A Human-Centered Artificial Intelligence Approach to Adaptable Digital Musical Instrument Development

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Abstract— **Advances within AI (Artificial Intelligence), particularly in relation to generative AI has led to greater inclusion of this technology within creative industries, including music. However, there are a variety of concerns pertaining to this innovation and its impact on musicians. Although there are a range of issues regarding this technology, it has the potential to enrich the current provision of adaptable, accessible digital musical instruments (ADMIs). This paper proposes the use of a human-centered AI methodology alongside users and musicians as co-creators to leverage the advantages of this technology, whilst integrating participatory practices to embed a more ethically focused approach to AI as a creative tool.**

I. INTRODUCTION

Updated guidance by the UK government has outlined the expectation that all music education should be fully inclusive [1]. Although there are variety of existing accessible digital musical instruments available there are limitations to these preexisting systems, such as a lack of trimodal feedback and a propensity for simplistic sonic complexity [2]. AI has the potential to increase sophistication of accessible instruments, however there are still unexplored areas relating to how this technology can support creative practices [3] and the interaction capabilities required when co-creating with AI [4].

To attempt to address some of the questions posed by incorporation of AI within ADMIs, a study is proposed which will investigate the use of AI as a collaborative tool. However, as the proposed system is to be used by a variety of users with differing and often complex needs, the 'nothing about us without us' [5] principle will be invoked alongside users as co-creators to ensure consultation and collaboration with relevant stakeholders. A human-centered approach to AI will also be employed to embed high user control over the system. The overarching aim of this research is to empower disabled people to be able to make choices and "be in charge" of their music making opportunities [6].

II. ADAPTABLE DIGITAL MUSICAL INSTRUMENTS

Existing research relating to successful ADMI design highlights important inclusionary features including adaptability, customization and the importance of user participation and interdisciplinarity [2]. Embedding users as co-creators is core to ensure that ADMIs are driven by the musical interests of disabled musicians rather than what is deemed most accessible [7].

III. HUMAN CENTERED ARTIFICIAL INTELLIGENCE

Incorporating AI for the dual purpose of personalization and breadth of sonic capability may improve overall quality of provision. However, there is a lack of existing research relating to the design of non-human collaborators. Using a human-centered AI approach to the design of an adaptable ADMI will aim to embed equivalence between automation and human control, promoting user influence and collaboration. Specific techniques will include the exploration of GANs and VAEs.

IV. CONCLUSION

The proposed research aims to further understanding of the human/AI collaboration process using participatory practice and a human-centered AI approach to mobilize human creativity. Engagement of varying interdisciplinary stakeholders is essential to embed appropriate design considerations and to facilitate a more equitable approach to ADMI design to empower users in their musical practice.

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