Exploring the Potential of Music Generative AI for Music-Making by Deaf and Hard of Hearing People

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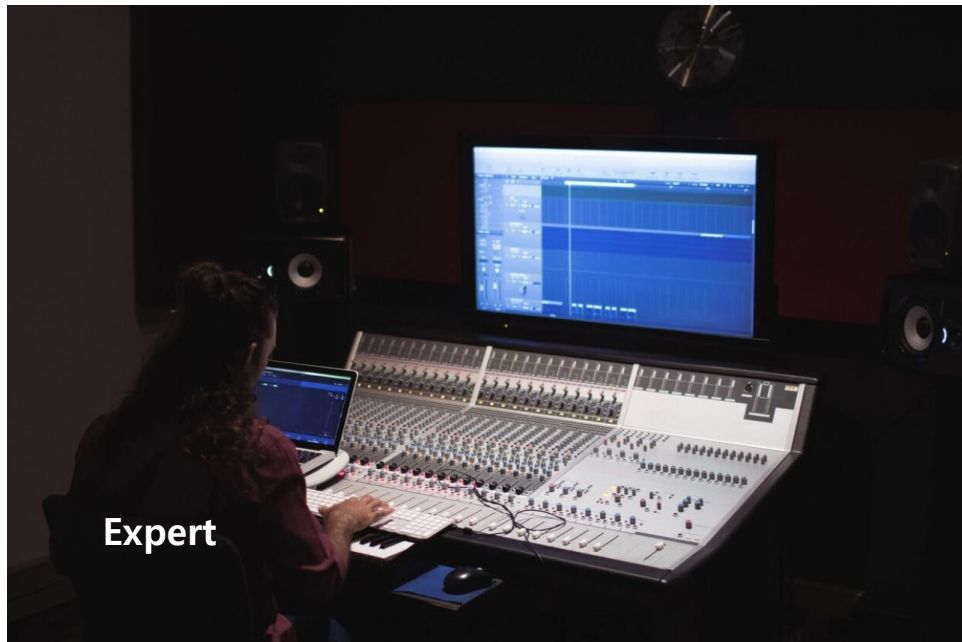super_moon@gm.gist.ac.kr

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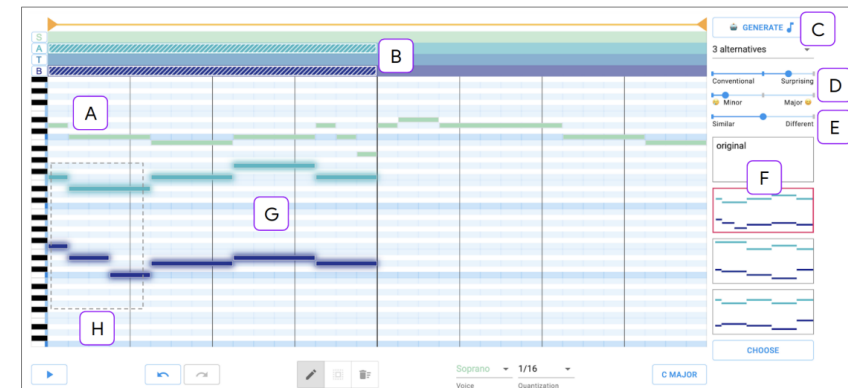9inceroo@gm.gist.ac.kr

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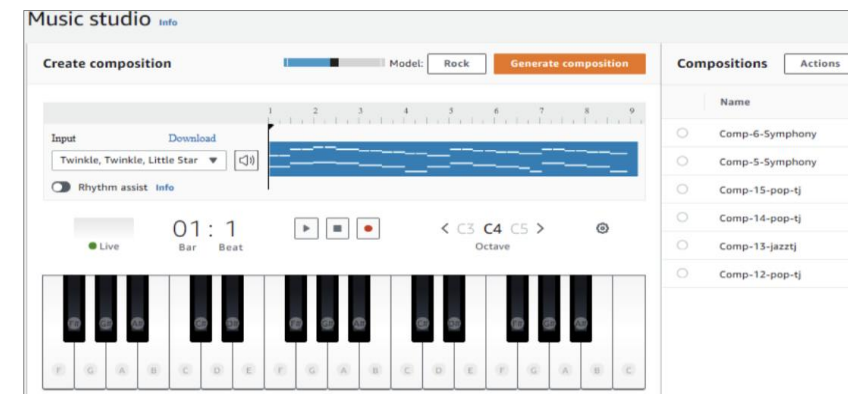Gwangju Institution of Science and Technology

1. Background | Music Generative AI

Composition

Expert

Music Generative AI

COCOCO (2020)

