The Need for Greater Accessibility in Video Games

Aidan C. Bundy

Department of Computer Information Systems, The University of Akron

Senior Programming Projects

Professor Michael Zellers

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A quote I find that perfectly represents what video games are meant to be for people comes from the late Nintendo president Satoru Iwata: "Above all, video games are meant to be just one thing: fun. Fun for everyone" (Davis, 2015). The video game market is the largest mainstream entertainment industry, nearly accounting for $150 billion dollars in revenue according to a report by website Newzoo's senior market analyst Tom Wijman. According to this same report, there are more than over 2.5 billion currently active gamers in the world, and this number continues to rapidly rise each year. As a big enthusiast of this industry and someone with a disability, an issue I currently see is a lack of accessibility towards players with disabilities. I find it unfortunate how little accessibility options are provided to players compared to other forms of media such as books and movies. Discussion online from gamers have been advocating for more developers and publishers to account for accessibility. I believe accessibility is worth exploring and implementing as every person should feel welcome and included in any game they play. I want more disabled gamers to take part and experience a game that can help bring more joy to their lives. **For my thesis statement, I want to address and advocate for advances that can be made to make video games more accessible for people with disabilities to improve the current gaming climate and the world around us. I will be utilizing many academic research studies, examples, and guides as sources for my paper. I will also be developing an accessible website to bring my information to those who are seeking accessibility standards.**

A disability is defined as a physical or mental impairment that affects an individual's daily functions. According to the World Health Organization's (WHO) manual: International Classification of Impairments, Disabilities and Handicaps (ICIDH), "Disability classifications include visual, hearing, motor and cognitive impairments" (WHO, 1980). This list of impairments can greatly affect how an individual reacts to a video game. A case study comprised by Bei Yuan, Eelke Folmer, and Frederick C. Harris, Jr. from the Department of Computer Science and Engineering at the University of Nevada focuses on the topic of game accessibility. Titled "Game Accessibility: A Survey," it provides a scientific model on how players react when they play a video game. The three steps of the model state that players: "1) receive stimuli, 2) determine response, and 3) provide input when playing a game" (2010). Players with an impairment struggle to successfully react to what is going on screen. Various figures are illustrated in the case study to showcase this model such as an integration sequence and interaction finite state machine diagram. Using data from a 2002 U.S Census, the three determine about 2% of the U.S population are unable to play games. Around 9% of the population are able to play but suffer from a disability that impairs their ability to fully enjoy the experience. While they do account age as a factor for this percentage where older individuals may have no interest in games, they nonetheless expect this percentage to continue climbing for years to come. Looking into recent 2018 census data from the CDC, this number has risen to about 26% of the population with a disability keeping them from participating fully in certain activities such as playing games (Perrin, 2021). Due to the rising number of impairments seen in recent years, attention has been increased on what can be done to accommodate for these impairments.

One approach that Yuan, Folmer, and Harris Jr. recommend for accessibility strategies is to use the interaction sequence diagram of receiving stimuli, determine response and provide input and divide them into high- and low-level strategies of accommodations (2010). For example, when we receive stimuli either through visuals or sound, it can be replaced or enhanced by other stimuli to simulate the same affect. Someone who may be blind can instead receive an audio stimulus to replicate what they should be seeing on the screen. Likewise, someone who may be deaf or can't hear well can instead receive a visual stimulus to replicate what they should be hearing in the game. Using these low-level strategies such as increased font size, subtitles, closed captioning, audio cues, haptics, and more help enhanced and replace high level stimuli. When determining a cognitive response, low level strategies such as increasing response time, automate inputs and limiting objects in the game can help reduce the number of stimuli received at once. With this, a player can be given more time and assistance to provide an input within the game either by removing, automating, or controlling said input. When using these accessibility strategies, they can be help address problems in game design and find solutions easier. Addressing what each strategy points to each stimulus can help make a game accessible for everyone. However, Yuan, Folmer, and Harris Jr. do state that tradeoffs are made when applying these strategies in game development. The developers need to be careful ending up making the game not fun to play or take away from the original vision (2010). The game should be made from the ground up with accessibility in mind when developing. Developers usually add these accessibility accommodations later on within development which makes it more complex to implement. Avoiding this can tremendously make a game more accessible for all players.

