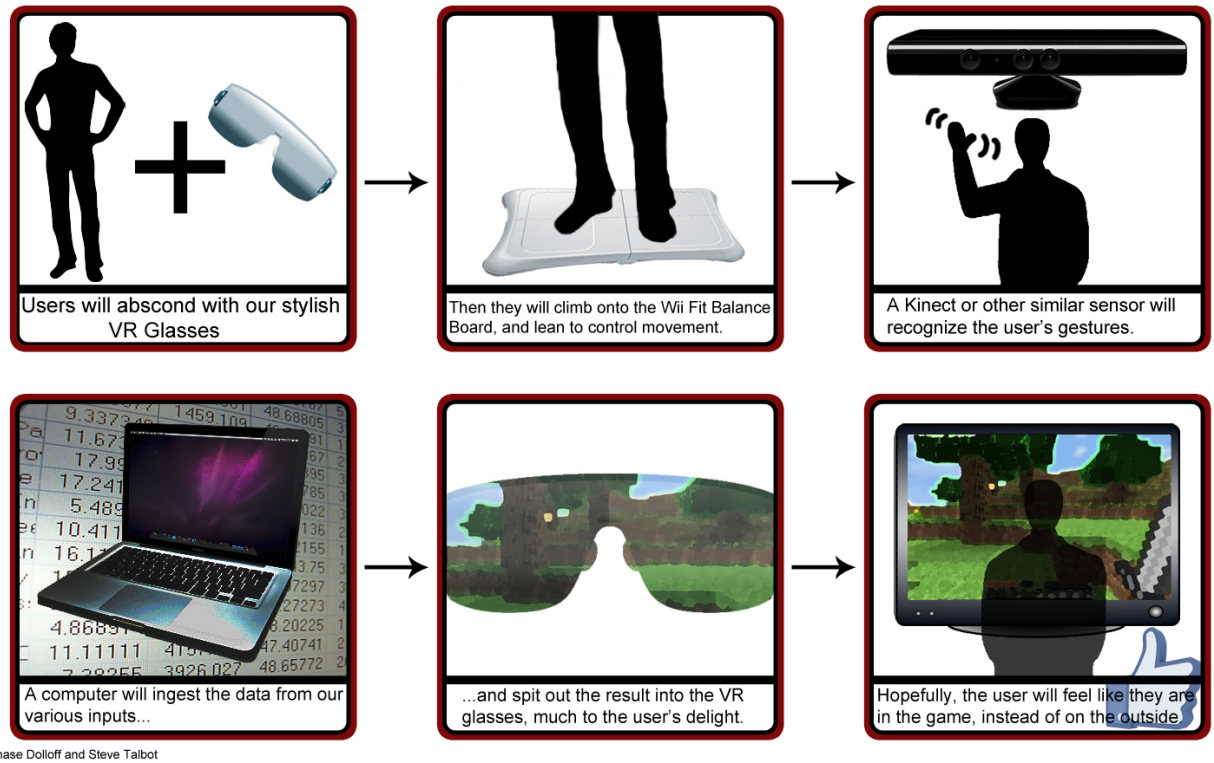
To ensure project completion, we have designated several weeks to program each device and ensure its functionality. By following the schedule we've laid out (shown in the Gantt Chart), we have made time for each piece of hardware to be configured, connected to the computer, and tested. We will start with the technology that is already available (the Kinect and Balance Board) and then when the Oculus Rift is available in January, 2013, that will be our main focus. From January to March, we will configure the Rift and connect all the interfaces together before moving on to the Beta stages.

Coding is an important aspect of this exhibit because, as mentioned, each device must send information. This data must be interpreted as specific commands (moving, turning), communicate to Minecraft, and be displayed through the Rift. The primary language we will be using is Java. We have access to various developer kits, such as the Windows Developer Kit (WDK) for building, packaging, testing, and debugging drivers. There is also OpenNI, which is a framework that provides the interface for physical devices and sensory data production.

