



UNIVERSITY OF
LIMERICK
OLLSCOIL LUIMNIGH

MODULE NAME:

CS6042 - INTERACTIVE MEDIA PROJECT/WORKSHOP

Assignment:

Interactive Art Storyboarding

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Submission Date: 23 Feb 2026

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Interactive Installation Proposal Report

You Are a Note

Theme: United Nations Sustainable Development Goals

Aligned With: United Nations

Focus Goals:

- SDG 3 – Good Health and Well-Being
- SDG 10 – Reduced Inequalities

1. INTRODUCTION

You Are a Note is a concept-driven interactive audiovisual installation that transforms biometric pulse data into generative sound and visual projections. In this multi-user environment, each participant's heartbeat is translated into musical notes, dynamic colours, and geometric fragments. When multiple individuals engage simultaneously, their contributions merge harmonically, forming a unified audiovisual composition in real time.

The project is grounded in the framework of the *United Nations Sustainable Development Goals (SDGs)*, specifically **SDG 3** (Good Health and Well-Being) and **SDG 10** (Reduced Inequalities). These goals emphasize mental health, social inclusion, and equal participation. Rather than communicating these objectives through text alone, the installation transforms them into an immersive sensory experience that allows participants to physically experience connection and belonging.

The work explores themes of mental wellbeing, emotional visibility, and collective harmony. By converting internal biological rhythms into external sound and light, the installation highlights how each individual presence matters within a shared system. The merging of visual fragments into a complete composition symbolizes unity, demonstrating that harmony is created not through uniformity, but through diversity and cooperation.

This report outlines the conceptual foundation, interaction system, thematic focus, and social relevance of the installation.

2. CONCEPTUAL FRAMEWORK

The central conceptual metaphor of ***You Are a Note*** is:
Every person is a note in a larger composition.

Music is used as a symbolic structure for co-existence. A single note carries identity and presence; however, harmony emerges only when multiple notes interact within a shared scale. The installation translates this metaphor into embodied experience through biometric interaction.

The heartbeat was selected as the primary input because it represents:

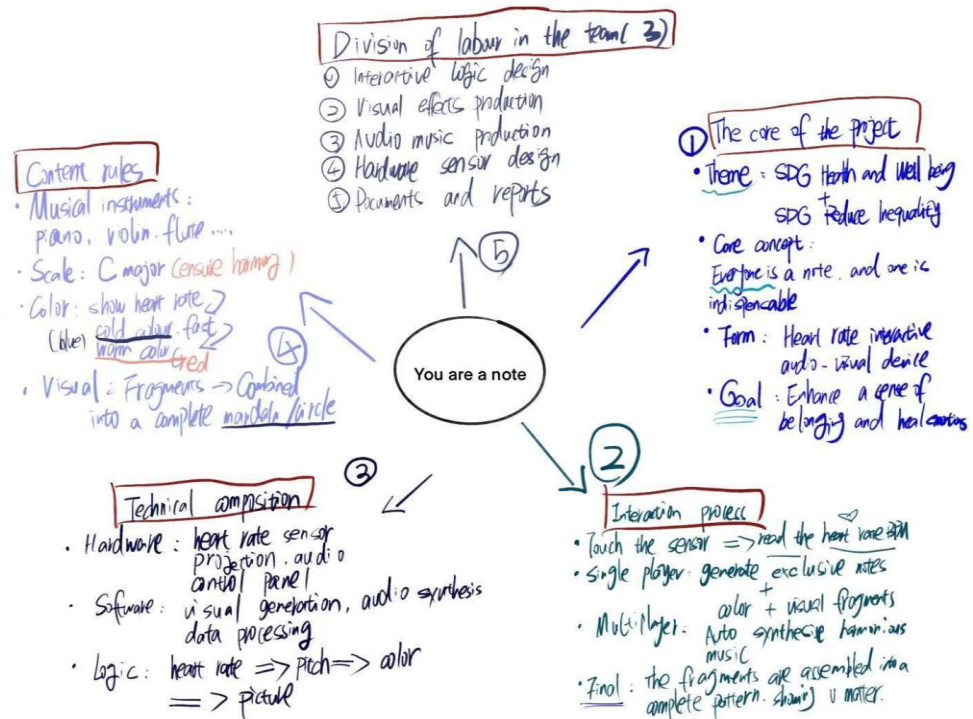
- Biological life
- Individual uniqueness
- Emotional state
- Universal human rhythm

By converting heart rate into sound and light, the installation externalizes internal presence. The work communicates that individual wellbeing contributes directly to collective harmony and that absence alters the whole.

3. MIND MAP DEVELOPMENT

The mind map for *You Are a Note* visually represents the conceptual structure, technical components, and thematic direction of the project. At the centre of the diagram is the core concept: “You Are a Note.” From this central idea, five primary branches extend outward, illustrating the key dimensions that shape the installation, core concept, interaction process, technical composition, content rules, and division of labour.