Another case study survey titled "Game Not Over: Accessibility Issues in Video Games," examines the scope of the problems faced with accessibility issues in gaming. This study was conducted by the Games Accessibility Special Interest Group; an organization founded in 2003 bringing awareness to accessibility needs. They determined common problems disabled gamers face include the following reasons such as, "inability to follow a storyline, unable to complete a puzzle, unable to learn how a game is played, and the inability to use adaptive hardware to play the game" (Bierre 2). Some reasons they provide for these common problems include no subtext for story, clues only given in text, unable to alter a game speed and more. The type of disabilities that affect a person's ability to play games can be broken down into four groups which includes auditory, visual, mobility and cognitive. As stated before, it is important that developers make their games accessible to everyone. Therefore, accommodations must be made for disabled players to fully enjoy the extent of a game. If a game does not feature any accessibility options built within, the group recommends using alternative assistive technology solutions outside the same. Prominent assistive software includes alternative pointing devices, on screen keyboards, speech recognition, screen readers, screen magnifiers and hardware. While these alternative solutions are most definitely helpful, it is still highly recommended for developers to accommodate for these features within the game first before players resort to outside solutions. However, I believe these tools are a great assistance to players. While financial grounding holds and budget can play a factor into providing accommodations to players, the Games Accessibility Special Interest Group advocates for a middle ground to be found. They believe all players should have the right to play.

While accommodations are an important aspect for game accessibility, some developers can run into problems with figuring out how to implement these features into their games. In an

article titled "An Empirical Study of Issues and Barriers to Mainstream Video Game Accessibility," researchers John R. Porter and Julie A. Kientz from the Human Centered Design and Engineering Department at the University of Washington study some of these issues that can occur in video game accessibility. Similar to the other case studies above, these barriers include motor, visual, hearing, and cognitive problems. The researchers conducted many surveys from players with disabilities to determine these barriers. They first gathered information where players in impairment classes play their games on different platforms, frequency of play styles on said platforms, and how well their assistive technologies work on these devices. The conclusion the researchers find is that "Based on industry's identification of middleware as a critical link in the chain of accessibility, invested parties (be they researchers, community organizations, or forces from within the industry itself) should work with middleware developers in an effort to define and implement standardized accessibility features that can be carried across platform lines" (Porter 2013). Just like the researchers, I believe that creating a standard for accessibility in gaming can help developers make superior products for every gamer no matter the needs.

Microsoft has been a big advocate for video game accessibility. In their article "Making Games Accessible", Microsoft encourages game developers, designers, and producers to make video games more accessible for everyone. They believe it is important to make gaming accessible for everyone as they state, "it will increase the gamer base, result in better games, and improve the quality of life for gamers" (Microsoft 2017). Microsoft urges developers to accommodate for vision, hearing, motor, cognitive, and speech impairments by providing gamers options, shifting game design, innovation, and game evaluation. When researching online about how to accommodate my website for this paper in Microsoft ASP.NET, I learned about different design

principles and guidelines to accommodate for accessibility. Microsoft had an excellent article with various design approaches to follow such as having a text equivalent for non-text elements, no color dependencies, full keyboard access with using focus properties, alternate images, and texts for the page and much more (Microsoft Docs, 2014). I feel that game developers can learn a lot from website accessibility and how much it has evolved over the years. Most of the same type of principles and design can be used when designing video games. This can also apply when developers are trying to advertise their games across different forms of media such as a website to players. One prominent assistive technology on the web are screen readers such as JAWS and VoiceOver. A screen reader is a piece of software that can translate text on a website to speech or braille. They are mostly found on computers and phones. This can help those who are visually impaired be able to navigate across the web. Recently, Microsoft and Sony have introduced system level screen reading on their PlayStation and Xbox systems with a software update effectively giving more people with disabilities the chance to play games and navigate the UI. This is a great step in the right direction for accessibility in gaming.

A great way to understand more about accessibility and how to implement accommodations into your games is to receive feedback from consultants who can help developers during development. One consultant who's been helping game developers with accessibility features is Josh Straub. As a deaf gamer with cerebral palsy who works as a video game accessibility consultant, Straub has noticed the trend of more developers beginning to accommodate towards disabled gamers when it comes to game development. Straub himself has been a tremendous help towards this positive change. He's recently worked on *Marvel's Spider-Man* by Insomniac Games for the PS4 as the lead accessibility consultant. Straub worked on

making the UI (user interface) accessible and certain puzzles skippable for those who are having difficulty. With more than 20 million units sold as of November 2020, his impact has certainty raised awareness towards accessibility and players being able to play the game more comfortably. Straub hopes that more people are acceptable toward accommodation options in games and for the industry to be open to all gamers as he states, "The best way to strengthen accessibility is by broadening the scope to include more people in the conversation and to give gamers with disabilities the same consideration as other minorities. We live in a time where games make headlines for being inaccessible, which shows how far we've come since I started my career as an accessibility educator" (Straub, 2019).