DeepComposer (2019)

1. Background | Prompt-based Music Generative AI

Education

Therapy
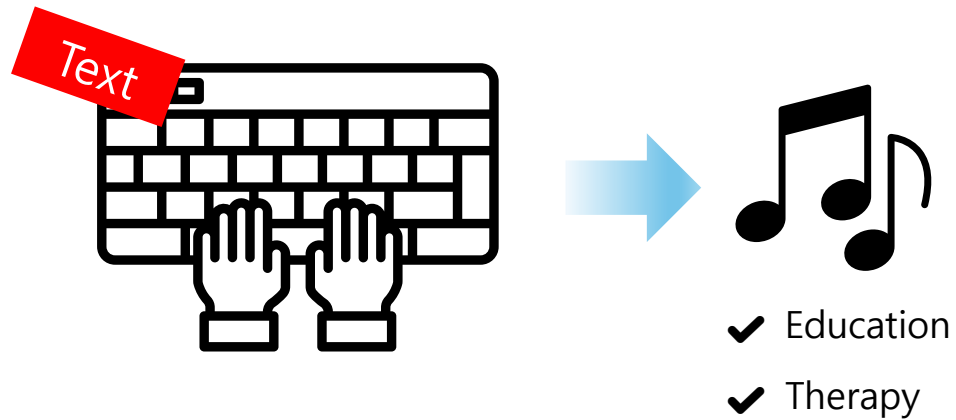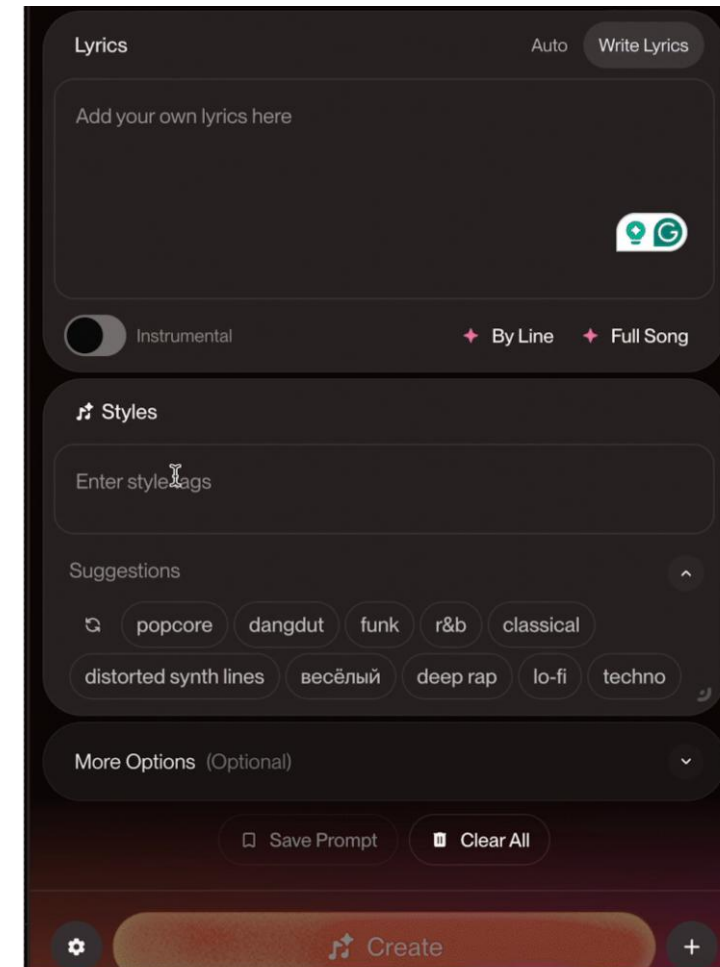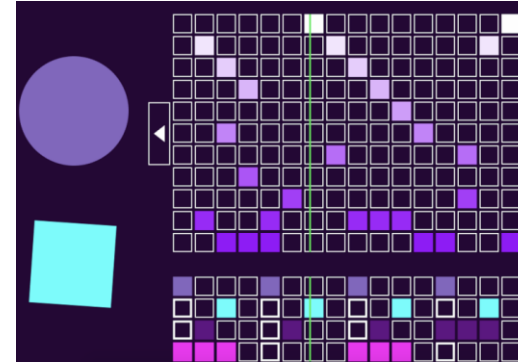
Prompt-based Music Generative AI

