Touching Wires: tactility and a quilted musical interface for human-AI musical co-creation

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Figure 1: *'Touching Wires'* system, installation view, 2024.

Abstract

Interactions with computers have traditionally been mediated by rigid materials, but as technology evolves, there is increasing potential to rethink these relationships. This paper explores how a soft, textile-based interface can reshape human-AI interaction, particularly in musical co-creation. We introduce a textile-based human-AI system used both for musical performance and public interaction. This system enables embodied, tactile engagement with an AI agent, offering users a more unique and participatory experience in human-AI musical co-creation.

We aim to examine the potential for soft materiality to mediate more dynamic human-AI interactions. Our findings reveal that users' choices when interacting with novel systems are informed by their expectations and biases, that embodied learning is built iteratively on layered multi-sensory experiences, and that there is a desire for familiarity and understanding when interacting with AI systems.

We found that the materiality of our textile human-AI interfaces influenced how users choose to interact, and that users sought clarity in the AI's role in collaborative creation. This work contributes to our understanding of how entanglement, embodiment, and materiality impact our relationships in human-AI collaborations.

Keywords

human-AI interaction, e-textiles, tangible and embodied interaction

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1 Introduction

Tactile interaction is a cornerstone of how humans build relationships in the world, including those we create with computers and machines. Textile-based computer interfaces, such as those created by Skach et al. [33] and EJTECH [12] allow us to embody these relationships in the context of art creation processes. As the presence of artificial intelligence (AI) systems in co-creative applications increases [6, 10], many of these relationships lack important elements of understanding and trust. In this work, we propose to articulate these crucial aspects of creative human-AI interaction through a textile-based interface. Our textile-based musical performance system is integrated with an AI music system to form sonic dialogues between human and machine. We argue that tactile, tangible and embodied interactions provide an appropriate lens for developing more understanding and trusting human-AI interactions. To reiterate these concepts, this paper introduces *Touching Wires* (shown in Figure 1), a quilted musical interface measuring approximately 155 x 155cm that allows users to control a digital synthesis instrument based on the Bela [26] audio platform via capacitive sensors. Our system applies call-and-response AI interactions with IMPSYpi, an interactive musical prediction system [22]. This musical AI software runs on a Raspberry Pi, tracks data from the quilt's sensors, and responds by continuing the sensor data. This system was developed and explored through an iterative process of performance and gallery exhibition.

To outline the role of soft textile interfaces in navigating relationships between human users and computer systems we conducted a study of 12 participants who engaged in creative improvisation with *Touching Wires*. Interview data from these sessions was subject to thematic analysis [7]. Three themes were identified that articulate the participants experience with choice and agency, multi-sensory experiences in embodied learning, and the process of clarifying the unknown through an engaging embodied experience. Our findings revealed that expectations and biases dictate the interactions between users and our novel textile human-AI interface. The materiality of tangible and embodied interfaces seem to matter as they can bring associations that dictate how users choose to interact. Furthermore, we find that in human-AI co-creation contexts, the human counterpart desires an understanding of the AI agent's participation and contribution.

2 Background

Revolutionary textile artist Anni Albers said, "we touch things to assure ourselves of reality" [1]. Articulating the role of tactility in human-AI musical co-creation engages with various bodies of literature. Artistic practices have always been dictated by the tools and technologies afforded to the artist. Likewise, sound and music making are dictated by the instrument provided to the musician. As we continue down a path of rapid technological development, new ways of designing and making are pushing the boundaries and definitions of a musical instrument. Within the NIME community, we have the privilege of gathering perspectives from various disciplines and their intersections.

2.1 Entangled Textiles

Familiarity and physicality underpin tangible computing and the development of embodied interfaces [11]. As technology further abstracts tangible experiences, we must revisit how tactile experiences and materiality foster better connections with novel concepts. Our bodies know that video calling is a digital abstraction for face-to-face communication; we know that a text message replaces vocal and verbal words—but how do we recognise the tangible experience of making digital sounds and communicating with an AI entity?