Another recent title that Josh Straub helped consult on was one I wanted to highlight. PlayStation and Naughty Dog's *The Last of Us Part II* for the PS4 in 2020 embraces accessibility options for players. Developer Naughty Dog built this title with accessibility in mind making this their most robust and accessible game to date. Featuring more than 60 different accessibility settings, Naughty Dog wanted to make sure that their latest title can be enjoyed by everyone (PlayStation, 2020). When starting the game up and anytime in the options menu, you can choose between three different accessibility presets which configures the recommended vision, hearing, and motor accommodations. Additionally, you can also manually choose what accessibility accommodations to turn on in the settings. Other accessibility features include alternate control methods, button remapping, text-to-speech with audio cues, combat accessibility, difficulty options, and much more. Naughty Dog mentioned that their goal with accommodating newer titles with as much accessibility features as possible came about due to feedback from Josh Straub. Straub struggled to complete the button mashing quick time events in their previous game,

Uncharted 2: Among Thieves. Gameplay designer at Naughty Dog Emilia Schatz wants to remove these barriers such as QTE's to players in order for them to complete the game. In one quote, she mentions that accessibility is, "not about dumbing a game or making a game easy. What do our players need in order to play the game in parity with everyone else? The idea here is to give players a starting point" (TutoGame, 2020). Their new title can allow you to skip these sequences. With the various options available to players, everyone can tailor the game to their own experiences.

The last title I wanted to highlight being built with accessibility in mind and partnered closely with the disabled community is Microsoft's and Playground Games *Forza Horizon 5* for Xbox and PC in 2021. Using Microsoft's own Xbox Accessibility Guidelines detailed previously, Playground Games were able to make accessibility a priority in the beginning of development. The most prominent feature I wanted to highlight includes American and British Sign Language being an option for game cutscenes by using a picture-in picture mode near the bottom of the display. Other accessibility features include a game speed modification, subtitle adjustments, contrast and color blindness modes, audio and difficulty adjustments, and full controller re-mapping for the player. With these accessibility features, Playground Games believes that players deserve the option to tailor their game experience however they would like (Brown). The release of the game also came with an important accessibility update to Xbox consoles. Included with this update is accessibility feature tags within the Microsoft Store for games, spotlight on games with accessibility in the store, color filters, night mode, and speech-to-text/ text-to-speech improvements. Last by not least, Microsoft also introduced a free fundamentals gaming accessibility course for developers to take on MSLearn. In this course, they can learn and prove out their knowledge of accessibility through various modules (Mortolani, 2021). Microsoft's main

goal through this course and their various accessibility features and updates is to bridge the disability divide between players and developers. They believe that in order for gaming to be welcoming and fun for everyone, that customization should be put first for the player. Overall, I believe that *Marvel's Spider Man, The Last of Us Part II, and Forza Horizon 5* are excellent modern titles that future developers should look upon for inspiration and guidance when accommodating their games with accessibility in mind.

One of the biggest advocates for accessibility in gaming is the non-profit organization, the AbleGamers Foundation. This foundation has served more than 56 million members of the disabled community according to their website. The AbleGamers mission statement is to bring awareness and broaden the range of video games for the disabled. The five pillars that they focus on to help players connect with others, build communities, and combat social isolation include peer counseling, engineering research, community development, user research and professional development (TheAbleGamers, 2012). Written by founder Mark Barlet and COO Steve Spohn of the foundation, their book Includification: A Practical Guide to Game Accessibility is a guide for game developers to follow when making their games. The guide contains many checklists for developers to use that would help benefit disabled gamers which includes mobility, vision, hearing, and cognitive guidelines. Some important accessibility accommodations they advise include remappable buttons, colorblind options, easy to read subtitles, visual cues for audio, difficulty levels, and game assistance. The organization also lists some negative connotations that might come with adding accessibility features into games. Such connotations include accessibility breaking achievements, implementation of bots, expensive to implement, cost of developing, and interference with platform technical requirement checklist. The foundation however argues against

each connotation as accommodations does not break any of imposed rules and can only help the player. The reason why the organization is so passionate about bringing greater accommodations to disabled gamers is as Barlet states, "Gamers with disabilities needed a resource to hold information on how to play games more easily, which games are more accessible, and what technologies exist to enable gamers of all disabilities" (Barlet and Spohn, 2012). While accessibility accommodations within the game are important, one thing that must also be considered is the controller or input device that the player uses to play the game.