1. Background | Music-making Supportive Tools for DHH
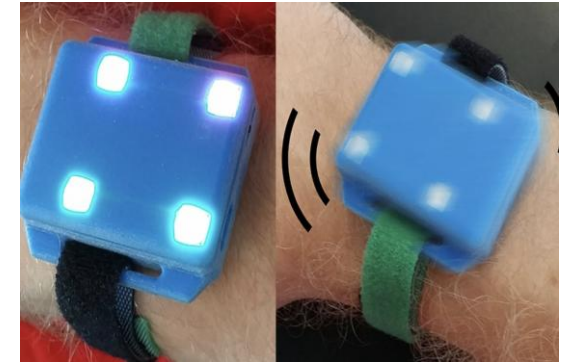
Multimodal music experience

Beat-driven music-making tool for DHH
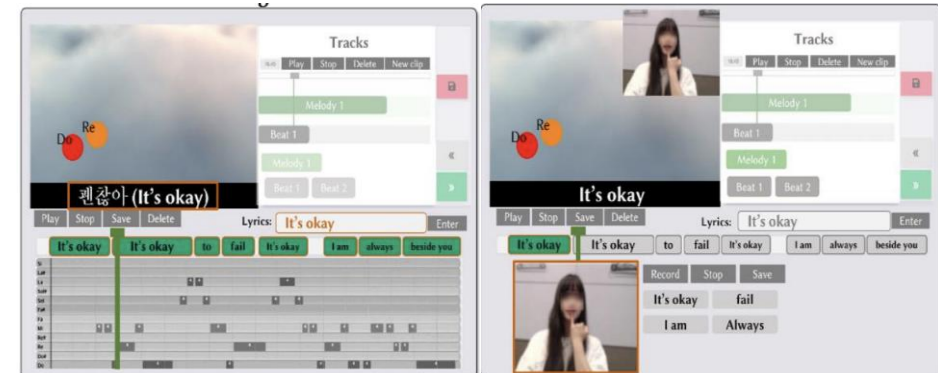
Music Aid (2016)

Muss-Bits (2018)

Lyric-driven music-making tool for DHH

Multimodal Synthesizer (2025)

2. Research Goal and Process

Goal

**Design and Development of a Multimodal Music-Making Supportive Tool
: Integrating Generative AI and Sensory Substitution Systems for Music**

Process

Making the video prototype

Development of multimodal music-making assistive tool

Focus group interview

with 9 DHH individuals (80 min)

Session 1. Understanding DHH's music-making (30 min)

Session 2. Introduction of a music AI tool through a video prototypes (20 min) ⋯→ Discussion of the initial design concept (30 min)

Design Requirement

Music creation study

with 9 DHH individuals – *4 from FGI* (70 min per day)

Day 1. Introduction to the study of music-making (20 min) ⋯→ Tutorial of our assistive tool (50 min)

Day 2. Music-making with our assistive tool (50 min) ⋯→ Individual interview (20 min)
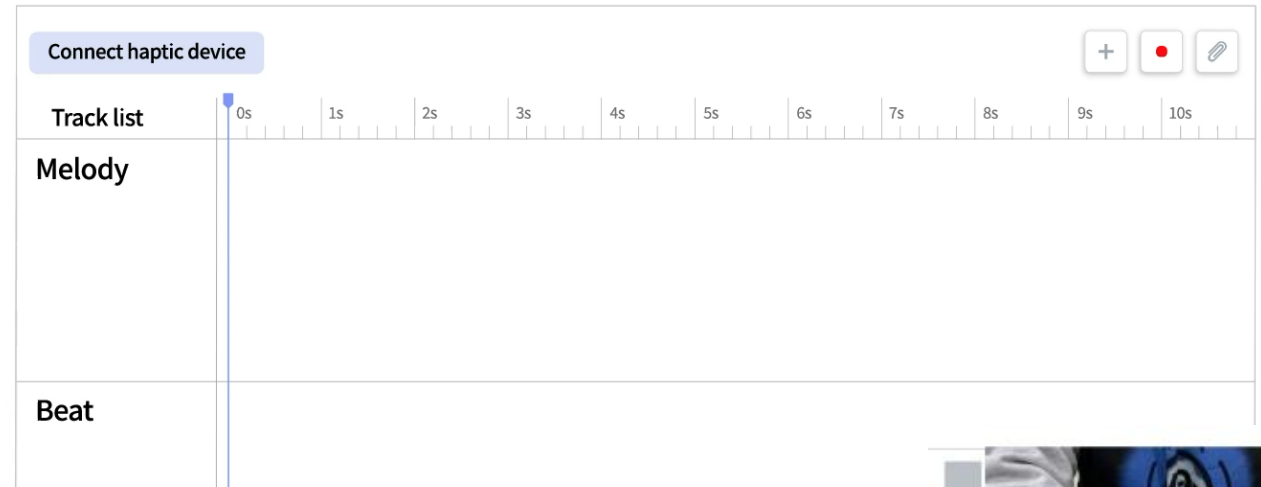
3. Preliminary Study | Video Prototype