Textiles provide an immediate entry point of familiarity and comfort as they define our analogue worlds and identities; textiles form our clothes, our bedding, our flags, our couches and so on. Therefore, the integration of textiles with technology seems to be a natural progression. The concept of e-textiles—or textiles incorporating electronics—has seen a growth in the community of DIY makers and repairers, and seen applications in rehabilitation, affect and event detection, as well as soft robotics [34]. While textiles are a flexible, intuitive material for human interaction—appropriately adopted by technologists—the familiarity and unconscious association invites users to be curious and consider how technologically charged textiles may challenge their assumptions and expectations.

With the recent application of entanglement theory into HCI [14], researchers have sought to articulate the relationship between the body and the machine through post-humanist or 'more-than-human' theories and frameworks [18, 27]. As technology increasingly integrates with textiles, it is important to consider how textiles currently influence our everyday experiences and interactions with technology. The comfort and softness of textiles offer a new way to engage with technology. By incorporating this unique quality into our interactions with new systems, like AI, we can better understand how we form relationships with novel technologies and autonomous systems.

Skach et al. surveyed the NIME archive [33] and provided an overview of the work on non-rigid interfaces within this community. They assert that textile interfaces for musical expression should be guided by three considerations:

- Exploit the affordances of different sizes as bigger interfaces are easier to make in textiles.
- Gestures should directly align to the sound output.
- Quality of the interaction over the quantity of sensors.

2.1.1 *Material Politics.*

Technology is built on human labour.

Since the industrial revolution, many have feared and criticised the removal of human handicraft and labour from production practices [4]. Contemporary concerns with textiles persist through the lens of production, consumption, and waste. Textile over-consumption and waste issues pose a threat to environmental sustainability [38]. 'Fast fashion' industries capitalise off of peoples' ignorance and apathy towards the human rights abuses and environmental impacts [30] of their practices for capital-driven greed. The human hands behind fashion industries are discarded and obscured to drive profits and consumer ignorance.

When we examine the technological revolution of today, the same criticisms of dehumanised and abstracted practices persist. Child workers are often exposed to the unsafe work conditions that plague the cobalt mines required for lithium-ion batteries used to power our rechargeable electronics [19]. Global technology company Samsung was found to be exploiting their predominately female labour [36] workforce in Vietnam, and were also responsible for environmental pollution from improperly disposed chemical waste [21]. Within realms of DIY electronics and novel interface designers, the practice of hacking and making your own solutions is inherently political by way of rejecting mass-produced technologies, and its associated shortcomings.

Through active consideration of the ethical implication of our work, technologists are able to provide further critical and transparent examinations of the impacts of their products. With the increasing accessibility of AI, there is also a growing desire to analyse the social and environmental impact of these models [37] and how they can shape better making practices. Interrogating the intersection of textile and technology practices allow us to better engage with the humanity in our work.

2.2 Human-AI Interaction

Human-AI interaction research has emerged to reflect on the growing integration of artificial intelligence (AI) into daily practices—from the medical, to academic, and even creative. Perceptions of AI vary from anthropomorphised entities to electronic devices [17]. Therefore, relationships with AI can vary in terms of more humanistic dynamics to hierarchical dynamics where users may view the agent as a tool rather than a collaborator [20]. Much like human dialogue, directionality of communication matters in forming a perception of AI agents [2]. Berkel, et al define continuous human-AI interaction as systems that 'listen' to a stream of uninterrupted user input rather than individual instructions and can respond to this input throughout the duration of the interaction [5]. Continuous human-AI interactions best suits tasks that involve exploration and discovery, allowing users to surrender some control, especially with complex interfaces [15].

Human-AI collaboration and co-creation currently manifests through either the visual in two-dimensional drawing and mark making activities, or sonic and music making systems [9, 13, 22]. With the increasing presence of artificial intelligence in creative practices, critical reflection on the relationships and definitions of collaboration with AI agents is required. If we define creativity as the ability to create with conscious intention, co-creation is therefore its output with multiple agents and their abilities and intents. Moura asserts that in human-AI co-creation, "the forms of autonomy may be shared between humans and AI to varying degrees, to shape the final creative output" [29]. Thus, the result of this collaboration is defined not by the comparison of intent or autonomy, but by the interaction and relationship formed during the process. There is little research directed at tangible and embodied interaction with AI in contexts of musical and artistic performance.

