Timbre Tools for the Digital Instrument Maker

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Abstract— **This project will investigate how timbre can play an active role in designing sound synthesis and AI tools which empower everyone to partake in digital music instrument making and use. A research-through-design approach is adopted, based initially on a hackathon design activity.**

I. INTRODUCTION

Timbre is among the most evocative yet elusive attributes of music. Musicians can express emotions through timbre by manipulating the physical responses of their acoustic instrument. Yet timbre is conspicuously absent from the digital luthier's toolbox [1]. Synthesiser design is still primarily based on concepts from early analog and digital synthesis, or emulation of it, using more recent techniques. Furthermore, an audio engineer's workbench is still based mainly on classical tools like oscilloscopes and signal generators. Such technologies, whether commercial or open-source, value technical knowledge for *producing sounds* (e.g., pitch, rhythm) over perceptual knowledge for *designing timbres*. This effectively marginalises sonic cultures where timbre-based practice predominates or is equally important (e.g., didgeridoo, tabla, techno) from partaking in the music maker movement.

Timbre Tools proposes a techno-cognitive [2], timbre-first approach to digital musical instrument (DMI) design, leveraging the latest advances in music artificial intelligence (AI) to restore timbre to the same level of accessibility as pitch and rhythm. The premise of this project is to promote a learn-by-making approach: through creating digital instruments using flexible, open-ended AI powered tools for control and analysis of timbre, artists and makers without formal training can learn more about sound synthesis and AI, become more aware of timbre phenomena, and so create their own highly expressive bespoke instruments, widening participation in computing and AI and enriching the cultural landscape.

II. A HACKATHON APPROACH

We propose an exploratory design activity for ideating and prototyping timbre tools based on a 48-hour hackathon with audio developers, researchers, music technologists, and interaction designers [3]. Here the user is a blurring between instrument maker, composer, producer, and performer, as these roles tend to merge in music interaction design [2].

Hackathons are time-bounded, low-pressure collaborative events that present themselves as *observatories* of design thinking [4]. We will prompt participants to consider the role of timbre/ interacting with timbre in the development of a DMI. Drawing on the notion of problem and solution spaces, which form a general model of the design thinking process [4], our exploratory research questions are:

- *Exploring the problem space*: How do participants think about the concept of timbre in the design of tools for makers? What (collaborative) strategies do they use to conceptualize their design?
- *Exploring the solution space*: What tools are required by our participants to realize their concepts? How do they use the tools currently available to them to develop their concepts?

We will borrow from methods of rapid ethnography [5] (e.g., self-reports, workbooks) to observe the design thinking process of participants, using the answers to the above questions to inform our future work.

III. PREPARATORY WORK

We will use the Ethically Aligned Stakeholder Elicitation (EASE) framework [6] to identify all project stakeholders, including users, considering their level of Power and Interest in the project, with particular attention to those who may be inadvertently or marginally damaged by it.

Subsequently, we will interview users about their practice, the tools they use, and their needs as makers. We will aim to better understand how they think about the concept of timbre and what current practices and tools of DMI design constitute *timbre tools*. Interviews will inform a follow-up workshop, aiming to produce prompts for the hackathon.

REFERENCES

[1] C. Saitis, M. F. Torshizi, V. Preniqi, B. M. Del Sette, G. Fazekas, "When NIME and ISMIR Talk Timbre," in *Proceedings of Timbre 2023, 3rd International Conference on Timbre*, 2023, pp. 125–129.

[2] A. R. Jensenius, *Sound Actions: Conceptualizing Musical Instruments.* MIT Press, 2022.

[3] N. N. Correia and A. Tanaka, "Prototyping audiovisual performance tools: a hackathon approach," in *Proceedings of the International Conference on New Interfaces for Musical Expression (NIME),* 2015, pp. 319–321.

[4] K. Gama, G. Valença, P. Alessio, R. Formiga, A. Neves, and N. Lacerda, "The Developers' Design Thinking Toolbox in Hackathons: A Study on the Recurring Design Methods in Software Development Marathons," *International Journal of Human–Computer Interaction*, vol. 39, 2023, pp. 2269-2291.

[5] D. R. Millen, "Rapid ethnography: time deepening strategies for HCI field research," in *Proceedings of the 3rd Conference on Designing Interactive Systems (DIS),* 2000, pp. 280–286.

[6] A.-K. Kaila, P. Jääskeläinen, and A. Holzapfel, "Ethically Aligned Stakeholder Elicitation (EASE): Case Study in Music-AI," in *Proceedings of the International Conference on New Interfaces for Musical Expression (NIME)*, 2023.