The purpose of the mind map is to clarify how artistic intention, technical execution, and thematic alignment are interconnected within a unified system. It demonstrates that the project is not only an aesthetic installation but also a structured interactive framework grounded in clear logic and social objectives.



3.1 Core Concept

One major branch of the mind map defines the conceptual foundation of the project. The installation is aligned with the United Nations Sustainable Development Goals, particularly:

- SDG 3 – Good Health and Well-Being
- SDG 10 – Reduced Inequalities

The central idea expressed in the mind map is:
“Everyone is a note, and no one is dispensable.”

This statement summarizes the philosophical basis of the installation. The form of the project is defined as a heart-rate-based interactive audiovisual device, and its primary goal is to enhance a sense of

belonging and harmony. The mind map highlights that the project is designed not merely as a technical experiment but as a socially meaningful interactive experience.

3.2 Interaction Process

Another branch outlines the interaction logic. The mind map identifies three key stages:

1. **Touch the Sensor:** The user places their hand on the heart rate sensor, which reads the BPM (beats per minute).
2. **Single Player Output:** The system generates exclusive musical notes, colour values, and visual fragments based on the detected heart rate.
3. **Multiplayer Integration:** When multiple participants interact simultaneously, the system automatically synthesizes harmonious music and combines visual fragments into a unified pattern.

The final stage emphasizes that all fragments assemble into a complete visual form (mandala/circle), symbolizing unity and collective completeness. This branch of the mind map clarifies how user interaction evolves from individual presence to shared harmony.

3.3 Content Rules

The mind map also includes content rules that guide the artistic structure of the system:

- **Musical Instruments:** Piano, violin, flute, and other layered instruments.
- **Scale:** C Major scale, chosen to ensure consonant harmony.
- **Colour Mapping:** Heart rate influences colour temperature

Slower BPM - Cooler colours (blue tones)

Faster BPM - Warmer colours (red tones)

- **Visual Design:** Individual fragments gradually combine into a complete circular or mandala pattern.

These rules ensure consistency and prevent dissonance. They demonstrate that harmony within the installation is not accidental but intentionally structured through musical and visual constraints.

3.4 Technical Composition

The technical branch of the mind map outlines both hardware and software components:

Hardware:

- Heart rate sensor
- Projection system
- Audio output system
- Control panel

Software:

- Visual generation algorithms
- Audio synthesis engine
- Data processing and signal filtering

The logical mapping process is summarized as:

Heart Rate - Pitch -Colour -Image

This sequence represents the transformation of biological data into artistic output. The mind map makes clear how physiological input becomes multisensory expression.

3.5 Division of Labor

The final branch defines team responsibilities, showing structured collaboration:

1. Interactive logic design
2. Visual effects production
3. Audio and music production
4. Hardware sensor design
5. Documentation and report writing

This division demonstrates organized project management and interdisciplinary integration. Each role contributes to the overall coherence of the installation.

4. INTERACTION AND SYSTEM DESIGN

4.1 Overview of the Interactive System

The interactive logic of *You Are a Note* is structured around the translation of biometric data into audiovisual outputs. Although developed conceptually rather than as a functional prototype, the system is governed by clearly defined rules and interaction modelling.

The core interaction sequence follows a structured progression:

1. A participant places their hand on a pulse-reading interface
2. The system detects heart rate (beats per minute-BPM).
3. The BPM value is filtered and normalized.
4. The processed data is mapped to:
 - A unique musical instrument,
 - A musical note within a fixed scale,
 - A projected colour value,
 - A geometric visual fragment
- 5: The generated sound and visuals are layered into the shared environment.
- 6: Additional participants introduce new layers, increasing audiovisual density.

The installation functions as a multi-user generative system in

which individual inputs accumulate into a collective output.

4.2 System Inputs and Outputs

Inputs:

- Biometric pulse data (BPM)
- Number of active participants
- Participant entry and exit events

Outputs:

- Instrument layer (audio)
- Note pitch (frequency)
- Colour projection (HSL mapping)
- Visual fragment (geometric form)
- Overall environmental intensity and density

This structured mapping prevents arbitrary system behaviour and reinforces conceptual coherence.

5. INTERACTION STATES (Step-by-Step)

The installation operates through four primary interaction states:

5.1 Idle State:

The environment begins in a low-intensity mode:

- Minimal lighting.
- Subtle ambient sound.
- Projection text: "Touch to be heard."

The space appears incomplete, symbolizing invisibility and social Isolation.

5.2 Single Participant State:

When one participant interacts:

- A single instrument is activated.
- One musical note loop in rhythm with the heartbeat.
- A corresponding colour is projected.
- One geometric fragment appears.

The space becomes activated but remains incomplete, representing individuality without collective connection.