STEP 1

Video Prototype

1. Prompt-based music GenAI
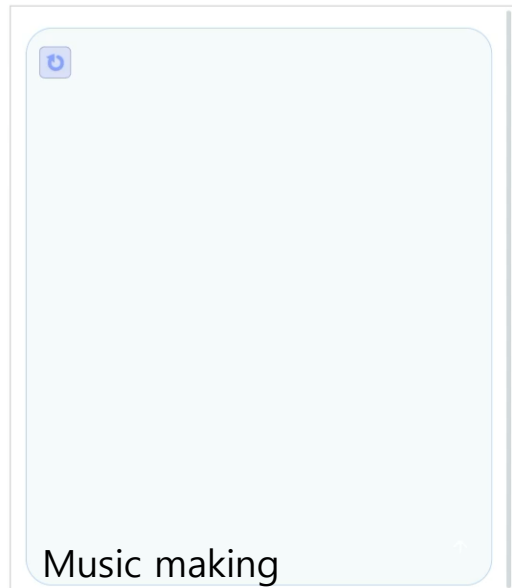
2. Music-sensory substitution system

Music making

Connect haptic device

Track list | Melody | Beat

Music understanding

Haptic device

3. Preliminary Study | Focus Group Interview

STEP 1

Discussion

- Focus Group Interview (about 80 min)
  - 9 DHH participants

  - Session 1.　focused on general musical experience
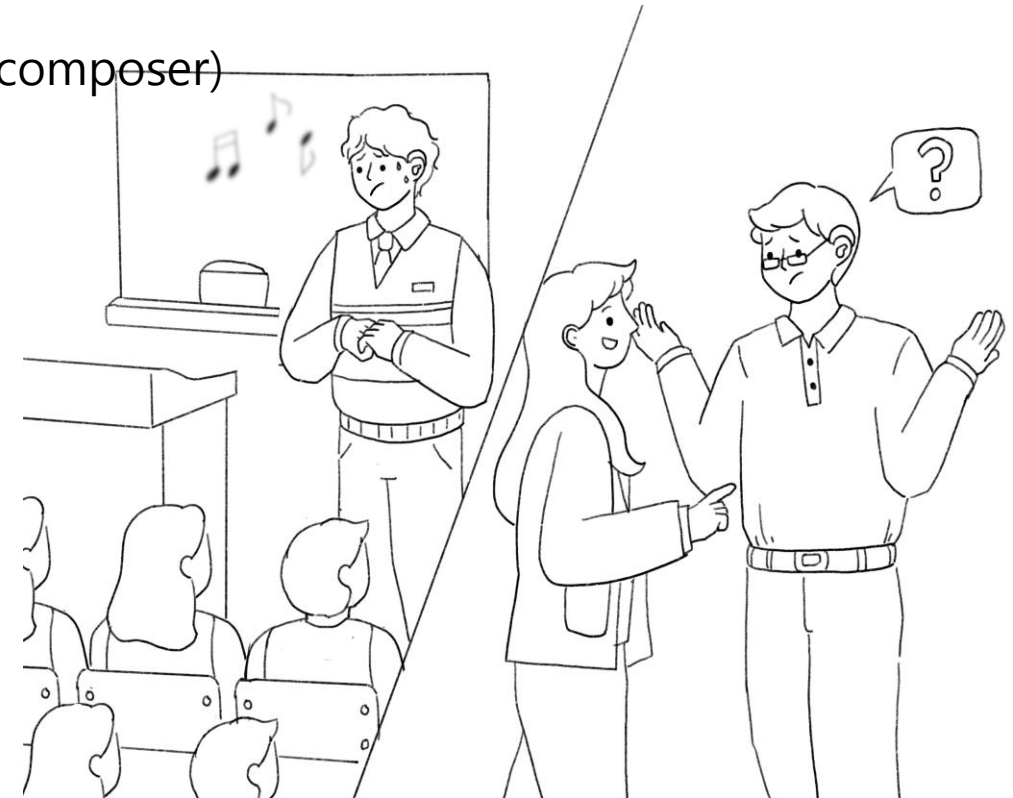 - Session 2.　focused on gathering feedback on the initial concept
- Thematic Analysis (7 themes)
  1) barriers to the music-making
  2) initial perception toward music GenAI
  3) design requirements