The game controller is the entry way between the player and world they interact with. Features from the functionality and build quality must be universally usable by many players. While many hardware manufacturers accomplish and create wonderfully built and feature rich controllers, it is nearly impossible to accommodate for every single player. Disabled gamers can especially find it rough to play a game if the controller is not optimized for their impairment. For example, an article written by Caleb Kraft for the website Hackaday follows the story of a kid named Thomas who suffers from muscular dystrophy. Muscular dystrophy is a condition in which someone loses strength in their muscles over time. Thomas loves to play Minecraft but finds it difficult to hold a default controller. Buying a custom controller online with the hardware to accommodate for a player's need can be quite pricey. It can also take a considerable amount of work in order to set up and operate a custom controller to use with your game if you are not tech savvy. The writer of the article decided to build it himself for Thomas as he states, "I made up my mind to do something more than just make a simple controller for [Thomas], I needed to help as many people as possible" (Kraft, 2013). Kraft tells other individuals that anyone can make a difference on helping make affordable custom controllers for disabled players. Either by making

them, sharing info, or donating to charities like AbleGamers, anyone can help a player like Thomas continue to play their favorite games. Many custom controllers have been developed for players and has helped make many games accessible for everyone. I want to highlight some of the most helpful ones available.

One custom controller that has been beneficial to players with disabilities is the QuadStick. Introduced in 2014, the QuadStick is designed for quadriplegics who are affected by paralysis of all four limbs. This device allows them to play video games using their mouth instead of using a default controller. It allows a person to control a game using puff, sip, and lip sensors as well as specialized voice commands that responds as input for the player. This makes it so where a player does not need to move their limbs to play a game. The QuadStick is powered by a special 32-bit processor that uses the input from the player. The processor then sends the input to a console or PC through either Bluetooth or a USB dongle. A player can customize their voice commands using Excel or Google Spreadsheet's. The voice commands are then stored within the device's memory to switch from different controller profiles when playing a variety of games. The QuadStick uses voice recognition software similar to VoiceOver or JAWS and then translates button inputs. For example, if the player says the letter X from an Xbox controller, the QuadStick will translate the command to use in the game. The QuadStick device was created by a joint partnership between custom controller designers Ken Yankelevitz and Fred Davison. Yankelevitz created a similar device in the past and was used as a basis for the QuadStick. Due to health issues, Yankelevitz could only supervise Davison on the project. The two then brought the project onto Kickstarter in order to get the custom controller funded by backers (New Atlas, 2015). Surpassing its Kickstarter goal of $10,000 and beyond, the QuadStick has been helping many gamers who are quadriplegic

be able to play games they were unable to play. Starting at $399, the device is a bit pricey. However, its impact cannot be undermined and is a pillar for others to follow in regard to accessibility needs.

A recent positive change is that companies such as Microsoft are taking accessibility more seriously when it comes to their gaming controllers. For example, they have recently released the Xbox Adaptive Controller being introduced in 2018, starting at only $100 and available at multiple retailers. This controller is an official, affordable, and highly customizable input device that can be used with every single Xbox, PC, and even in PlayStation and Nintendo games. Featuring large programmable buttons that can be configured to anything from a default Xbox controller, this makes it so where disabled players can play much easier. Another great benefit of the controller is the ability to connect external devices such as joysticks, switches, pedals and more. The QuadStick accessory mentioned previously is also compatible with the device with official support from Microsoft. Multiple controller profiles can be set up for different games and can be configured within either the Xbox Accessory app, an Xbox or on Windows 10/11. The controller is also compatible with the Copilot feature on Xbox where multiple controllers can be connected to be one as if it were a single controller. While some may see the Xbox Adaptive Controller as only being used for disabled players, Microsoft created this controller in mind for everybody and can be customized to be played in any which way. Microsoft worked extremely closely with the disabled community when creating their adaptive controller. They received feedback from groups such as the AbleGamers Charity and The Cerebral Palsy Foundation to make sure the controller reached the needed design, shape, and functionality for all players (Xbox, 2018). I see this controller as a huge win for the disabled community and players. This allows for more people to

enjoy games with everybody and feel included in the community. I am happy Microsoft spent the time and effort to develop an adaptive controller that is readily available and affordable for everyone. And with this effort shown by big companies like Microsoft, more developers will be encouraged to bring accessibility options to their games. I hope other companies will continue to refine and release more adaptative controllers for every gamer's needs.