5.3 Multi-Participant State:

Each additional participant triggers:

- Assignment of a new instrument.
- Mapping of BPM to a compatible musical note.
- Generation of a distinct colour.
- Creation of an additional geometric fragment.

Sound layers accumulate harmonically. Visual fragments begin spatially connecting. The atmosphere transitions from individual presence to collective coexistence.

5.4 Collective Harmony State:

When a threshold number of participants (4–6) is reached:

- A complete chord structure forms.
- Visual fragments merge into a circular mandala.
- The environment becomes immersive and dense.
- Projection displays: “You matter.” and “This space needs you.”

If a participant exits:

- Their sound layer fades.
- Their visual fragment dissolves.
- The structure becomes partially incomplete.

This reinforces the concept of interdependence.

6. SYSTEM RULES AND ALGORITHMS

Although conceptual, the installation is governed by explicit rule-based logic.

6.1 Signal Processing Rules

- BPM is sampled every 2 seconds
- A moving average filter smooths fluctuations.
- Values outside the biological range (40–150 BPM) are ignored.

These constraints ensure stability and realism.

6.2 Instrument Assignment

Each participant receives a unique instrument from a predefined list. No duplication occurs until reset.

6.3 Note Mapping

All notes belong to the C Major scale to ensure harmonic compatibility.

6.4 Colour Mapping

Heart rate values are mapped to hue:

- Lower BPM - Cooler colours (blue tones)
- Higher BPM - Warmer colours (red/orange tones)

6.5 Harmony Control

- Audio layers balanced automatically
- No single participant dominates
- Chord structure maintained

7. THEMATIC FOCUS

The thematic foundation of *You Are a Note* is centered on the relationship between individual presence and collective harmony. The installation explores mental wellbeing, social inclusion, belonging, emotional visibility, and collective interdependence as interconnected dimensions of sustainable social development. These themes are not presented abstractly; rather, they are embodied through structured interaction and rule-based system design.

7.1 Mental Wellbeing and Embodied Awareness

Mental wellbeing is widely understood as a state that includes emotional regulation, self-awareness, resilience, and social connectedness, not merely the absence of mental illness. Contemporary psychological frameworks emphasize that wellbeing is relational and context dependent.

Self-awareness plays a critical role in mental health. By translating heartbeat data into sound and colour, *You Are a Note* creates a form of embodied **biofeedback**. Biofeedback research suggests that when individuals perceive real-time representations of physiological processes, they often develop greater emotional awareness and regulation.

Your presence has impact.

The system's responsiveness promotes a sense of agency. Participants observe how their pulse shapes sound, colour, and form in real time. This direct feedback loop encourages awareness of embodiment and emotional state. The act of listening to one's heartbeat translated into harmonious sound can also produce a calming effect, reinforcing emotional regulation and self-awareness.

Furthermore, the installation avoids competition or evaluation. There is no measurement of performance, speed, or superiority. This non-competitive structure reduces anxiety and supports psychological safety within the interactive space.

7.2 Social Inclusion

Social inclusion refers to the process of ensuring equal participation in social, cultural, and communal life. Exclusion often arises from systemic inequality, marginalization, or social hierarchies.

The installation structurally models inclusion through its design logic:

- Each participant receives equal audiovisual weight.
- No instrument is prioritized over another.
- Contributions are harmonized rather than ranked.
- All participants follow the same interaction rules.

By assigning each person a unique instrument and compatible note within the same harmonic scale, the system ensures that every contribution is necessary and balanced. There is no “lead” or “background” role. Instead, all layers collectively shape the composition.

Importantly, the system prevents dominance. Automatic balancing ensures that no participant can overpower others. This design choice mirrors inclusive social systems, where diversity is integrated rather than suppressed.

The installation therefore becomes a metaphor for equitable participation in society, aligning with the broader principle of reducing inequalities.

7.3 Belonging

Belonging is the emotional experience of being accepted, valued, and part of a group. Psychological research consistently identifies belonging as a fundamental human need.

In *You Are a Note*, belonging is not simply described it is constructed through system behaviour. The environment only reaches visual and auditory fullness when multiple participants engage. A single participant activates the space, but it remains incomplete. This deliberate incompleteness reflects the idea that individuals thrive within relational networks.

As additional participants join:

- Sound becomes richer.
- Colours merge into gradients.

- Geometric fragments connect into unified structures.

The experience of witnessing one's output merge with others reinforces collective identity. Participants do not lose individuality; rather, their uniqueness contributes to shared harmony.

If a participant leaves, the system visibly and audibly changes. The fading of their layer demonstrates that absence has impact. This reinforces the idea that each person's presence matters within the collective

7.4 Emotional Visibility

Emotional experiences are often internal and invisible. Many individuals struggle with feeling unseen or unheard, particularly those who experience anxiety, marginalization, or social isolation.

The installation addresses emotional visibility by externalizing the heartbeat a private physiological rhythm into public artistic expression. Variations in BPM influence pitch and colour, subtly reflecting emotional states such as calmness or heightened energy.