3. Preliminary Study | Findings (1/2)

STEP 1

Understanding

Barriers to Music-Making Experience

- Lack of confidence
- Dependence on hearing people (composer)

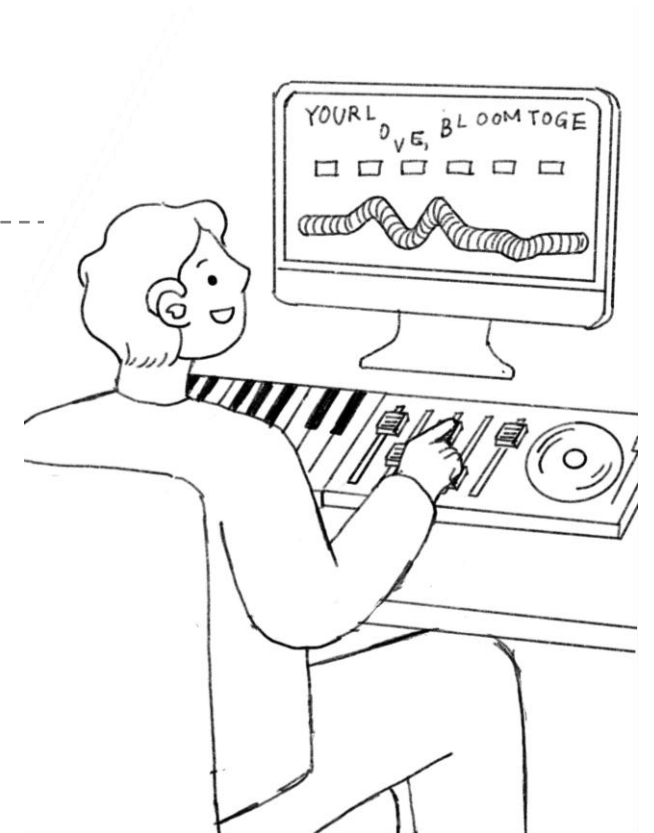**STEP 1**

Understanding

▌Opportunities and Challenges of Our Concept

- Expanding musical opportunities
- Independent music-making

- -

- Passive engagement in the creative process

4. Multimodal Music-Making Assistive Tool | Design Requirements
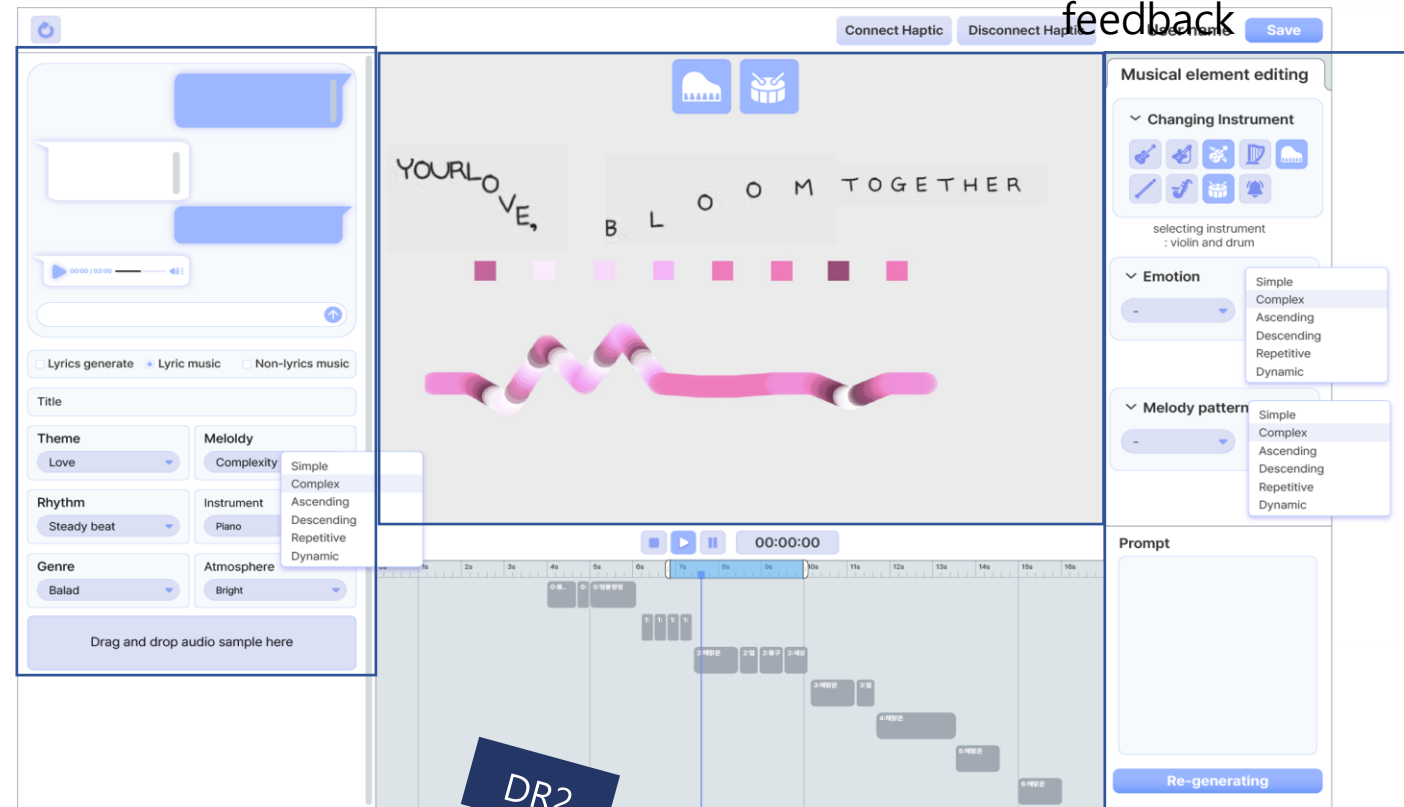
STEP 2

Design

DR1

Music generation

Support for textual musical expression

DR3

Music editing

Support for music editing through alternative sensory feedback

DR2

Music understanding

Need for an intuitive alternative sensory design to help in understanding the generated music

4. Multimodal Music-Making Assistive Tool | Development

5. Music-making Study | Design

Participation

- 9 DHH participants