Another point I wanted to go over with my research is a recent legislation that has come into law. According to an article from the IGDA Game Accessibility foundation, this legislation introduced by the FCC in 2019 requires for all new games to comply with accessibility guidelines via the 21st Century Communications and Video Accessibility Act (CVAA). Such guidelines to follow include making your game accessible to those with no sight, color vision impairment, little speech, and limited strength. Previously, waivers were put into place where developers can ignore certain accessibility requirements into their game. Once the waiver expired at the end of 2018, all future developers must meet minimum guidelines in order for their game to release without any consequences. CVAA states for after the expiration that , "1) Games that enter development after this date must be fully compliant to accessibility, 2) Games already in development after this data but released after it must be as compliant as possible, how far through development the game was at Dec 31st may be taken into account in case of a complaint, and 3) Games released before this date that receive substantial updates after it must also be compliant" (IDGA, 2019). If games after this date do not comply with these guidelines, then the FCC will step in and heavily fine companies that fail to follow. While specific standards aren't set in place, developers are encouraged to find various organizations, resources, and guidelines for how to utilize accessibility accommodations in their games. I think it is great to see this legislation put into law as it gives developers more of

the chance to implement and experiment with accessibility efforts, even if most companies will only do so to avoid the fines. This can only be a good thing for the industry as accessibility accommodations will be the norm rather than the exception to the rule.

While it can be difficult to argue against wanting to add accessibility options into games, there can be cases where a small development team might not have enough time or resources to implement them. Therefore, I would say its best for a development team to plan for adding accessibility options early on in their project. If not possible, the development team can also add it in later with a free update or patch to their game. Other difficulties that may arise may include low return on investment or a limited audience for developers to implement such accessibility accommodations for players. Even so, the positive impact for bringing their games to more players, helping improve their mood, and increased participation in said activities with more friends, family and individuals highly outweigh these issues. And while I do understand that developers also need to make money on their games to keep their studios running, increased accessibility features will most definitely improve game sales for developers. And in return, this increase in sales can help put more budget into accommodating accessibility features into later projects. The positive word of mouth from accessibility groups can also help with the game's reception, support from people for including accessibility into account, and bringing in more players.

To recap, accessibility accommodations should always be considered when designing your product. The earlier you can plan to include them, the better for the user. Budget should not be much of a concern as many options can be included relatively easily and cheap. Positive word of mouth and support from players can easily outweigh any negatives or budgetary issues. Simple

accommodations such as remappable buttons, difficulty options, subtitle and audio changes can go a long way to making your game reach wider audiences. Additionally, supporting various disabled communities and taking their consulting feedback can help you as a developer on what your games needs to be accessible. And lastly, keeping your platform and game open to modifications, such as alternate controller methods and assistive software features can allow players to come up with additional ways to custom their play experience to whatever they wish it to be.

As a software developer, gamer, and someone who has a disability, I greatly appreciate and commend those who promote and advocate for accessibility in not only the video game industry, but other mediums. I urge for more companies and developers to embrace accessibility accommodations for the benefit of others. In this day in age with how rapid and sophisticated technology has evolved, accessibility should always be an option for people. From the research I conducted and obtained by various sources and organizations, accessibility efforts have come a tremendous way from what they were say twenty and even ten years ago. As I progress further into my major and career field, I see accessibility as a necessity in all the work I conduct. I want everyone to feel accepted for who they are, feel included and know that they fully matter. While it can be difficult to argue against implementing accessibility needs, it is still important to accommodate for them early on in development and seek assistance from accessibility consultants. Accessibility cannot be anything, but only a good thing for everyone. Accessibility efforts and advocation has improved a long way over the years and continues to do so. I hope for more people to be aware of the needs of others not only in the gaming, technology, and entertainment industry, but within the world around them. Disabilities should not be put down upon or ignored by society.

They should instead be embraced, supported, and utilized for the betterment of mankind and those around us.

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