Literature Review outline

Research Topic: AI-based assistive technology for the physically disabled and/or the elderly

What is the focus and aim of your review? Who is your audience?

- How assistive technology can improve a disabled persons quality of life?
- What are the benefits of AI based assistive technology?
- What are the ethical, legal and social concerns relevant to assistive technology more specifically AI based assistive technology?
- What are the drawbacks to assistive technology (E.G cost, negative perception etc)
- The target audience is the disabled, the elderly and their carers
    - The goal is to educate them on the assistive technologies available to them

Why is there a need for your review? Why is it significant?

- Because some people with disabilities may not be aware of the assistive technologies available to them
    - Possible reasons for this; they were diagnosed later in life so may not have been aware of their disabilities, they were unaware of the assistive technologies, they may have server mental deficiencies so may be unable to understand the information that has been provided to them on assistive technologies in the past
- Assistive technologies could help to safeguard the vulnerable from being exploited by people who may look to exploit them
- Assistive technologies could improve the quality of life for people with severe disabilities
- Assistive technologies can help people who struggle with daily activities of life and may allow them to become more independent

What is the context of the topic or issue? What perspective do you take? What framework do you use to synthesise the literature?

- The context of the topic is going to be centred around how assistive technologies can improve vulnerable people's quality of life allowing them to be more independent
- While I will mainly be looking at the perspective of how assistive technology has improved their life, I will also touch on the drawbacks of assistive technology such as the overreliance on it.
- I will be using Chris Hart's book on Literature Reviews (Hart, 2018) in conjunction with Harris Cooper's article on Literature Reviews (Cooper, 1988) for guidance when writing the literature review

How did you locate and select sources for inclusion in the review?

- Sources were located a series of key word search on Google scholar and Google. I also discussed assistive technologies with my DSA mentor as due to there experience working with people with disabilities, they were more aware of the types of assistive technologies available in the market today.
- Documents that weren't written or translated into English were excluded as that is the only language I can understand.
- Documents that didn't come from reputable sources were excluded as they haven't been checked for accuracy
- It was important to find academic articles that argued both for and against the use of AI assistive technologies
- Selected Sources:
    - Access to Artificial Intelligence for Persons with Disabilities: Legal and Ethical Questions Concerning the Application of Trustworthy AI (Joamets & Chochia, 2021)
    - Ethical issues in assistive ambient living technologies for ageing well (Panico et al., 2020)
    - Assistive Technologies for Improving Quality of Life (Lancioni & Signh, 2014)
    - Assistive technology for people with intellectual and developmental disabilities in the United States in Home- and Community-Based Services (Friedman, 2024)
    - Outcomes of assistive technology use on quality of life (Scherer, 1996)
    - Economic evaluation of healthcare technology improving the quality of social life: the case of assistive technology for the disabled and elderly (Shin et al., 2015)
    - Assistive technology: Impact on education, employment, and independence of individuals with physical disabilities (Stumbo et al., 2009)
    - Assistive technology: Interventions for individuals with severe/profound and multiple disabilities (Lancioni et l., 2012)
    - Using assistive technologies to improve lives of older adults and people with disabilities (Kowtko, 2012)
    - Assistive Technology for People with Autism Spectrum Disorders (Lang et al., 2014)
    - Assistive technology for people with developmental disabilities (Lancioni, 2017)
    - The use of everyday and assistive technology in the lives of older autistic adults (Zheng et al., 2022)
    - Assistive technology to support people with autism spectrum disorder in their autonomy and safety: A scoping review (Wohofsky et al., 2022)
    - Assistive technology and people with dementia (Cash, 2003)
    - Effectiveness of assistive technology in improving the safety of people with dementia: a systematic review and meta-analysis (Brims & Oliver, 2019)

    - Users of assistive technology: The human component (Brodwin et al., 2007)
    - Maslow's hierarchy of needs (Maslow, 1943)
- Key word searches:
    - The legal, social and ethical concerns of AI assistive technologies
    - How Assistive technologies improve people with disabilities quality of life
    - Assistive technologies for those with dementia
    - Assistive technologies for those with autism
    - Assistive technologies for the elderly
    - Assistive technologies impact on self confidence
    - How assistive technologies aid people with their daily activities
    - The use cases for assistive technology for the elderly and disabled

Access to Artificial Intelligence for Persons with Disabilities: Legal and Ethical Questions Concerning the Application of Trustworthy AI