new

Process

Day 1

- ✔ Introduction (20 min)
- ✔ Tutorial (50 min)
  created two simple music pieces

▶

Day 2

- ✔ Music-making (50 min)
- ✔ Post interview (20 min)
  1) The overall music-making
  2) Potential and challenges of the tool

Analysis

- Thematic analysis

  = 61 codes and 5themes

6. Finding 1 | Music-making Experience (1/3)

Musical intent: musical expression and symbolic meaning for DHH individuals

- A means of expressing DHH own experiences and emotions.

  - Heal and comport from emotional pain (P6 and P12)
  - Convey social messages (P9 and P10)
  - Gift music to family or friend (P7, P11, and P14)
  - Express curiosity about hearing people (P8 and P13)

▌Creation process: Adjusted from abstract emotional expression to concrete musical elements
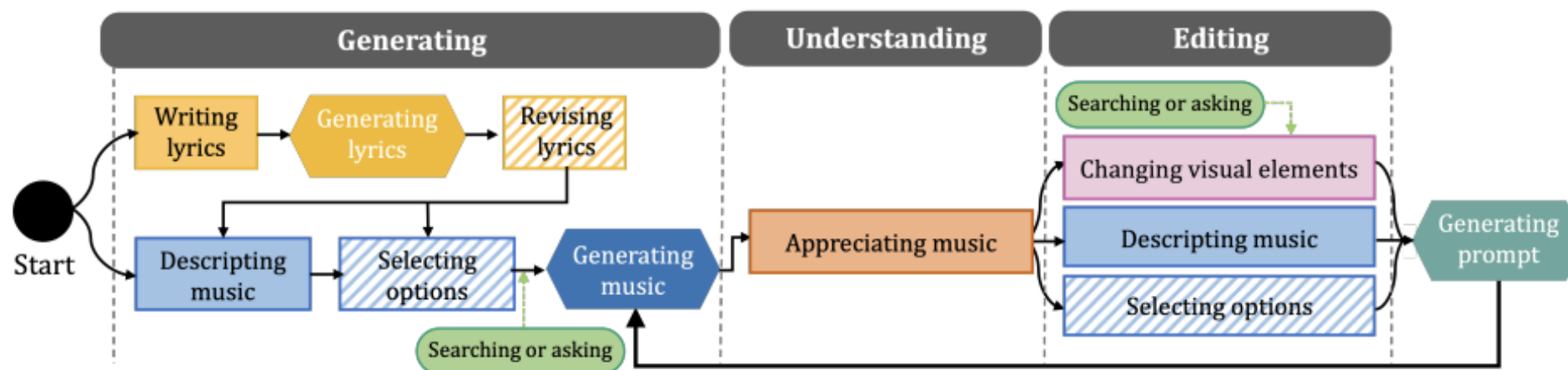
- Abstract musical intention through visual description and emotion

