Tentacle Orbits

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CCS Concepts: • **Hardware → Tactile and hand-based interfaces**; • **Human-centered computing → Sound-based input / output**; • **Applied computing → Sound and music computing**; **Performing arts**.

Additional Key Words and Phrases: Wearable Electronic Instrument, Participatory Performance, TIME, NIME

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1 Program Notes

Tentacle Orbits is a participatory performance composed with malleable Tentacle Instruments that are played through manipulations such as squeezing or stretching. The performance of these custom-built instruments is supported by live electronics that build a framework for playful improvisation.

During the performance, the audience is invited to don and play the instruments, squeezing and bending them to create a variety of sounds. The colourful appearance and glitchy sonic palette of the instruments inspire playful musicking, culminating in a cacophony of freeform play. The invitation techniques of the participatory performance vary in response to the performance site, considering the atmospheric and social aspects of the performance venue.

The Tentacle Instruments' sounds range from bright square waves built with digital logic circuitry to glitchy samplers built with the Daisy Seed platform. The parameters of their electronic components, the affordances of their code, and the nuanced expression afforded by the soft interface's malleability inform each instrument's sonic direction.

Fig. 1. A Tentacle Instrument being played by audience members, 2023.

2 Project Description

2.1 Background and concepts

Tentacle Orbits is an improvised participatory work performed with malleable tentacle-shaped electronic instruments played through manipulations such as squeezing and bending. These instruments are colourfully decorated and designed to be worn on the body. The Tentacle Instruments, developed by the performer, use soft circuitry and body contact to control audio circuitry. The audience is invited to wear and play the instruments during the performance in an improvised, collaborative, creative experience.

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Recent research in non-rigid and deformable music interface development found that material properties of an interface provoke intuitive gestures [4] and that this intuition shapes preconceptions of the material's sonic and gestural affordances before any physical connection is made [2].

The shape and malleability of the Tentacle Instruments provoke an intuitive response to grab and squeeze the tentacles, and the placement of the conductive thread allows for connections with a range of hand sizes and methods of grabbing. This intuitive response and adaptability of the instruments are essential for publicly playable instruments that must be simple to start playing and expressive enough to hold interest.

The Tentacle Instruments are developed for use in participatory noise performance, and the participatory experience is considered the starting point for their development. Musical Instruments developed for participation are effective when they inspire curiosity in their approach, simplicity in their use, and complexity in the experience. For clarity of communication within the limited temporal nature of live performance, focusing on one key method for interaction is effective, as multiple options can cloud focus. By employing the tentacle sensor as a central interface, the audience can easily approach and explore different instruments.

As the researcher is both performer and maker, in-person evaluations of live performances inform future iterations of the Tentacle Instruments. Tentacle Orbits introduces a new iteration of the instruments featuring a system for audio monitoring and feedback.

2.2 Underlying concepts and technologies

The wearable Tentacle Instruments are built with electronic audio circuits and tentacle-shaped sensors built with soft circuitry. The instruments all use a common interface, consisting of stuffed fabric tentacles embedded in a wearable form, ranging from a belt to head wear to a full-body costume. Each instrument employs tentacle-shaped sensors as its interface,

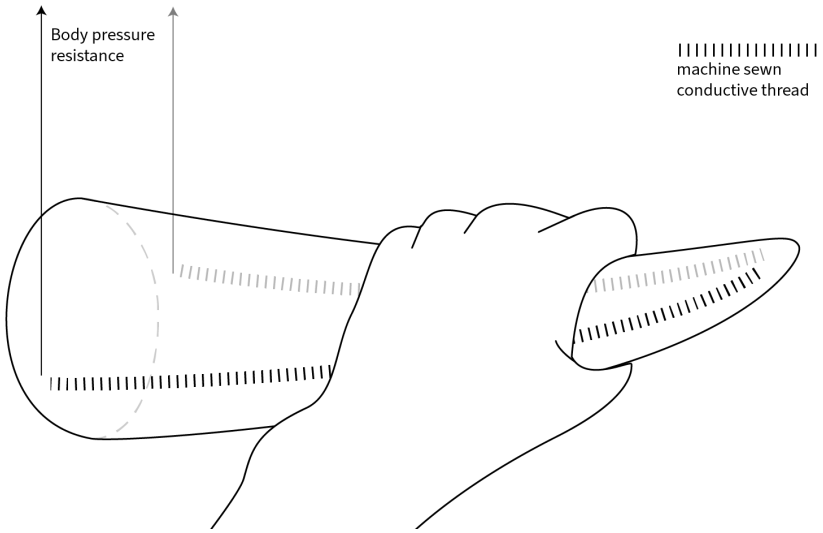

Fig. 2. Diagram of a tentacle sensor.

which use body contact to control the audio circuits. Figure 2 shows the design of the tentacle sensor. Machine-sewn conductive thread runs along opposing sides of each tentacle. When a hand squeezes the tentacle, the two sides are connected, closing the circuit and using body resistance to control the sound. This use of body resistance creates an effective pressure sensor because increased hand pressure equals greater contact with the resistive thread, resulting in a sensed response to pressure differences.

While each instrument uses a tentacle sensor as its interface, the audio circuitry varies across the instruments, with three circuits in use.

- Digital Logic: The tentacle sensor controls pitches on a CMOS circuit built with a CD40106 and CD4040, producing multiple square waves.
- Noise Radio: Three tentacle sensors control the sound of a circuit-bent LM386 amplifier circuit with combinations of the tentacle touches and pressures, creating a range of sound from high-pitch squeals to static to bass oscillation.
- Sampler: This sampler instrument has a 5-second buffer that plays continuously while no recording is occurring. There are three tentacle controls. Recording is triggered through a soft button in one tentacle, with an LED turning

red to indicate recording. The second tentacle controls the pitch of the sample playback, and the third controls the length of the sample. This instrument is built using the Daisy Seed and Arduino.

2.3 Relevance to NIME

Textile interfaces for musical expression (TIMEs) and non-rigid electronic musical instruments have been identified as key areas for further research, particularly in the context of longitudinal studies [1][3]. This performance contributes to the NIME community by showcasing the Tentacle Instruments, a notable example of a non-rigid instrument developed through a longitudinal process of live performance research. Using a cyclic process of live participatory performances, developed over years, the performer-researcher has increased the instrument's robustness and diversified their sonic possibilities. This approach contributes to the research gap highlighted by Boem et al.[1] and reflects over fifteen years of iterative development by the performer/maker.

3 Technical Notes

The performance runs between 5 – 8 minutes and is adaptable for most spaces. The ideal performance space is a club space or a setting with minimal barriers between the audience and the performer. A dark space with some lighting on the performer would work well.

The author will provide:

- Mixer with 2 x XLR outputs.
- Various sound equipment: iPad, DEP, sample pedal, 3 x Tentacle Instruments.
- I will bring all my equipment and cables to run between my instruments and the mixer.

Venue to provide:

- Stereo DI.
- Cables to run between my mixer (2 x XLR) and the stereo DI.
- A table approximately 1m x 60cm.
- 2 x microphone stands.
- 1 x microphone.
- Lighting – minimal lighting required.

4 Media Links

- Video: https://vimeo.com/1048397360/038e6d170c

5 Ethical Standards

This artistic research was undertaken as part of the author's PhD project at the Queensland Conservatorium, Griffith University. Ethical standards and considerations for this project are approved under a Griffith University ethics clearance, GU Ref No: 2025/054.

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