Initially, we proposed to provide an alternative gaming experience using Augmented Reality. There is a difference between Virtual and Augmented Reality. Augmented Reality is displaying bits of virtual information over a real world view (for example, an image or text appearing on an iPhone screen while using the camera). With extended research, we concluded that Augmented Reality was not as plausible a medium to use for our project because of its limitations and parameters needed surrounding the factor of physical space. By using Virtual

Reality instead, we will get much closer to the experience we wish to achieve, as well as allowing ourselves to work in a purely computer-created world, effectively shrinking any issues created by doing everything in physical space. The coding from Augmented to Virtual is independent from one another and could not be created one way and then translated into the other. If we wanted to start with Augmented and then switch to Virtual, we would waste valuable time modifying and re-coding instead of making Virtual Reality work the way we intended.

Here is a storyboard of how the project will look when it is being used in the final installation:



Chase Dolloff and Steve Talbot

For a clearer view, please visit: http://tinyurl.com/capstone-storyboard

When

This Capstone will be deployed in April of 2013; however, the project must be completed in February to ensure that there is plenty of time for making adjustments - if needed - and rigorous testing. Attached is our current schedule of development as we expect it to go.

If you are reading this on a computer, you can view it at http://tinyurl.com/capstone-gantt2

Who

This is a collaborative Capstone by Charles Dolloff and Stephen Talbot. We have enlisted further assistance from various sources, the most notable being Richard Corey, Spatial Engineering Director of Operations, and John Bell, Professor of New Media. Apart from these people, we have other acquaintances in mind, as well as the useful information we've found on the Internet. We plan to get in touch with the Engineering department for assistance in building housing to protect each device, along with the structure in which this exhibit will be contained.

Budget:

Line	Category	Item	Detail	Year 1 Cost	Year 2 Cost	Sponsored	Needed	Total	Notes
1	Hardware							$420	
2		Virtual Reality Glasses	2 pairs x $300/each	$600		-$300	$300	$300	Sponsor
3		Wii Fit balance board	1 unit	$99		-$99	$0	$0	Sponsor
4		Headphones/ Speakers	1 pair x $120	$120			$120	$120	
5		Kinect	1 kinect kit	$110		-$110	$0	$0	Sponsor
6		Computer	1 Macbook Pro	$2000		-$2000	$0	$0	Our Contribution
7	Software							$0	
8		Game: Minecraft	1qty. x $27	$27		-$27	$0	$0	Aquired
9		Unity	open source	Free			$0	$0	
10	Programming							$1250	
11		Amateur	50 hours x $10/hour	$500	$250	-$500	$250	$250	Our Contribution
12		Professional	20 hours x $50/hour	$1000	$500	-$500	1000	$1000	Collaboration
13	Installation							$755	
14		Support Beam	14 beams x $15	$210			$210	$210	
15		Sheets	4 sheets x $30/each	$120			$50	$50	
16		Harness	1 harness	$70			$70	$70	
17		Labor	15 hours x $15/hour	$225	$225	-$225	$225	$225	Our contribution
18		Rent	2 days x $100	$200	$200	-$200	$200	$200	UMaine sponsored
19	Promotion							$22	
20		Poster Design	5 hours x $20/hour	$100		-$100	$0	$0	Our Contribution
21		Poster Printing	2 posters x $20/each	$40		-$18	$22	$22	UMaine Printing Funds
22		Web	Social Networking	Free			$0	$0	
23	Total before contingency			$5421	$1200	-$4079	$2447	$2447	
24	Contingency	10% of subtotal		$542	$120	-$408	$248	$248	
25	TOTAL			$5963	$1320	-$4487	$2695	$2695	

For a clearer view, please visit: http://tinyurl.com/capstone-budget2

Please note that there are two years included in the budget. The reason being that we are planning ahead in case we wish to further expand and showcase this exhibit beyond Senior Capstone Night and graduation. Completion will still be within year one as intended.

How is this new media?

All these technologies exist; however, none of these companies have combined these pieces of hardware to create a stronger user experience. This exhibit will be taking multiple technologies and unifying these separate pieces through code; utilizing their strengths for the gesture controls and 3D mapping from the Kinect and the pressure sensors from the Balance Board. This would allow for highly accurate user orientation and movements.

Virtual Reality, though it has been around for decades, is still an emerging technology and a fully immersive consumer model will be available for the first time in 2013. We have taken advantage of the opportunity to obtain the Oculus Rift and the developer kit as soon as it is available in January. The Rift will be completely commercially available later in the year. Since it is brand new, this will be first time this device is connected to the Balance Board and the Kinect. Our unique code modifications, once complete, can be distributed amongst the developer community, allowing this exhibit to expand and shape the way users interact with these devices.