Relationships of understanding and trust with AI [16] is a current research direction attempting to articulate this gap, however, lacks the intimacy and reflexive nature performance and creative practice offers. Exploring human-AI co-creation places the human as an active participant in the process. This allows us to better define the role generative tools and machines have in our daily lives through articulating our relationship, and identifying our needs for AI.

3 Methodology

3.1 System Design

An iterative making process was undertaken to create the three components in this musical system: the textile interface for human input, the audio-visual output, and the integration with machine generated input from an interactive musical prediction system (IMPSYpi) [22] that uses a mixture-density recurrent neural network. The synthesiser element forms the audio-visual output of this performance system and runs on the Bela board. Sound synthesis occurs via a Pure Data (Pd) patch [31] that generates tones and plays samples based on the capacitive input from a Bela Trill Craft sensor, and visual output was built with the p5.js JavaScript library [35]. Figure 2 details the inputs and outputs within the cybernetic system. Both Pd and p5 accept an array of 16 input values from the Trill Craft. Due to the nature of the Bela and its interactions with P5 and Pd, the Pd patch initiates all operations on the Bela.

The textile interface is comprised of a patchwork quilt that uses handmade placemats sourced from charity shops. 16 capacitive sensors within the quilt were made of recycled aluminium cans, copper tape, and duct tape. These sensors provided readings to the Trill Craft breakout board to be communicated to the Bela board via I2C communication. IMPSYpi provides machine input as an array of 16 numerical predictions reflective of the capacitive readings from the Bela Trill. IMPSYpi is designed to engage in call-and-response improvisation between a performer and a trained machine learning model running a Raspberry Pi computer. The model used during user studies was trained on data gathered by the researcher enacting potential interactions on the quilted interface. This included hand tapping, sliding, stepping, and rolling with the entire body.

3.2 User Study

User study sessions were conducted in a controlled environment to gather data from random participants' perspectives. In this project, we followed the methods articulated by Braun & Clarke [8] who define thematic analysis as the method for developing, analysing and interpreting patterns across a qualitative

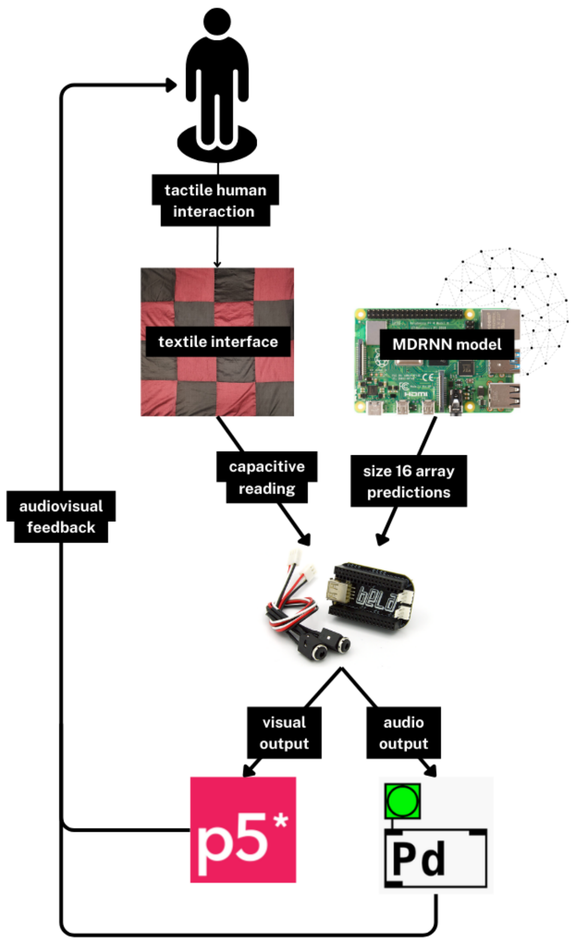

Figure 2: *Touching Wires*—System Diagram

dataset. Their proposed approach of reflexive thematic analysis incorporates critical reflection on the part of the researcher through the process of data familiarisation, coding, and theming. Researcher subjectivity is leveraged to better situate and conceptualise knowledge that is interpreted from the data and its themes. We use thematic analysis in this project to bridge and interpret user perspectives, from both creative and non-creative backgrounds, to articulate perceptions of AI in human-AI co-creation. Thus, we are able to better define the roles of AI in human-AI co-creation.

