Echoes of Nature's Heritage – Composed for a Custom-Made Data-Driven Instrument

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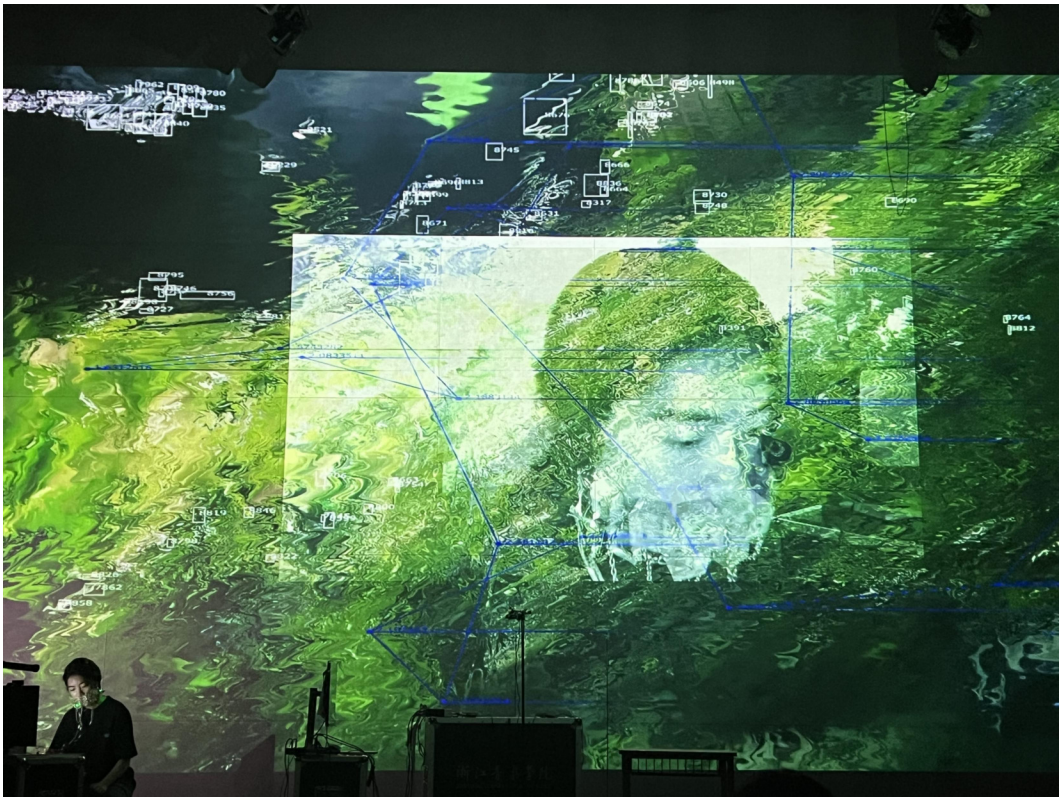

Fig. 1. Author's Stage Performance

1. PROJECT DESCRIPTION

This work is inspired by the author's personal experience of wearing braces twice due to bite and tooth decay issues. During orthodontic treatment, the author developed an interest in the mechanics of braces and the changes in teeth alignment. Through research and interviews with dental professionals, it became apparent that the stages of orthodontic treatment (alignment, bite adjustment, closure, and retention) [1] mirrored the balance and mutual restraint between nature and mechanics, encompassing concepts such as natural processes, the two industrial revolutions, green sustainable development, and renewable energy. This reflection on the relationship between nature and mechanics led to the creation of a data-driven instrument performance, which aims to advocate for environmental protection and promote a balance between mechanical and natural systems in the pursuit of sustainable development. The work intends for audiences to perceive

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the voice of nature, understand its complex history, and reflect on the relationship between humans and nature.

2. TECHNICAL NOTES

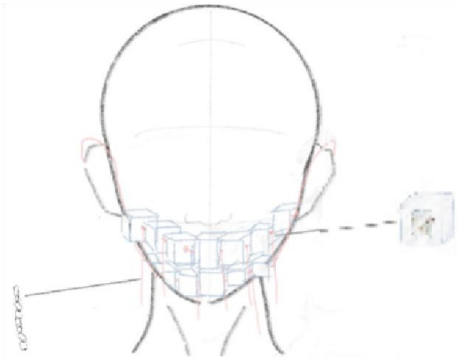

Fig. 2. Sketch

The installation utilizes Arduino IDE to facilitate interaction between hardware and software. The MPU6050 accelerometer and gyroscope are used to track the performer's head movement, capturing real-time data on head tilt and rotation, which is sent to the Arduino. This data is subsequently processed in Max/MSP to dynamically adjust filter parameters based on the performer's movements. Additionally, infrared sensors are employed to detect the performer's hand movements and positions, triggering real-time camera zoom effects on the stage screen by TouchDesigner.

