Research Proposal Outline

Project Title

The title of the research proposal is Harnessing Artificial Intelligence (AI) in Assistive Technologies for Autism Spectrum Disorder (ASD): Bridging Gaps in Independence, Education, Accessibility, Ethics and Employment.

Introduction

- Overview of ASD
- How assistive technologies are used to address the challenges faced by individuals with ASD
- How AI is being integrated into assistive technologies

Significance/Contribution to the discipline/Research Problem

ASD affects approximately 1 in 100 children globally (World Health Organization, 2023). Individuals with autism typically struggle with communication, social interaction and independence. The integration of AI into assistive technologies creates new opportunities for personalised solutions. For example, AI tools such as adaptive learning platforms, wearable devices and job matching systems have the potential to enhance independence, confidence and employability.

There are significant gaps in the current literature in understanding the long-term effectiveness, ethical implications and accessibility of these technologies. This research proposal aims to fill these gaps by focusing on the need for inclusive and sustainable solutions that improve the quality of life for individuals with ASD.

Research Question

The central question this research aims to answer is how can AI-based assistive technologies be optimised to enhance independence, confidence, education, safety and employability for individuals with ASD while addressing ethical and accessibility challenges.

Aims and Objectives

The primary aim is to critically evaluate the potential and limitations of AI-based assistive technologies for individuals with ASD.

Research objectives

1. Evaluate existing AI-based assistive tools
2. Evaluate efficacy of AI-based assistive tools
3. Explore cultural and demographic adaptability of AI-based assistive tools
   Evaluate accessibility barriers of AI-based assistive tools
4. Identify gaps and limitations in the current solutions
5. Highlight the importance of interdisciplinary collaboration for developing AI-based assistive tools

Key literature related to the project

- Emotion recognition systems have shown promise in improving social skills and emotional intelligence of individuals with ASD (Sahin et al., 2021)
- Social robots provide safe non-judgemental environments for practicing social interactions and have been shown to help reduce anxiety and improve self-confidence (Pennisi et al., 2016)
- Adaptive learning platforms such as BrainPro provide personalised content and have shown to improve academic engagement (Zhou et al., 2020)
- Adaptive learning platforms have demonstrated a 40% improvement in academic outcomes compared to traditional methods (Kientz, Hayes, and Abowd, 2020)
- Accessibility is limited due to high costs and infrastructure requirements (Parsons et al., 2019)
- Privacy concerns related to ethical compliance and informed consent remain huge obstacles that are yet to be overcome (Rozenblum et al., 2021)
- Studies on the impact of AI on independence, education, and employment outcomes (Kim et al., 2021; Parsons et al., 2018)
- Ethical concerns in AI (Floridi et al., 2018; Shen et al., 2020)
- Research on cultural adaptability and accessibility challenges (Chunara et al., 2021; Schmidt et al., 2019)
- Long term impacts
- Potential risks of overreliance and suppressed natural coping mechanisms (Lindsay et al., 2020)
- Effectiveness of wearable AI tools in reducing wandering incidents (Goodwin et al., 2020).
- Discussion of increased task completion rates and emotional empowerment (Kim et al., 2021).

Methodology/Development strategy/Research Design

- Systematic literature review to select sources then a thematic synthesis to categorise findings into key areas then a comparative analysis of technologies based on key metrics
- Using solely secondary data due to time constraints
- Using a combination of quantitative and qualitative data to provide a balanced perspective on technical efficacy and real-world applicability
- Comparative evaluation of technologies

Ethical considerations and risk assessment (as part of your ethical approval application)

- Privacy of sensitive data collected (Shen, Hong, and Smith, 2020)
- Data breaches or misuse could harm vulnerable populations (Barocas et al., 2019)
- Informed consent as users or caregivers may not understand how their data is processed or used (Crawford and Calo, 2016)
- Algorithmic bias (Suresh and Guttag, 2021)
- Selection bias
- Ensuring data privacy and informed consent in all referenced sources

Description of artefact(s) that will be created (if applicable)

No physical artefacts will be created as the research focuses on a critical evaluation of existing literature.

Timeline of proposed activities

The research will be completed over 8 weeks. During the first two weeks I will focus solely on searching for and selected the relevant sources. Over the next two weeks I will focus on the thematic synthesis and begin drafting up the key sections for independence, education, employability and safety. Over the next two weeks I will dive into the long-term impacts, ethical challenges and cultural challenges. In the penultimate week I will focus on the strengths, limitations and recommendations. Then in the final week I will be finishing off the research proposal.

Conclusion

While AI-based assistive technologies have a transformative potential to positively impact the lives of individuals with ASD there are plenty of challenges that they are yet to overcome. Future research should focus on longitudinal studies to demonstrate the long-term impacts of AI-based assistive technologies.

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