Inviting participants to interact with the system in a controlled and observed environment provides us with data that helps understand the potential impact of this research beyond ones' personal artistic practice. The system setup included speakers placed on either side of the quilt for audio playback, and the visualisation displayed on a laptop screen placed to the side. A go-pro was set up to film each session and additional audio was captured during the semi-structured interview.

Participants were instructed to "interact with the quilt however you like", with a note that there are wires attached so lifting the interface was discouraged. A brief verbal overview of the system was provided and each participant was given 8 minutes to create a musical interaction/performance with the AI agent. They were instructed that they could end the performance whenever they saw fit either before, at, or after they were given a verbal

8-minute indication. After the performance, a semi-structured interview would take place with the following prompt questions:

(1) Can you describe your initial impressions the musical quilt?
(2) How did your impressions of the quilt evolve as over the session today?
(3) Can you describe your thoughts on the AI component in this system?
(4) What roles did you think that the AI component had in your performance?
(5) How do you feel that your performance evolved?
(6) Did you feel like you were developing a relationship or collaboration with the AI component in the system? Did you feel trust (or mistrust) when interacting with it?
(7) Could you talk about aspects of this experience that you found enjoyable?
(8) Could you talk about aspects this experience that were confusing or frustrating?

4 Results

Transcription of interview audio was completed using Aiko local transcription software on a MacBook laptop. Quotes were then taken from each participant's transcript, and organised as individual notes on a Miro board for further analysis. We will refer to each participant as P1, P2, P3, and so on. A total of 12 individual user study sessions were conducted between 19 - 23 September 2024, where participants were presented with the AI integrated version of the system. Through thematic analysis of the data gathered, we identified the following three themes threading our user study sessions together.

4.1 Choice and agency are informed by expectations and biases

Our expectations influence the choices we make when constructing experiences. This user study uncovered the entangled nature of participants' expectations and assumptions in shaping their actions and experiences. Participants noted associations or expectations of their interaction with the quilt, a digital instrument, and the AI agent. P8 stated that "*I think over the session I was mainly trying to understand if/how my interactions with it kind of affected the audio*" highlighting their intention on trying to find a causal relationship between the quilt and the digital musical instrument (DMI). As the session progressed, they were "*trying to look at the areas where I could see more wear on the quilts*" to infer on what actions may have been popular for previous users of the interface. This indicates their expectations about usage and wear. Associations and conclusions about their expectations were also conveyed through the physical design of the quilt. P7 described the "*patterns like hopscotch ... like moving a knight across a chessboard*" that P5 "*was perceiving as an automatic structure for me to play with*". Both expectations were derived from associations with the checkerboard pattern and encouraged both participants to explore for a period on their feet with movements that actuated one sensor at a time.

Expectations of AI were also prevalent in the participants' actions, and subsequent perceptions of their relationship with the AI agent. P12 said: "*I think any experience I've had with AI at this point, I ask a question, it gives me an answer, or there's a reciprocity, but it's limited. And so I thought with this, if I touch it, it will give me an instant response. But it didn't ... I just had to do my own thing, and find my own rhythm, and enjoy what I was doing rather than try and communicate*". This suggests that P12's previous experiences with AI entities provided a base expectation of reciprocity, and when that expectation was not met, P12 expressed an altered goal in the interaction, and thus altered actions. Other participants expressed a misalignment of expected behaviours from the AI. P7 stated "*I didn't feel like we were working together ... I felt really energised and involved when I was touching and then I just felt like when I wasn't ... [the AI's output] wasn't an equal sharing*" alluding to the expectation of equal participation from the AI agent. Similarly, P5 stated that "*I would like it to be interacting* ***with*** *me", and likewise for P3 "the AI didn't learn as quickly or visibly as I expected it to ... I didn't feel like I was interacting with anyone*" thus, describing a disappointment as the AI did not participate as anticipated.

The different processes of exploration and expressions of surprise from participants highlights that expectations and biases of known factors drive our choices and considerations when exploring new environments and systems.