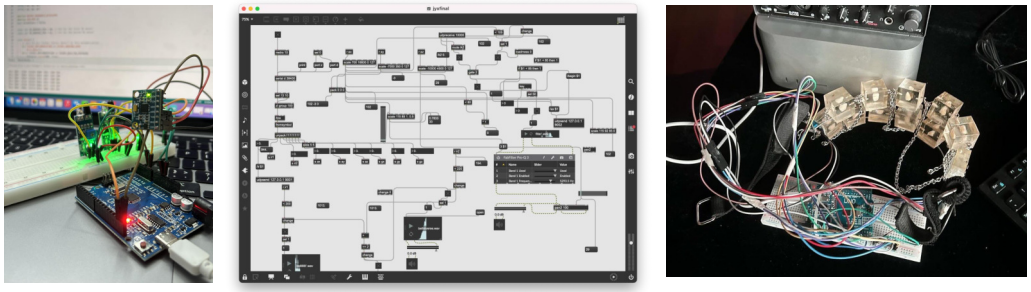

Fig. 2. Process of Making the Sensors Part

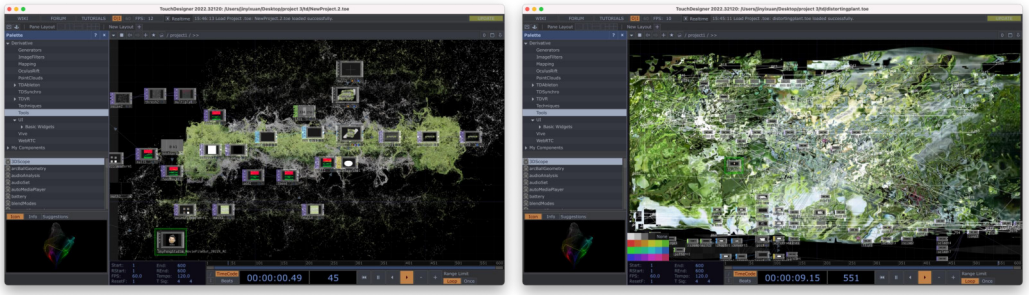

Fig. 3. Process of Making the Interactive Visual Part

The wearable device merges elements of nature and machinery. The transparent resin cube encases a suspended tooth, symbolizing the preservation of natural states while also representing control over nature. Arch wire (iron wire) connects the brackets and applies force, embodying the tension and interaction between nature and machine. The chain symbolizes the broader connections and constraints within the natural-mechanical system, signifying the dynamic interplay between stability and restriction. This physical installation is affixed to the performer's head using Velcro.

Fig. 3. Process of Making the Device

The sound is divided into pre-recorded and real-time segments. Pre-recorded sound employs Alchemy and Atmospheric Synthesizers to create distinct "natural" and "mechanical" atmospheres. Real-time sound triggers are controlled via infrared sensors, with different segments of the soundscape activated by the performer's head and hand movements. For instance, the phase parameters respond to the performer's head tilt, simulating the dynamic balance between nature and technology.

3. PROGRAM NOTES

The performance draws inspiration from the process of wearing braces as a metaphor for the balance between nature and mechanical intervention. It explores how humanity can reconcile the forces of industrialization with the natural world, advocating for sustainable and green development.

Section A: Represents nature, with smooth and harmonious sounds that evoke vitality and calmness, using long pad tones.

Section B1: Symbolizes mechanical intrusion, marked by dissonance and rhythmic complexity, incorporating percussion, harsh high-frequency hits, and metallic effects.
Section B2: Depicts distortion, chaos, resistance, and transformation, combining elements from Section A and glitch effects.
Section A': Represents the reconciliation of nature and mechanics, blending elements from A and B into a harmonious resolution.

The soundscape includes samples and transformations of bells (signifying the passage of time and awareness), bird calls, and nature sounds. The transformation of these sounds into mechanical distortions reflects the impact of technology on the natural environment. Glitch effects symbolize the intrusion of technology, particularly during moments of conflict between nature and machine.

4. MEDIA LINK(S)

- Video: https://youtu.be/a1ZNhHtlV7E

ETHICAL STANDARDS

This research does not involve human participants or animal subjects. Therefore, informed consent and animal welfare statements are not applicable. Additionally, there are no conflicts of interest, either financial or non-financial, associated with this work. This research was not funded by any external sources.

REFERENCES

[1] M. T. Cobourne, P. S. Fleming, A. T. DiBiase, and S. Ahmad, *Clinical Cases in Orthodontics*. John Wiley & Sons, 2012.