  "shall we fly to the sky" (P9), "more aggressive situation to a boxing scene" (P10)

- Understanding and editing musical elements using visual and tactile feedback

  "I'm shining brighter" (P7), "making it stronger or calmer" (P4)

▌ <mark>Creation result</mark>: Satisfaction with AI assistance and multimodal feedback in music-making

• Translate abstract concepts into musical elements
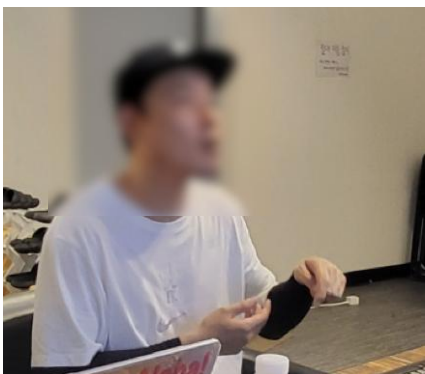

"I liked that I could modify and change things myself instead of just accepting what the AI made. It felt like I was a real composer. Being able to make changes while seeing it visually helped me create exactly what I wanted." (P7)

• Challenge of detailed modifications
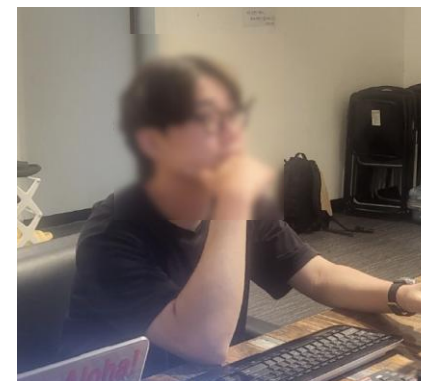
"Sometimes it was hard to understand why the AI made certain choices. Especially when I wanted to modify the musical structure or temporal aspects, I wasn't sure how to proceed. I ended up having to make decisions based solely on the feeling from colors and vibrations." (P10)

6. Finding 2 | Potential and Challenges of our Tool (1/2)

Potential

▌Autonomy in music-making

- Enhancing confidence through musical engagement
- Empowering musical self-determination

▌Changing attitudes and increased interest in music

- Shifting perspective on hearing impairment
- Increased musical curiosity and interest

▌A medium for emotional expression

- A new medium for emotional expression
- A new communication method through music

Challenges

▌Music expression

- Difficult to express musical intention through language
- Difficult to understand intuitively between options and generated music

"I want to try making music without lyrics for YouTube videos. However, because I don't usually enjoy music without lyrics, expressing the music felt awkward." (P7)

▌Determining musical mortification direction
- Difficult to consider the music that matched the lyrics

"I can see what the music looks like, but it's still hard to judge whether it matches well with the lyrics I wrote, or how to change it to match better." (P10)

"I can tell something doesn't feel right with the music, but I'm not sure if I should change the beat, the instruments, or something else entirely. It's still hard to connect what I see in the visualization with specific musical elements that need adjustment." (P11)

Enhanced accessibility of communication with GenAI

- Support multimodal input such as humming and gesture-based input.
- Support multimodal feedback such as visual guidance or suggestions of AI

Customization of the multimodal sensory feedback

- Consider DHH's sensory preference
- Support personalizing music-visual and tactile feedback through music conceptualization

8. Limitations and Future Work

Limitations

- Limited sample size

- Single session observation

- Current AI model constrains

- Technical limitations

Future work

- Expanded research design

- AI model optimization

- Technical improvements

9. Conclusion

1. Our system successfully supported independent music creation by DHH individuals, enhancing their musical autonomy and engagement

2. This technology served as a catalyst for changing perceptions about disability within the DHH community

3. Our study demonstrated the potential for inclusive artistic creation, opening new pathways for DHH participation in the arts.