4.2 Embodied learning is built on iterative and layered multi-sensory experiences

Embodied interactions are built on the iterative and layered accumulation of multi-sensory experiences. The relationship between our senses in forming our understanding with new interfaces and systems was expressed by multiple participants. Some participants expressed the desire to single out the system one sense at a time. For example, P6 highlighted that they were "*focused on the actual interaction and my involvement in where those sounds were coming from. So I think it might've blocked out what else was going on.*" when questioned about why they were not referring to the visualisation. Similarly, two other participants suggested that being overwhelmed with focusing on more than one sense may be detrimental to an immersive experience. These experiences suggest that the sensory comfort of a user is integral to their engagement and participation with the system. This also highlights the importance of focus and understanding through one sense, which seemed to facilitate further exploration, study, and building up of the multi-sensory experience in an embodied journey.

When exploring the tactile experience, P5 remarked that "*I still felt like my feet were dominating the sound and then I laid down and I quite liked the lay down. ... your hands have got more control*". Resonating different qualities of sound with different aspects of the body suggests a holistic embodied experience built by both auditory and tactile senses. The participant's experience suggested that audio reaction informed tactile choices. Likewise, P7 "*noticed that if I pressed with my two fingers, there was a sound, but then I pressed with four. And then it changed it, and so then I wanted to, like, knead out to a point. ... I would never have generally considered my physical involvement in the making of a sound, and there's, like, a reciprocal pattern there*" explicitly describing the relation between sound and tactility in forming their embodied understanding.

From a contrasting perspective, P11 noted that "*the size and having to move around a lot is a bit weird ... it is a little bit tedious and if you want to move from like there to there you kind of have to either reach really far or walk around*". P11 was the only participant to conclude their co-creation session before the 8-minute indication. This emphasises how the scale of the interface impacted P11's understanding of and embodied interaction with the system. Furthermore, P11 "*kept looking at [the screen] to see*