This transformation achieves several objectives:

- It validates internal experience.
- It transforms vulnerability into beauty.
- It normalizes emotional fluctuation.

The mapping of slower heart rates to cooler colours and faster heart rates to warmer tones creates a visual language of emotion without labelling it as "good" or "bad." All states are harmonically integrated. No emotional condition disrupts the system; instead, it enriches the composition.

By avoiding judgment or categorization, the installation fosters emotional acceptance and awareness.

7.5 Collective Harmony and Interdependence

Harmony in music arises from structured relationships between distinct notes. Similarly, sustainable societies depend on structured relationships between diverse individuals.

The installation enforces harmonic compatibility through rule-based scale mapping. By limiting notes to a consonant scale, the system ensures that difference does not produce chaos. This design symbolizes the importance of shared frameworks laws, values, and mutual respect in enabling diversity to coexist productively

Interdependence is reinforced through cumulative layering:

- More participants increase sonic depth.
- Visual complexity grows with engagement.
- Environmental immersion depends on collective input.

The system visually and audibly communicates that collective richness emerges from participation. When engagement decreases, complexity diminishes. This demonstrates the fragility of communal systems when inclusion weakens.

Harmony, therefore, is not accidental it is intentionally structured and collectively maintained.

8. ALIGNMENT WITH THE United Nations Sustainable Development Goals

8.1 SDG 3 – Good Health and Well-Being

SDG 3 promotes physical and mental health for all individuals. While physical health is often emphasized, mental health and emotional wellbeing are equally critical components of sustainable development. Research shows that feelings of isolation, exclusion, and invisibility significantly affect psychological wellbeing.

Mental health is strongly influenced by:

- A sense of belonging
- Social inclusion
- Recognition and validation

Community participation

The installation addresses SDG 3 by creating an environment where participants experience their presence as meaningful and impactful. *You Are a Note* responds to this broader understanding of wellbeing by focusing on emotional presence and belonging aspects of health that are difficult to measure but deeply impact quality of life. The installation turns an individual's heartbeat a fundamental biological sign of life into **sound** and **visual expression**, making emotional presence both felt and seen, rather than only sensed internally. In doing so, the project directly reflects the principle of SDG 3, which promotes wellbeing in its broadest sense, including psychological and social wellbeing.

8.2 SDG 10 – Reduced Inequalities

SDG 10 focuses on reducing inequalities within societies. Inequality can extend beyond economic or structural disparities and include emotional and social exclusion.

Social inequality often manifests when individuals:

- Feel unheard
- Feel invisible
- Feel disconnected from collective spaces

Believe their presence does not matter

You Are a Note addresses this issue by ensuring every participant is assigned equal sonic and visual importance within the system. Everyone receives:

- A unique instrument
- A distinct note within a shared musical scale
- A visible geometric fragment

No participant dominates the system, and no contribution is erased. The concept behind *You Are a Note* addresses these forms of inequality by creating an interactive environment where every participant, regardless of background, contributes equally to the shared experience. No participant's input is privileged or diminished each heartbeat generates a distinct musical and visual contribution. When combined, these contributions form harmonious sound and unified visual structures that symbolise social inclusion and equal participation.

This design mirrors the intention of SDG 10: to promote inclusion and reduce unequal outcomes by ensuring that every individual's role or presence is valued and contributes to the whole.

9. CONNECTION BETWEEN MENTAL WELL BEING AND BELONGING

A key conceptual foundation of the project is the psychological relationship between belonging and mental health. Social science research consistently demonstrates that belonging is a fundamental human need. Individuals who feel included and valued experience higher levels of emotional resilience and self-worth.

The installation transforms this psychological principle into an interactive experience. When a participant places their hand on the pulse sensor:

- Their heartbeat is detected.
- It is translated into a musical note.
- A colour corresponding to their pulse is projected.
- A visual fragment appears in space.
- When multiple participants engage simultaneously:
 - Notes form harmonious chords.
 - colours blend into gradients.
 - Geometric fragments combine into a unified structure.

The system remains incomplete without participation. This mirrors social environments, where collective harmony depends on individual presence. The installation demonstrates that belonging is not abstract; it is experiential and relational.

10. DESIGN RATIONALE (Why This Project Matters)

The structure of the installation mirrors social systems:

- **Incomplete space** [Social isolation]
- **Activation through touch** [Personal agency]
- **Layered harmony** [Community building]
- **Dissolution upon exit** [Interdependence]

The interaction is non-verbal and accessible, creating a safe space for participants who may feel socially anxious or marginalized, the project addresses urgent contemporary realities:

- Rising global mental health concerns
- Increased loneliness and isolation
- Social fragmentation
- Emotional invisibility

Rather than communicating through statistics, the installation allows participants to experience inclusion directly.