CHI 2025

Thank you for listening

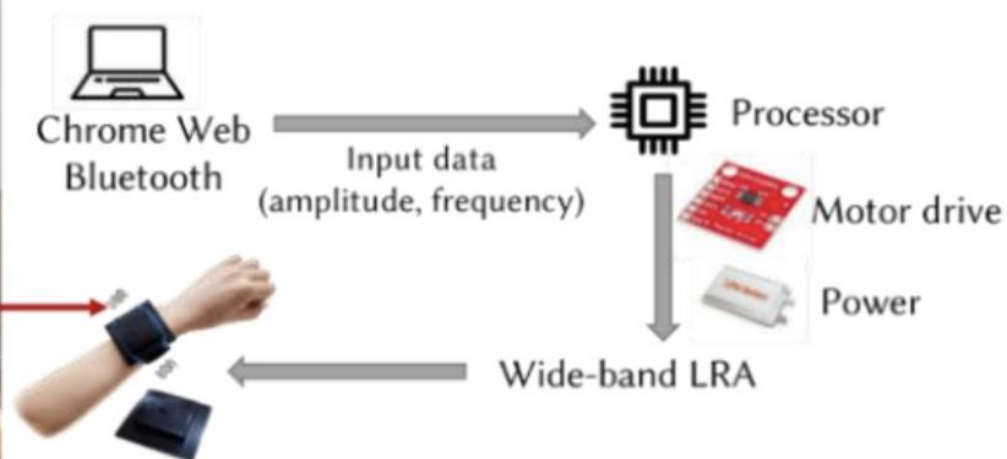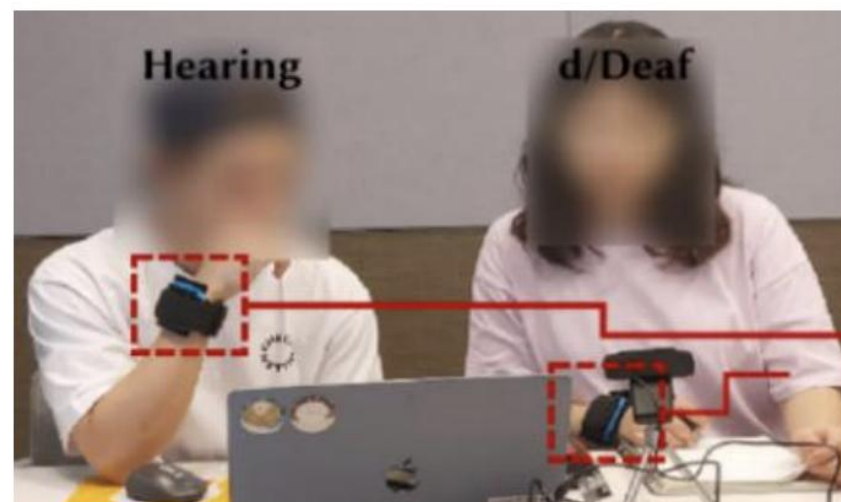**Youjin Choi chldbwls304@gm.gist.ac.kr**

Haptic device

Table 1: Demographic information of the participants in the FGI and music-making study

ID	Gender	Age	Communication method	Hearing loss	Hearing loss age	Aid device	Experience in music	Interest in music	Participation FGI	Participation MMS	Knowledge of GenAI
P1	M	44	KSL and W/T	Severe	Infant	None	Writing lyrics	6	O		Experienced
P2	M	28	KSL and W/T	Mild	Infant	CI + HA	Making video	6	O		No knowledge
P3	F	48	KSL and W/T	Moderate	Innate	CI	Making music	5	O		No knowledge
P4	F	26	KSL and W/T	Mild	Infant	CI + HA	Making music	6	O		No knowledge
P5	M	27	KSL and W/T	Moderate	Innate	HA	Making video	5	O		Experienced
P6	F	24	KSL and W/T	Mild	Infant	HA	Making music	6	O	O	Experienced
P7	M	26	KSL and W/T	Moderate	Innate	CI	Making music	5	O	O	Experienced
P8	F	45	KSL and W/T	Profound	Infant	None	Playing instrument	5	O	O	No knowledge
P9	F	35	KSL and W/T	Moderate	Infant	HA	Writing lyrics	6	O	O	No knowledge
P10	M	34	KSL and W/T	Mild	Infant	HA	Making music	6		O	No knowledge
P11	M	43	KSL and W/T	Severe	Innate	HA	Playing instrument	5		O	Experienced
P12	M	45	KSL and W/T	Severe	Innate	HA	None	4		O	No knowledge
P13	F	33	KSL and W/T	Mild	Infant	HA	None	5		O	No knowledge
P14	F	42	W/T	Moderate	Infant	HA	Writing lyrics	5		O	No knowledge

Communication method: Korean Sign Language (KSL), Writing and Typing (W/T). Hearing loss (with aid devices): Mild (20−34 dB), moderate (35−49 dB), severe (65−79 dB), and profound (80−94 dB). Aid device: Cochlear implant (CI) and hearing aid (HA). Interest in music: 7-point Likert scale ranging from 1 (very low) to 7 (very high). Experience in music: Making music involves song signing or making music using composing tools. Participation: Focus group interview (FGI) and music-making study (MMS). Knowledge of GenAI: previous experience in using Gen AI (Experienced) and no knowledge of GenAI (No knowledge).