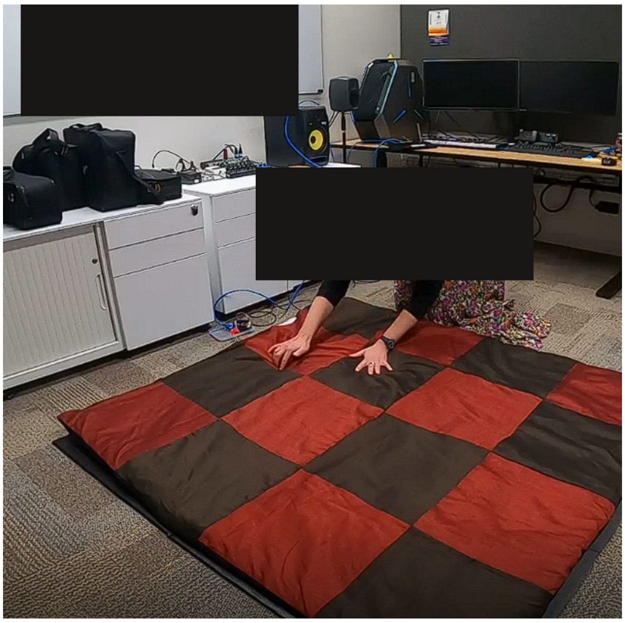

Figure 3: Hand-led movements

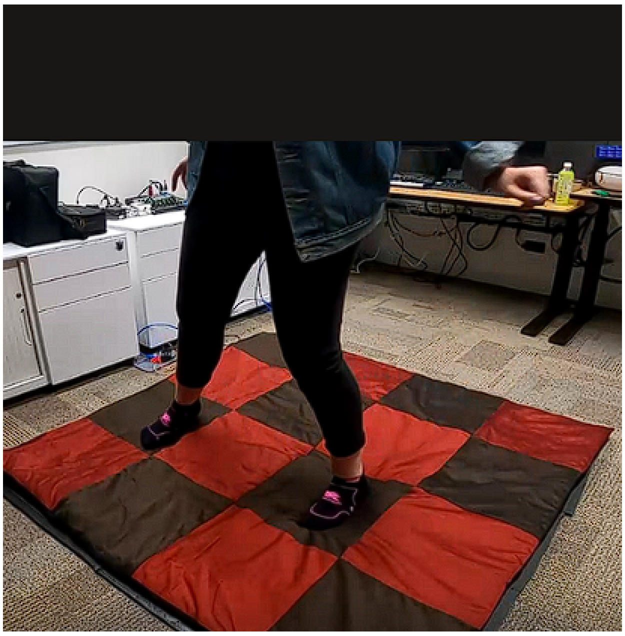

Figure 4: Feet-led movements

what changed when I touched things ... just pattern recognition I guess" reinforcing the multi-sensory reassurance for participants' to understand the novel system. For P11, the visual insight into the system seemed to inform their agency in constructing their overall experience. The participants' reports of differing sensory start points, and their processes of exploration suggest that all of their senses came together to inform our interactions and immersive embodied experiences.

4.3 Engagement, curiosity and embodied experience clarifies the unknown

Novelty and curiosity of this system seemed to encourage exploration and the participants' agency and confidence grew through active involvement which in turn clarified their roles in the co-creation. The participants in our study described the journey through their co-creation, and the emphasis on finding familiarity to further fuel confidence in their participation. Some characterised their journey as serendipitous, where the joy in their surprise encouraged exploration. Others described discomfort and confusion that led them to move away from connecting with the AI agent and towards personal sonic performance and creation.

P1 described "*the surprise of not knowing what sounds at the start would be where and how they related to each other spatially*" had eventually led them "*to a point where I could sort of use it to compose with or like make music with*". This highlights their journey of exploration leading to confidence. In contrast, P2 noted that they ' '*had no idea what it was doing ... I still have absolutely no idea how it works*" and engaged in the limited interaction of stepping on each square. P6 commented that "*I think I became a lot more confident and relaxed towards the end of the process and when I knew that I wouldn't necessarily kind of hurt it or damage it, I became a lot more kind of comfortable and relaxed around it*". The differing experiences suggest that time and familiarity with a novel system, developed through active curiosity and engagement, clarified the dynamics in this system.

The discussions around the AI unveiled that, for some participants, the novel interface had distracted them from engaging with the AI and making full judgements. P5 expressed the desire for more time with the system as "*I felt like I just started exploring*", outlining the desire for further engagement and familiarity. Furthermore, P5 said that "*I wasn't expecting to see what looks like a quilt. I was expecting to see the tech. I was happy to see this ... I don't even understand AI ... so I guess it's like a participatory work where the AI and I are chilling out together*". As an artist with "*a sound practice,*" P5 emphasised the tendency to articulate the unknown in familiar terms, framing their co-creation as a participatory artwork. Active participation and generating personalised understanding allowed the participant to define their own role in the system.

Similarly, P12 thought that the AI "*was either mimicking me, mocking me, or taking me on a different road ... I just had to do my own thing, and find my own rhythm, and enjoy what I was doing rather than try and communicate*", outlining that the exploration of the system led to a clarified formulation of personal and active goals in participating with the interface. Additionally, P6 mentioned that "*I didn't take too much notice of the AI component. I think I was primarily focused on my involvement with the pressure points and I wanted to either make music or make a sequence of sounds*" and "*I didn't [feel trust or mistrust] I wasn't aware of it that much.*", conveying the lack of intimacy preventing a formalised relationship. Therefore, fostering better exploration of these new environments through novelty can improve agency and clarity in human-AI relationships.

The sounds created by the machine-generated input provided many participants with an immediate entry of recognition to the system. P1 stated that the "*AI was reliable in a sense,*" and that "*knowing if I didn't know what to do, I could just wait and it could give me a nudge in the right direction ... and I could fall back on it*". Similarly, P9 felt "*it was cool having background noise to start me off*" however, "*I don't think that I put enough of a personality or like personhood onto it to be able to trust or distrust it. I know that what it is, is a program that knows how to use training to like*