It communicates that:

- Presence has impact.
- Belonging strengthens wellbeing.
- Equality creates harmony.
- Diversity enriches collective systems.

By aligning interactive technology with global sustainability goals, *You Are a Note* transforms policy level objectives into embodied experience.

The work demonstrates that sustainable societies depend not only on structural change but also on psychological inclusion and collective awareness.

11. CONCLUSION

You Are a Note demonstrates how interactive design can embody principles of equality, wellbeing, and inclusion through experiential engagement. By translating biometric pulse data into sound, colour, and geometric projection,

the installation transforms individual presence into a shared audiovisual composition. Rather than presenting social values as abstract ideas, the project allows participants to physically experience how their existence influences a collective environment. Each heartbeat becomes both a personal expression and a contribution to a larger system, reinforcing the idea that individuality and community are interconnected.

The structured rule-based system ensures that every participant holds equal importance within the composition. Each person is assigned a unique instrument and mapped to a harmonic note within a shared scale, preventing dominance while maintaining balance. As additional participants engage, the soundscape grows richer and the visual projections become more complex. When someone withdraws, their layer fades, and the environment becomes noticeably incomplete. This dynamic shift highlights interdependence and demonstrates that collective harmony depends on active inclusion and sustained participation.

Aligned with the United Nations Sustainable Development Goals, particularly SDG 3 (Good Health and Well-Being) and SDG 10 (Reduced Inequalities), the installation translates global development principles into lived sensory experience. It emphasizes that wellbeing is relational, inclusion requires intentional structure, and diversity strengthens unity. Ultimately, *You Are a Note* communicates that every individual matters, not symbolically, but structurally within the systems they inhabit, and that harmony emerges when differences are integrated with equality and respect.

12. REFERENCES

United Nations. (n.d.). Sustainable Development Goals.

(<https://sdgs.un.org/goals>, n.d.)

United Nations. (n.d.). Goal 3: Good Health and Well-Being.

(<https://sdgs.un.org/goals/goal3>, n.d.)

United Nations. (n.d.). Goal 10: Reduced Inequalities

(sdgs.un.org/goals/goal10, n.d.)

13. FLOWCHART (Interactive System Diagram)

[User Places Hand on Sensor]



[Pulse Sensor Reads BPM]



[Noise Filtering + Normalization]



[Check Available Instrument]



[Assign Unique Instrument]



[Map BPM to Note (**Scale-Based**)]



[Map BPM to Colour (**HSL Value**)]



[Generate Visual Fragment]



[Output Sound + Projection]



[More Participants?]



[Merge Audio Harmonically]

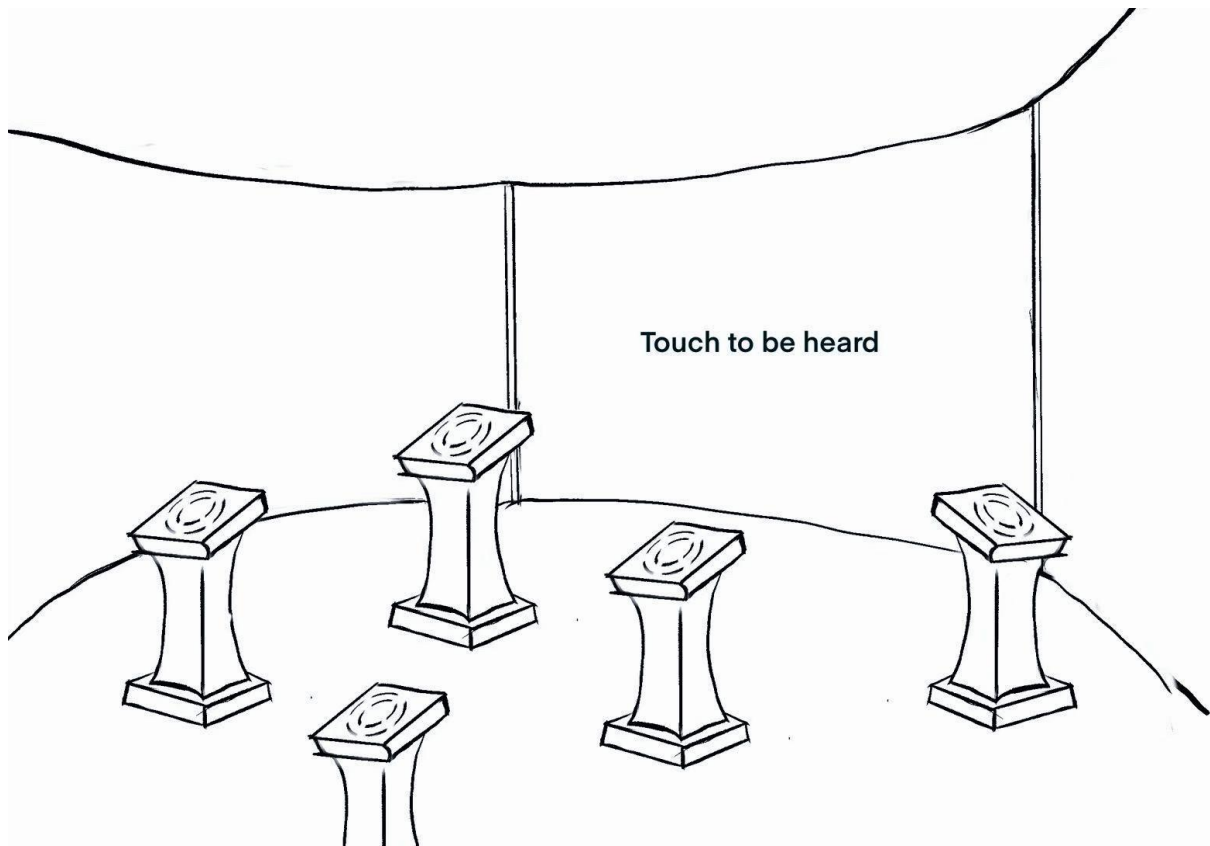
[Merge Visual Geometry]



