Project Paper

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I. Introduction- The Problem Definition

Gaming is an activity that generally requires the use of your hands and people without access to their hands, whether due to an accident or a medical condition, generally find themselves having limited options in terms of accessibility.

A. Where and when does the problem takes place?

There are people all over the world without access to their hands and there hasn't really a solution that gives people working hands so the problem appears any time they want to play a video game.

B. Who does the problem affect?

The problem affects people without access to their hands who want to play video games. While we don't have an exact number of gamers who don't have access to their hands. We do know that there were over 3 million arm amputees in 2008, with that number having grown since then [1] .

C. What solutions or attempts have been made to solve the problem?

There have been several non-hand based controllers researched and developed by various individuals, companies and organizations that utilise different body parts such as feet, eyes and hips etc. An example would be the unnamed foot device that was presented at the 2018 18th International Conference on Control, Automation and Systems (ICCAS) [2]. Another example would be the Spring Stepper, which was a foot controller originally built as an alternative to teleportation in VR [3]. The last example is the commercially available 3DRudder controller which allows the user to perform actions in PC and PlayStation VR games [4].

II. Justification

The reason why addressing this problem matters is because accessibility is not too widespread in the gaming industry. In a survey done by disability advocacy organization Scope, it showed that 66 percent of gamers with an impairment or condition say they face barriers or issues related to gaming. In the same survey 22% of disabled games stated that the limited choices or availability of suitable assistive or adapted tech was also a barrier, making it the thirds most prevalent barrier right after the affordability of suitable assistive or adapted technology (30%) and the knowledge or time required to set up assistive or adapted tech (23%) [5].

A. What will happen if the problem is not solved?

If the problem is not solved then there will be less accessibility options in the gaming space, specifically ones for people who don't have access to their hands.

B. Who will feel the consequences?

With less accessibility options, people without access to their hands will feel the consequences. They will either continue to play games with a barrier or they might quit gaming entirely which could affect revenue of gaming companies.

C. Does the problem have wider relevance (e.g. are similar issues found in other contexts)?

The problem of not having accessible options for people without access to their hands does have wider relevance, as hands are crucial in using many modern day tools such as computers and smartphones, which don't really have the most accessibility options either.

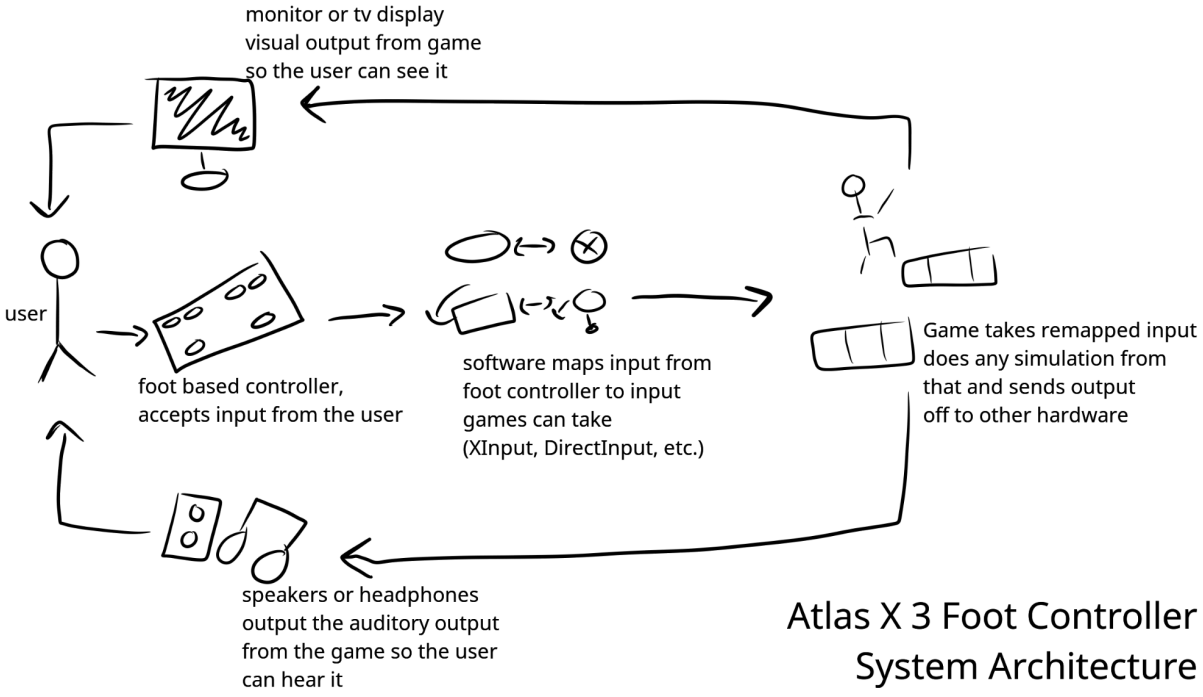
III. System Architecture

The system architecture will consist of using the foot based controller to accept in put from the user. That input from the foot controller will then be mapped to inputs the game accepts such as XInput or DirectInput. The game will then take those inputs and simulate them in the game world and then output them to other hardware systems such as monitors or speakers which the user will be able to perceive.

References

[1] "Limb loss stats." Group 10, u.osu.edu/fitness4all/loss-limb-stats/.
[2] J. Park and J. Kim, "Development of foot devices for virtual reality," 2018 18th International Conference on Control, Automation and Systems (ICCAS), 2018, pp. 1784-1787.
[3] C. Carmichael, M. V. Balderas, B. Ko, A. Nova, A. Tabafunda and A. Uribe-Quevedo, "Spring Stepper: A seated VR locomotion controller," 2020 22nd Symposium on Virtual and Augmented Reality (SVR), 2020, pp. 346-350, doi: 10.1109/SVR51698.2020.00058.
[4] Bonora, V., Chesnais, S., Leclercq, S., amp; Fromy, E. (2015). "U.S. Patent No. 20170185168". Washington, DC: U.S. Patent and Trademark Office.
[5] "Accessibility in gaming report." Scope, www.scope.org.uk/campaigns /research-policy/accessibility-in-gaming/About-our-research.

Appendix A - System Architecture



Atlas X 3 Foot Controller
System Architecture

Appendix B - Paper Prototype

Paper Prototype - Motion Board