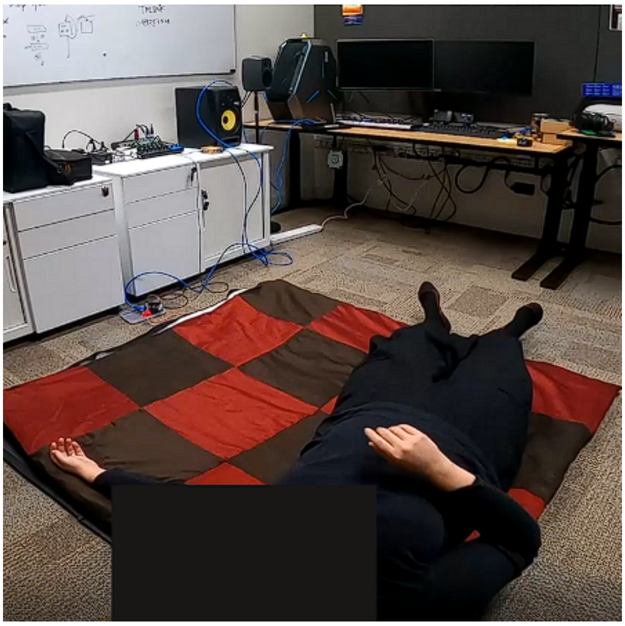

Figure 5: Body-led movements

evolve and make decisions". This emphasises that the response to the reliability is not necessarily one rooted in emotion or trust. P4 posits that this reliability could also be a hindrance—"*early on it was there and it was cool and it gave some background noise but it kind of stopped me from seeing the cause and effect of my actions*". This further highlights the importance of individual agency in forming their understanding of the system. It appears that in these instances active participation helps clarify intentions.

Our findings suggest that in this human-AI system, active participation helped users to build confidence and agency and to define their own intentions and roles in the interaction. The novelty of the system empowered users to investigate, but may have limited understanding of the AI components.

5 Discussion

5.1 Textile DMIs

Textiles as a material carry memory that persist in the context of digital musical instruments [33]. Our study finds that the actions when interacting with textiles are guided by curiosity when presented in a novel context. As shown in our findings, the participants' expectations dictated their choices in constructing experiences with our novel interface. Thus, being conscious of the expectations associated with material during the design process may harvest more critical interactions. Our study participants revealed a strong response to the materiality of the quilt, both visual and tactile. P8's recognition of potential wear of the textile uncovers the intimate considerations of textiles, and suggests the potential to expose and formulate new ways of interacting with technological systems. Leveraging associations and biases of familiar materiality to combat the unfamiliar in novel AI systems may empower users to develop their own relationships with new tools.

5.2 Embodied human-AI interactions

Dourish defines embodiment as phenomena "*that by their very nature occur in real time and real space*", a definition that involves both the physical and the transcendent [11]. In our study, the participants' embodied experiences was constructed by an evolving dialogue between multiple senses. The tactile engagement was often informed and altered by audiovisual feedback, which transcends simple observation to engage in a dynamic relationship with their surroundings. While the participants did not explicitly used the term 'embodiment', many described the relational interaction between their bodily actions and their sensory experiences.

Tactility actively engages the body, deepening our understanding of embodied interactions. Larger interfaces are spatially captivating in a way that invites the entire body, and affects the choices and intentions of the user [25]. Some of our study participants were empowered to use their entire bodies and experiment with different body parts. While these participants enjoyed the scale and material of the interface, we note that one participant responded negatively to the large design. It could be that leveraging larger interfaces to mediate more diverse multi-sensory embodiment invites mindfulness and presence into the interaction. Additionally, tangible and embodied interfaces mediate meaningful interaction by inviting the user as an active participant with their own agency. Incorporating audiovisual and other multi-sensory experiences to formulate embodied interactions with AI enable more dynamic exploration and learning experiences to connect the human to their AI collaborator.

5.3 Familiarity, AI, & Trust

Familiarity can allow us to form relationships and trust with external systems. Reflecting on the experiences of participants in our study, time spent with the novel system provided a basis for a comfortable and clear dynamic between the human and AI system. It is notable that P2's lack of progression in forming a relationship (Section 4.3) was accompanied by limited engagement in interaction. This suggests that active engagement motivated by individual curiosity is required to form trust with AI systems. Building relationships takes time and effort, and human-AI trust evolves over time [24].