- The article by Dr Kristi Joamets and Dr Archil Chochia looks at the legal, social and ethical issues of ai based assistive technologies for those with disabilities
- They argue the need for a national policy to enforce the rights of disabled people
- As a vulnerable adult myself I found the article to be rather informative
- Strengths:
    - Highlights the ability of assistive technologies to improve a disabled persons quality of life
    - Highlights how Artificial Intelligence can enhance assistive technologies
    - Emphasises the importance of trustworthy AI referencing relevant EU legislation and ethical guidelines
    - Provided a solid background on the laws surrounding Artificial Intelligence and the rights of people with disabilities
- Weaknesses:
    - The article heavily focused on the European legal and ethical standards. The article could have benefited from providing more of a global perspective on the relevant legal, social and ethical legislation for AI based assistive technologies.
        - What about the relevant legislation in regions other than Europe?
    - The article could have gone into more detail on the benefits, risks and limitations of AI as they only looked at them at a high-level.
- Further Research:
    - How different cultural and legal contexts affect the adoption and ethics of AI
    - How AI can aid those with specific disabilities such as those with dementia

Ethical issues in assistive ambient living technologies for ageing well

- The article by Francesco Panico, Gennaro Cordasco, Carl Vogel, Luigi Trojano & Anna Esposito looks at the ethical issues in assistive ambient living technologies for the elderly
- Provided background on the negative connotations of people who using AAL technologies
- The ethical concerns when forcing this technology on the elderly (E.G loss of dignity)
- Strengths:
    - Identifies the importance of ethics in assistive ambient living technologies
    - Discusses on how ethical principles can be violated when caring for the elderly
    - Referenced real world projects effectively
    - Demonstrated good knowledge of AI Ethics
    - Identifies the psychological impact of AAL technologies
    - Alignment with recognised ethical frameworks
- Weaknesses:
    - Limited details on legal issues
        - What are the relevant laws in different countries
    - Limited number of case studies
        - Mainly European case studies
- Further Research:
    - How ethical concerns could be resolved?
    - First hand research
        - Interviewing careers and those who require AAL technologies

Assistive technology for people with intellectual and developmental disabilities in the United States in Home- and Community-Based Services

- The article by Carli Friedman provided statistical data on assistive technologies for people with disabilities in the United States
- Strengths:
    - Thorough analysis of data from Home and Community Based Services across the majority of the United States
    - Provides an understanding of how assistive technologies are integrated into medical aid
    - Good use of quantitative research
    - Highlights the key issues relevant to access to assistive technologies
    - Highlights the need for increased funding
    - Provided an economic analysis on the potential ROI for assistive technologies
- Weaknesses:
    - All data came from one source
    - All hypothesises are based on projected data
    - Does not address the effectiveness of assistive technologies
    - Doesn't provide a detailed longitudinal analysis of trends in assistive technologies
    - Doesn't explain why there are such disparities between states
- Further Research:
    - Provide a global perspective on assistive technologies
        - The access and funding for assistive technologies for people with intellectual and developmental disabilities in other countries
    - Research assistive technologies for people with other disabilities
    - Research into the effectiveness of assistive technologies
    - Research into how state funds are allocated across different departments
    - Longitudinal studies tracking the growth of assistive technologies to show trends
    - Primary research
        - Interviews with individuals with IDD and their caregivers

Economic evaluation of healthcare technology improving the quality of social life: the case of assistive technology for the disabled and elderly'

- The article by Jungwoo Shin, Yeunjoong Kim, Heekoo Nam & Youngsang Cho analysis the social economic value of assistive technologies using the Spike model
- Strengths:
    - Used the spike model to handle scenario when respondents indicated zero willingness to pay for government investments in assistive technologies
    - Used contingent valuation method a widely accepted method
    - Provided quantitative insights
        - Social economic benefit
        - WTP
    - Identified key social demographic factors that influence WTP
    - Identified attitudes towards assistive technologies
    - Provided a recommendation on how to decrease the number of respondents who indicated zero WTP
- Weaknesses:
    - Study focused on respondents from Seoul and Gyeonggi Province. Other areas may have very different perspectives
    - Results rely on hypothetical willingness so may not be accurate
    - Only focused on 5 different types of assistive technologies
    - No longitudinal analysis
    - Didn't investigate the indirect benefits of assistive technologies
- Further Research:
    - Include other regions in South Korea into research
    - Compare the hypothetical WTP with the actual payments
    - Do a longitudinal study to show how attitudes and WTP have changed over time
    - Research the indirect benefits
    - Gather qualitative data

Assistive technology: Impact on education, employment, and independence of individuals with physical disabilities

- The manuscript by Norma Stumbo, Jay Martin and Brad Hendrick looks at how assistive technologies impacts individuals with disabilities in relation to their education, employment and independence.
- Strengths:
    - Evidences assistive technologies impact in education, employment and independent living
    - Uses statistical data to show disparities in education and employment for individuals with disabilities
    - Analyses the relevant legislation surrounding assistive technologies
    - Argues effectively for cost effective assistive technologies
    - Makes appropriate recommendations
- Weaknesses:
    - Doesn't look into other factors that affect accessibility to assistive technologies enough
    - Doesn't provide a global perspective on assistive technologies as focused on the United States
    - No qualitative insights
- Further Research:
    - How bleeding edge technologies are being integrated into assistive technologies
    - Longitudinal study on the long-term impact of assistive technologies
    - Global impact of assistive technologies
    - Qualitive first hand research
        - Interviews with those who actively use assistive technologies

Assistive technology for individuals with severe/profound and multiple disabilities.

