Literature Review

# Introduction

We are reviewing assistive technology for autistic children, in order to understand the current research into this topic. We found that this is a narrow topic with little specific research. We are hoping to understand firstly how assistive technologies have helped in other fields, such as visual impairments or disabilities. We have then narrowed the scope of our research to be specific to autism, and how other real-world assistive technology has helped. We are doing this to fully understand the subject area before we begin to invest time into designing, and ultimately producing, our augmented reality application. The scope of our review was limited to assistive technologies specifically in augmented reality, and so we have left out areas not related to this. We have also not included non-assistive implementations of augmented reality, such as those targeted at the general population. We have however included in the scope other disabilities such as visual impairments, motor skills and learning/developmental disabilities.

# Autism

“Clinically, autism is defined by a “triad” of deficits comprising impaired social interaction, impaired communication, restricted interests, and repetitive behaviors” (1). This general definition, however, doesn’t fit every case of autism as there is a wide range of autistic traits within the spectrum. For example, speech impairment can sometimes be reduced with people being able to hold conversations to a reasonable degree whereas sometimes the speech of the individual hasn’t developed at all (1).

Autistic children think and act very difficult to the average child, this begins with their inability to interact and connect with people. Some people diagnosed with autism didn’t think about or even realise that there are other people, they are just confined to their own head. (2) mentions quote from an autistic person and their experiences from their childhood. They mention how they didn’t know other people existed until they were 7 years old when it suddenly dawned on them. Even after this though the person was unable to interact with people as normal, “I could never have a friend, I really don’t know what to do with other people, really” (2). This is an important factor to consider when making a game specifically designed to help autistic children develop.

In Meltzer, Donald. (2008) findings, he talks about a child named Timmy, who was diagnosed with Autism, the first five months of his life were said to be a “delight” to his mother. But not until he became of nursery age, he had a failed attempt at psychotherapy, he needed to constantly have a mother figure present, had frequent crying outbursts   and destroyed anything he built with plasticine.  He seemed to have a deep obsession and relationship with objects, he was easily distracted by any external stimuli. Any birds chirping or birds moving in the garden, he seemed to go and study them deeply. Timmy during a child had a very dynamic life, he could “lick the glass of a window” “smell plasticine” or could even stroke his therapist’ cheeks or hair, he didn’t seem to have any knowledge or care for social cues, and inappropriate behaviour for the specific situation.

The main social dilemmas for someone diagnosed with autism is their ability to read facial expressions, understand different tones of voice and realise if someone is joking or being sarcastic (4). This contributes heavily to why autistic children generally play alone and keep themselves to themselves, understanding other people is a huge challenge throughout childhood and generally throughout life.

# Assistive Technology

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# Assistive Technology for Learning & Development

Salomia, Anca et al. (2018) conducted a research paper documenting his findings in a special educational learning institution in Romania conducted workshops aimed at young people with mental disabilities and hearing impairments helping them with their driving lessons. The institution tested a mobile AR application is a game where the player can recreate real road scenarios, they may go through with real life objects. The reception had been very positive, as the paper reports on the application “manifesting increased curiosity” and “strong desire to experience”. In addition, “providing lower costs and higher portability” compared to regular computer game consoles. The same school SAMUS, provided a regular course on driving theory with analogy learning methods with written questionnaires and revision from legislation books, the course was abandoned with no benefits achieved in favour of the new AR application.

# Assistive Technology in Autism

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# Augmented Reality

Augmented reality has seen a large increase over the years. Billinghurst et al. (2015) highlighted how augmented reality has seen a widespread implementation since 2010, after a slow and steady development beginning with early research in the 1960s. In their research, they discuss how it can be applied to a wide range of technologies. In particular, they found that while only ten million people used augmented reality in 2010, this number is expected to exceed one billion by 2020.

Garnet have indicated that augmented reality is now past its peak hype for emerging technologies since 2014. (Gartner, 2017) This would indicate that there is a growing familiarity with augmented reality as a technology; this view is backed up by the explosion in growth AR saw through games like Pokemon Go in 2016, and if Billinghurst et all (2015) are correct, we are well on course to having 1/7th of the global population regularly using augmented reality.

# Augmented Reality as an Assistive Technology

Augmented reality has seen a growing use as an assistive technology; much of the research available has indicated how this technology has helped with everything from learning disabilities to aiding surgeons carry out surgery.

# Augmented Reality in Autism

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# Conclusion

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