A goal of this study was to enable a physical connection to an otherwise abstract human-AI interaction through a tangible and embodied interface. However, the results suggest there must still be clearly defined roles for the AI that offer clear boundaries of the interaction and relationship. Some participants cited disconnection, confusion, or even disappointment with the AI interaction stemming from an inability to clearly recognise the AI's contribution in the system and performance. P7's description that "[the AI's output] wasn't an equal sharing" and P12 saying "I just had to do my own thing [...] rather than try and communicate" outline an imbalance between the two collaborators in a co-creative context.

Additionally, P9's description of personhood as a predicate for both trust and distrust (Section 4.3) suggests that there is an innate desire to impart a personality to determine trustworthiness. Noting that the definition of trust does not inherently require personhood—e.g. trusting that a machine will work in the way it is intended. Empowering individuals to explore and clearly define their roles in interactions fosters active participation in collaborative environments. Forming tangible understanding to our personal contexts allow us to develop deeper familiarity, and thus more productive relationships with emerging technologies. Negotiating common experience using metaphor provides a way for us to apply our lived experience to understand new information and interaction with the world [32]. As reported by our participants, finding a personalised understanding of our interface allowed for deeper engagement. Participants who were able to form an understanding of the system were able to successfully co-create and participate. We note with caution that it was not necessary for this understanding to accurately reflect reality, as long as it resonated with their perceptions.

5.4 Entangled AI

Entanglement theories offer frameworks to better articulate how individual experiences can inform HCI [14]. Timothy Morton argues that the interconnectedness of our lives and our technologies means we are responsible for our creations, and specifically for AI beings as "we can't tell whether the AI beings are alive or sentient" [28]. The findings of our study suggest that users' assumptions and perceptions of AI influence their interactions, a factor beyond the designer's control. Therefore, it is essential to foster adaptable associations within the technological structures we create. Recognising that expectations shape choices highlights the agency embedded in a broader context. In designing interfaces for human-AI interaction, it may be beneficial to consider how users perceive the structures of these experiences and their impact on the relationship between humans and machines.

Researchers have argued for the anthropomorphism of AI in hopes of increasing trust and interpersonal connections with autonomous chatbots and systems. However, Nicholas Barrow posits that this "limits our understanding of AI to *human terms*" [3]. Likewise, McCormack et al. questions "why dismiss outright that a machine and a human might share experiences that result in something meaningful and worth communicating? … what could possibly be the defining characteristics of an autonomous computer artist" [23]. Bringing human expectations to AI means humans expect a humane interaction. Our study suggests that humans desire the time, space, and autonomy to build their own relationships and understandings. Our findings reiterate the importance of defining the role of AI, and for that role to be identifiable for the human counterpart in human-AI co-creation.

5.5 Limitations

This project examined human-AI musical co-creation where human input occurs via tactile touch of a quilt, and machine input is generated as an array of 16 numbers. As IMSPYpi cannot communicate in a way that can semantically express its perspectives, we are unable to capture the other perspective in this relationship.

6 Conclusion

Tangibly, the artefact created through this project is a textile musical interface that can be used independently for performance. This quilt interface controls a digital musical instrument that also accepts machine generated input. Together, the system supports human-machine musical co-creation.

Through this artefact, we have investigated the role of tactility in human-AI musical co-creation, and explored embodiment as a way of forming connections with emerging technologies. We conducted a study with 12 participants to form their own interactions with the AI system. We identified themes that show how expectation frames participants' choices, how their embodied learning is shaped by iterative experiences and how they clarified this unknown system through their curiosity and engagement.

These findings more broadly point to the potential for tangible and embodied interfaces to invite users to be an active participant in human-AI co-creation. Familiarity and embodiment may be key to connecting users to novel systems where the human counterpart desires an understanding of the AI agent's participation and contribution. This work demonstrates that leveraging materiality in design processes can invite immediate access into users' awareness and understanding while cautioning that engagement is still required to build connection with an AI system. Our large musical interface seemed to encourage engagement of multiple body parts, and mediate embodied interaction. By considering entanglement, embodiment, and materiality, this research contributes to the broader conversation on how we form relationships in human-AI collaborations.

7 Ethical Standards

Throughout this project we emphasised sustainability by minimising waste and reusing materials for the system design. Our use of embedded computers reflects on energy consumption of technology. The ethical aspects of this study were approved by the ANU Human Research Ethics Committee (Protocol 2024/0995). Participants were fully informed of the implications of their engagement.

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