- The extract written by Giulio Lancioni, Nirbhay Singh, Mark O'Reilly, Jeff Sigafoos and Doretta Oliva from the book assistive technologies for people with diverse abilities focuses on the assistive technologies available for people with severe disabilities
- Strengths:
    - Effectively categorises use cases for assistive technologies
    - Uses numerous empirical studies to support any claims
    - Uses real world examples effectively
    - Highlights emotional benefits of assistive technologies
- Weaknesses:
    - Doesn't address the challenges associated with assistive technologies
    - Too heavily focuses on the technology
    - Too heavily focuses on empirical data and expert analysis
    - Emerging trends aren't explored in enough detail
    - Not a longitudinal study
- Further Research:
    - Research future of assistive technologies
        - How they will integrate bleeding edge technologies
    - Research global context
    - Gather qualitative data
        - Interview carers
    - Longitudinal study on how assistive technologies have developed over time
    - Research into overcoming the challenges of assistive technologies

Using assistive technologies to improve lives of older adults and people with disabilities.

- The article by Marc Kowtko looks at the challenges faced by the disabled and elderly using modern technology
- Strengths:
    - Thoroughly explores the impact ageing and disabilities can have on one's ability to use technology
    - Used a combination of quantitative and qualitative data
    - Offered solutions on improving accessibility
    - Critiqued current accessibility guidelines and laws
    - Emphasised the importance of education and sensitivity to good affect
    - Explained the efforts being made globally to make assistive tools more affordable and accessible.
- Weaknesses:
    - Source and statistics are now outdated
    - Limited diversity in examples
        - What are the differences between the challenges faced by those with cognitive impairments and physical disabilities?
        - What about those who aren't disabled or elderly but still struggle with technology?
    - Doesn't offer detailed solutions to the challenges
- Further Research:
    - Look into more recent studies
    - Research the impact technological advances have had
    - Provide a global perspective not just US and EU

Assistive technology for people with autism spectrum disorders

- The extract written by Russell Lang, Sathiyaprakash Ramdoss, Tracy Raulston, Amarie Carnet, Jeff Sigafoos, Robert Didden, Dennis Moore and Mark O'Reilly from the book assistive technologies for people with diverse abilities focuses on the assistive technologies available for people with ASD to enhance communication, social, and daily living skills.
- Strengths:
    - Covers a wide range of assistive technologies
    - Uses empirical evidence to support any claims
    - Discusses real world application of the technologies
- Weaknesses:
    - Sources and Studies were dated
    - Lack of diversity in data
        - Didn't mention how the elderly with ASD can benefit from assistive technologies
        - Heavily focused on children with ASD
        - Barley mentioned adults with ASD
    - Several areas are not explored deeply enough
        - Overly Focused on communication and social skills
    - Doesn't offer enough explanation on accessibility and affordability
- Further Research:
    - How assistive technologies used vary between different age groups
    - Look into more recent studies
    - Comparative studies into the different types of assistive technologies
    - Researching future trends
    - Longitudinal studies

Assistive technology for people with developmental disabilities

- The article from Giulio Lancioni looks into the assistive technologies available for people with developmental disabilities
- Strengths:
    - Covered a range of assistive technologies
    - Referenced numerous studies
    - Used real world examples to demonstrate the effectiveness of assistive technologies
    - Touched on cutting edge technologies
- Weaknesses:
    - Doesn't look at any of the challenges associated with assistive technologies in enough detail
    - Focused too heavily on education and therapeutic use cases
        - Employment not covered
    - No longitudinal analysis
- Further Research:
    - Research into how assistive technologies are used by different groups of people with developmental disabilities
    - Perform cost benefit analysis on assistive technologies
    - Research into how bleeding edge technologies will integrate with assistive technologies
    - Research into a global perspective of assistive technologies
    - Longitudinal analysis

The use of everyday and assistive technology in the lives of older autistic adults.