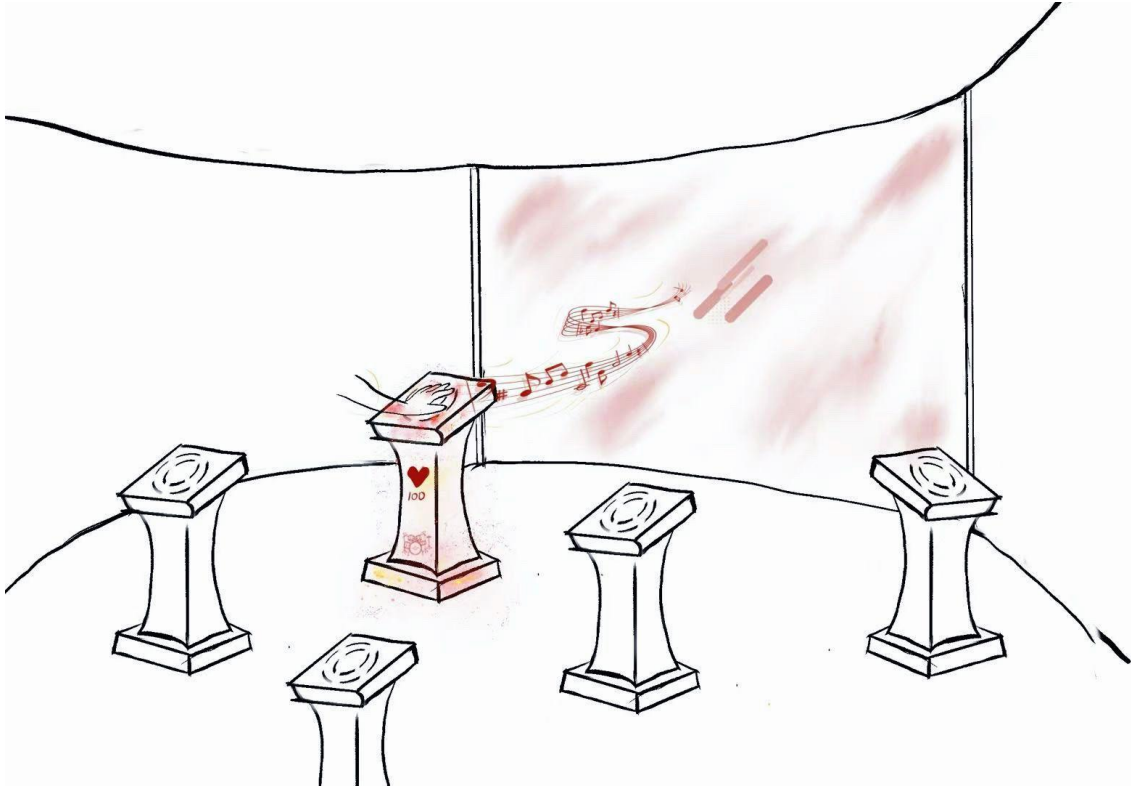
[Collective Atmosphere]

