Gulf: Piano and Gesture-Controlled Live Electronics

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1. Program Notes

Gulf lives on a knife edge, treading carefully through both natural and artificial soundscapes, and seeks to find a relationship between queer and sacred identities. The performer traverses this path alone, the temperamental duet between piano and electronics only ever able to respond to itself. By controlling the effects that alter the sound of the piano, and to a degree, how long the listener dwells in heavy and lighter spaces, the performer balances on either side of the gap. The performer is also asked to de- and re-attach themselves to both their instrument and their upper body movements, timing moments of change carefully to avoid tumbling over the edge.



Fig. 1: Zubin Kanga performing *Gulf*. Photo by Adele Keith Photography.

2. Project Description

This performance by Dr Zubin Kanga (Royal Holloway, University of London) features a new work for solo piano and electronics that demonstrates an innovative use of MiMU's gesture-control technologies, where the pianist's hand gestures control live electronics using webcam-based video-motion-capture rather than a sensor glove.

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Gulf (2025), composed by Rylan Gleave, utilises research undertaken by Dr Thomas J. Mitchell (UWE, Bristol) that links the Glover mapping software (created by MiMU for use with their sensor gloves and co-developed by Mitchell) with Google's MediaPipe (an open-source framework for creating real-time machine learning solutions for video-based motion and gesture tracking) to combine the flexibility and accessibility of single-RGB-camera motion capture with the end-user mapping capabilities of Glover. The result is a system which uses a camera, placed on the piano facing the pianist, to facilitate motion capture, allowing the performer to lift their hands off the keys to control electronic sounds through gestures. The combination of software allows the live piano sound to be shaped and parameters to be manipulated through movements of the hands across the range of camera vision. Multiple layers of control are facilitated by the use of trigger gestures and complex combinations of different types of gesture and movement.

This work builds on previous research with motion-based instruments, including Tanaka [1], Miranda and Wanderley [2] and Frid [3], as well as research into MediaPipe-based gesture mapping for music, including Lim, Kotsani and Hartono [4], Cochiara and Turchet [5], and Bayd et al. [6]. It also builds on the skills and music-technology explorations developed in works composed by, or created in collaboration with, Dr Zubin Kanga, integrating gesture into performance using sensors and new interfaces (including the MiMU gloves), such as Neil Luck and Zubin Kanga's *Whatever Weighs You Down* (2022), Jon Rose's *Ballast* (2019), and Laura Bowler's *SHOW(ti)ME* (2022).

The performance showcases a unique combination of technologies and the integration of instrumental performance with camera-based gestural control, while also demonstrating the level of technique and virtuosity required to explore the full expressive potential of the technologies in performance.

3. Technical Notes

The performance requires the following equipment :

- Grand Piano with adjustable stool
- PA with two speakers
- Two foldback wedges
- Two condenser mics for piano amplification
- Two condenser mics for live electronics
- Small table for laptop/interface
- Laptop and audio interface

4. Media Link

- Video: https://www.youtube.com/watch?v=vhQa5uy12XE

Acknowledgments

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Ethical Standards

The research complies with the NIME Principles & Code of Practice on Ethical Research, and the Research Principles and Codes of Practice of all affiliated institutions and funders. There are no conflicts of interest, and all participants in the project have consented to their inclusion.

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