- The article by Lidan Zheng, Kitty-Rose Foley, Rachel Grove, Kieran Elley, Scott Andrew Brown, Dawn-joy Leong, Xue Li, Elizabeth Pellicano, Julian Trollor, and Ye In Hwang looks at how adults with autism use assistive technologies in their everyday lives
- Strengths:
    - Fills the research gap by focusing on elderly autistic adults
    - Used semi-structured interviews to collect qualitative data
- Weaknesses:
    - Small sample size
    - Didn't collect data from people from different socio-economic backgrounds
        - Only those who live independently
    - Excluded participant with intellectual disabilities and those who are non-verbal
        - Disregarding a large portion of autistic people
    - Ignored the new technologies being integrated into assistive technologies
    - Limited exploration of how systemic issues affect technology adoption.
    - Reliance on self-reported data
        - May be inaccurate
- Further Research:
    - Research into how assistive technologies facilitate independence for all forms of autism
    - Research into the barriers of assistive technologies
    - Research into tools and technologies specifically targeted at those with autism
    - Longitudinal research on the impact of assistive technologies over time

Assistive technology to support people with autism spectrum disorder in their autonomy and safety

- The article by Lukas Wohofsky, Philip Scharf, Sandra Lisa Lattacher and Daniela Krainer looks at how assistive technologies can enhance the autonomy and safety for individuals with ASD
- Strengths:
    - Addressed the gaps in assistive technologies research
    - Followed PRISM guidelines
    - Highlighted emerging trends
    - Provided comprehensive insights
    - Referenced plenty of studies
- Weaknesses:
    - Only 18 of the 40 studies involved people with ASD
    - Many of the studies exclude ASD subgroups
    - Missing recent developments in assistive technologies
- Further Research:
    - Research how IoT devices support the independence of people with ASD
    - Research ASD subgroups
    - Research barriers to assistive technologies

Effectiveness of assistive technology in improving the safety of people with dementia: a systematic review and meta-analysis.

- The article by Lucy Brims and Kathryn Oliver looks into the effectiveness of assistive technologies for people with dementia focusing on how they ensure their safety
- Strengths:
    - Focuses on how assistive technologies improve safety concerns relevant to people with dementia
    - Followed PRISM guidelines
    - Provided statistics on the safety benefits of assistive technologies
    - Evaluated a range of assistive technology devices
    - Built upon research to date
- Weaknesses:
    - Used a small number of large studies
    - Follow up periods were too short to determine long term impact
    - Excluded telehealth technologies
        - Focused on assistive technologies specifically designed to ensure safety of people
    - Potential bias as only used English sources
- Further Research:
    - Long-term studies assessing the safety impacts over a long period of time
    - Research into emerging technologies
    - Perform a cost benefit analysis
    - Expand participants to find a wider variety of people

Users of assistive technology: The human component. The psychological and social impact of illness and disability

- The extract from the book the psychological and social impact of illness and disability looked at the psychological impact of assistive technologies
- Strengths:
    - Details the psychological benefits of assistive technologies
    - Highlighted the barriers for assistive technologies
    - Provided information on a range of devices
- Weaknesses:
    - Not enough explanation on the systematic barriers
    - Over-reliance on self-efficacy theory
        - Could have drawn on other psychological frameworks
    - Doesn't reflect on the limitations of assistive technologies in enough detail
- Further Research:
    - Investigate the issues on a global scale

How is your review structured?

- Introduction
- Key definitions
- The use cases of assistive technologies
- The pros and cons of assistive technology
- The legal, social and ethical issues of assistive technologies
- Assistive technologies impact on quality of life and self confidence
- Main findings
- Conclusion

What are the main findings in the literature on this topic?

- Assistive technologies help people with disabilities and the elderly regain their own independence improving their overall quality of life and self confidence
- Assistive technologies have use cases across all aspects of everyday life
- Even though there are tons of benefits to assistive technology particularly for the disabled and elderly there are some potential concerns to the technology such as overreliance on the technology and privacy concerns
- In less economically developed countries, the elderly and disabled don’t have the access to assistive technologies
- Due to the cost those who have a genuine need for assistive technology may not have access to the technology

What are the main strengths and limitations of this literature? Are there any discrepancies in this literature?

- Every disabled person's disability will affect them differently
- Most of the literature is from the last decade
- Data was limited as excluded non-English sources
    - Different cultures view disabilities differently
- All sources were academic sources
    - No first-hand research
    - Those who have first hand experience will have different viewpoints compared to those who are using theoretical experience
- Sources demonstrate multiple viewpoints
- The medical field is constantly evolving so old sources may not be relevant
    - E.G. Aspergers got renamed to ASD due to the history of Hans Asperger and his links to the Nazis
- Due to the significant benefits of assistive technologies, there isn't as much literature on the negatives.

What conclusions do your draw from the review? What do you argue needs to be done as an outcome of the review?

- Everyone who struggles with a disability can benefit from assistive technologies
- There needs to be greater access to assistive technologies
- There isn't enough research from those who have first-hand experience with people with disabilities on assistive technologies
    - Inference is that there aren't enough disabled people in academia
- Greater emphasis should be placed on educating the elderly and disabled on assistive technologies

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