14. APPENDICES

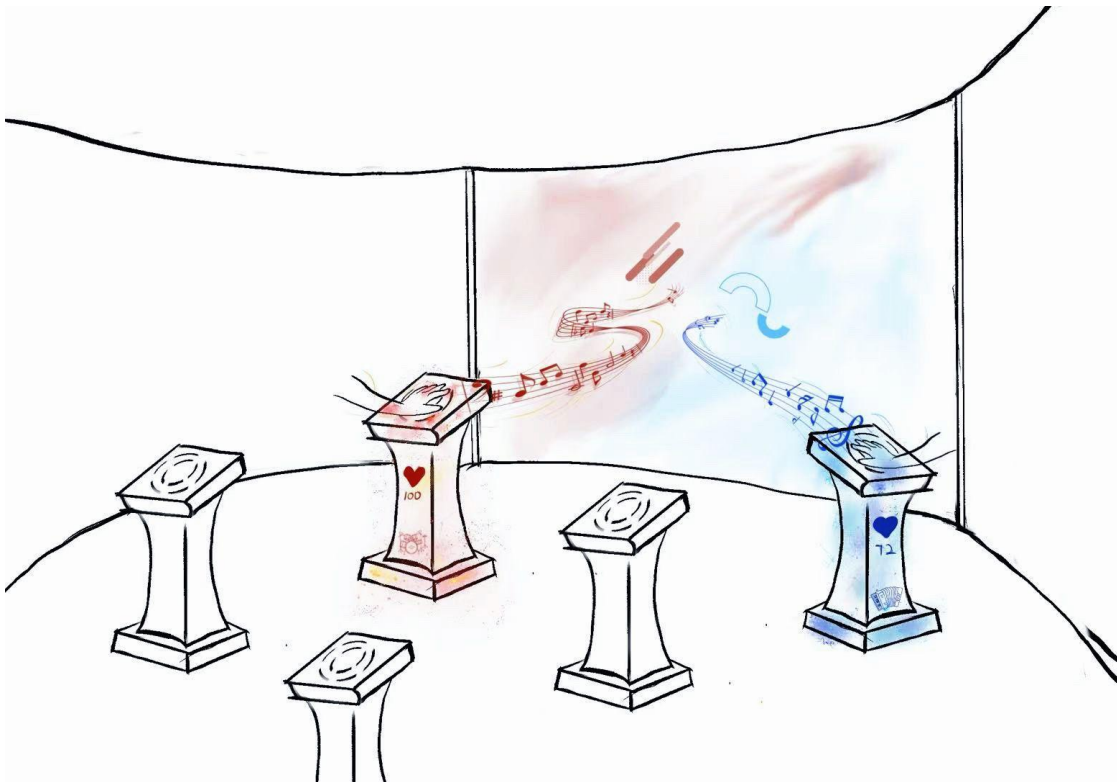
Appendix A – Storyboard:



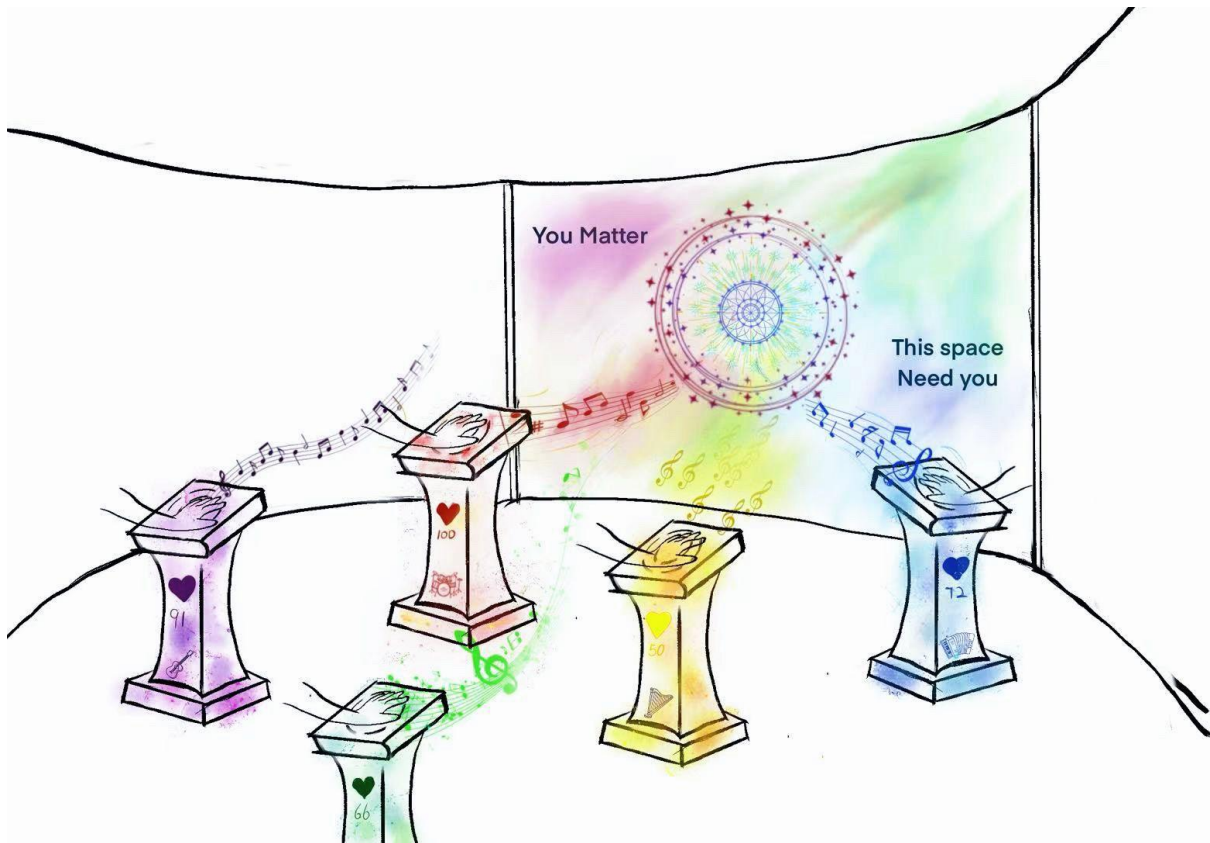
Appendix B:



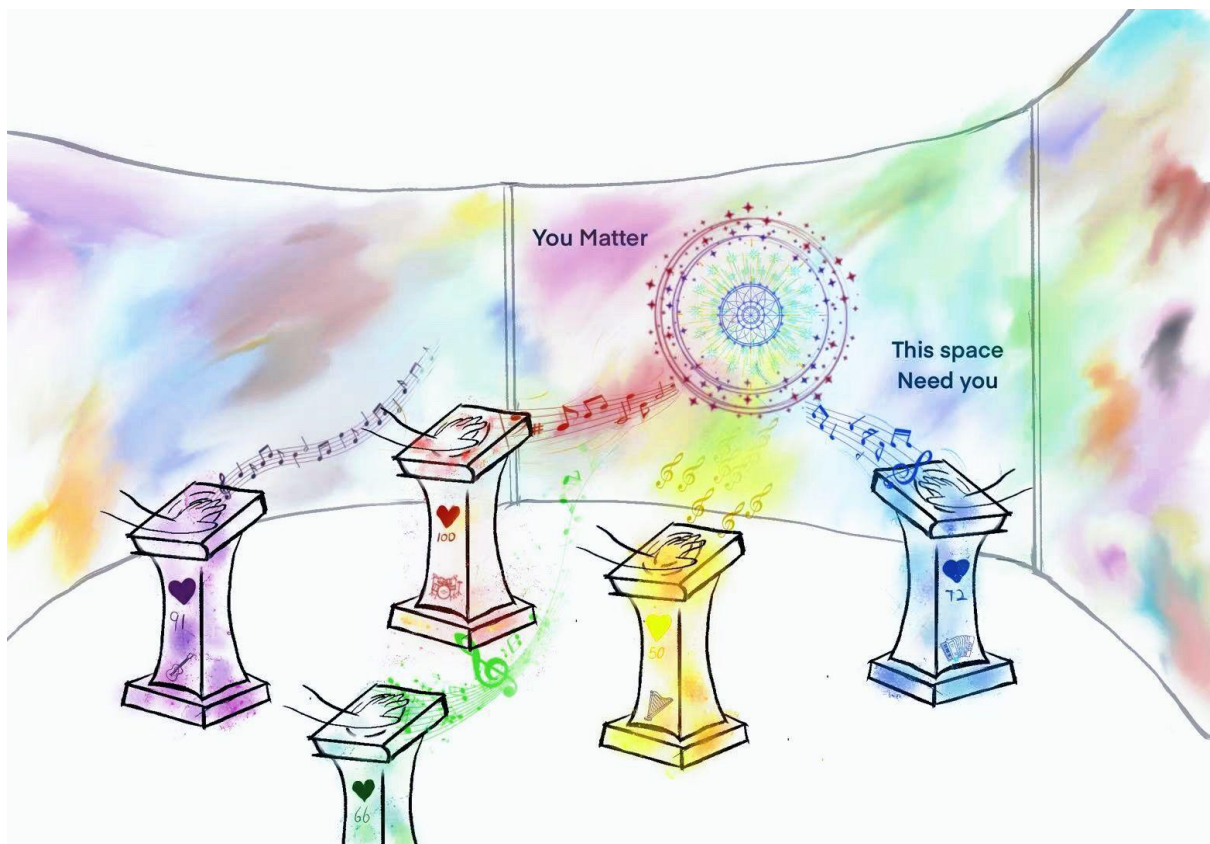
Appendix C:



Appendix D:



Appendix E:



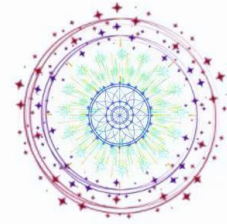
Appendix F:

Put your hands on the machine.

Different colours correspond to different heartbeats and different musical instruments.

- | | |
|---|--|
|  Purple - Guitar |  Blue - accordion |
|  Yellow -Harp |  Red - drum kit |
|  Green - Piano | |

Randomly activate geometric fragments of different shapes and colours.



Finally, all fragments combine into one complete graphic.

