Prototype GO: Wireless Controller for Pure Data

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ABSTRACT
This paper describes the development of a wireless wearable controller, GO, for both sound processing and interaction with wearable lights. Pure Data is used for sound processing. The GO prototype is built using a PIC microcontroller using various sensors for receiving information from physical movements.

Keywords
Wireless controller, Pure Data, Gestural interface, Interactive Lights.

1. INTRODUCTION
This paper describes the development of prototype GO, a wireless and wearable controller for sound processing using Pure Data [1]. GO is being developed as part of research in wireless and portable systems for sound processing. Various sensors on the GO board are reading data from human movements. Output from GO is, in addition to live sound processing, also using various lights modules corresponding to physical movement. The first stage of development was described in *Designing Prototype GO for Sound and Light.* [2] To couple sound and light for live performance has not been examined within studies of wearable interactive performances.

2. PROTOTYPE GO
Prototype GO is a wearable controller, aimed to work with physical movements, to generate interaction with both sound and lights. One of the design ideas of the GO board, which can be seen in Figure 1, is to build a modular controller, with easily detachable and exchangeable sensors and light modules both for practical and for artistic purposes.

The circuit board holds a PIC micro controller [3], with an accelerometer from Analog Devices, ADXL210 [4], three micro switches, and one bend sensor from Images Scientific Instruments [5]. The accelerometer sends out values depending on its relation to earth's gravity. It is a 2-way axis sensor. The bend sensor, in Figure 2, controls volume. Information is sent from GO via a wireless Bluetooth module into Pure Data, over a emulated serial port [6].

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Figure 1. Prototype GO.

Figure 2. Volume control.

3. PURE DATA
Pure Data is used for sound processing. GO is set up to interact with Pure Data in two different ways. One way of interaction is if GO is placed inside of a moving object, without a performer, the accelerometer advances the sound composition depending of the movement of the object. The second way of interacting with the composition is by using physical movements of a performer, using both the accelerometer and the switches. See main interface for Pure Data in Figure 3.

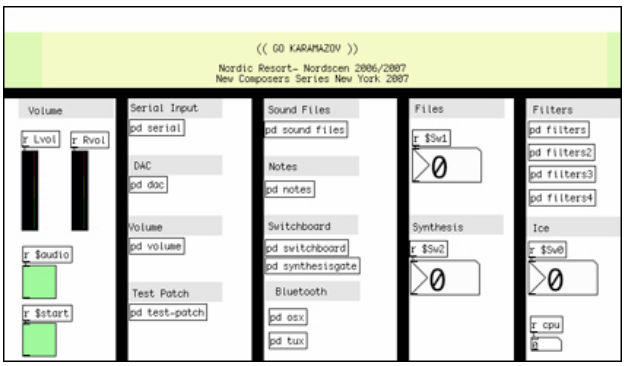

Figure 3. Main interface in Pure Data.

4. PERFORMING WITH LIGHTS

Performing with a small amount of light sources is not very common. Most music performances are taking place on a stage with a traditional light environment, where the musical performer is fully visible to the audience. A laptop musician is often using light coming from the laptop, where the audience's gaze is focused on the often un-expressive face of the performer.

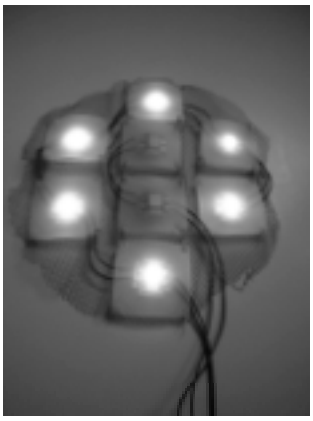

Figure 4. Light module circle.

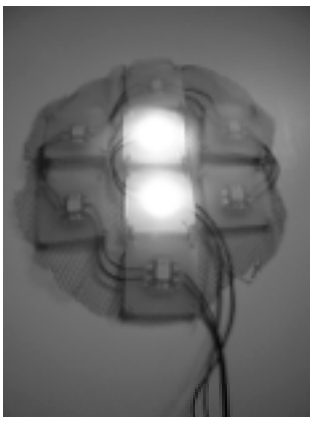

Figure 5. Light module centre.

Prototype GO is an experiment in creating a sound performance with lights corresponding to the performer's movements coupled with sound processing. Some of the light modules for GO can be seen in Figure 4 and Figure 5.

5. FUTURE WORK

GO is a work in progress. Future developments will be focused on a few issues. There will be more work on the sound composition. The development of the final board will also be made, with a Printed Circuit Board (PCB). One of the design criteria of the final printed circuit board, is that the size will be as small as possible, since the board should not be visible during the performance. There will also be work made on computational light modules corresponding to movements. Some more work will be put into developing new light modules, as well as new switches.

ACKNOWLEDGEMENTS

Many thanks to White Noise ll and New Composers Series at White Box in New York for commissioning the GO Karamazov performance for PERFORMA 07 [7]. Many thanks also to Nordscen Artist in Residency Program for giving me space to work out the first prototype and light modules for GO [8].

REFERENCES

[1] Pure Data, http://puredata.info/

[2] Sjuve, E.S.I. Designing Prototype GO for Sound and Light. In *Proceedings of Pure Data Convention 2007, (*Montréal, Canada, August 21-26, 2007*)*, http://artengine.ca/~catalogue-pd/

[3] Micro Chip, http://www.microchip.com

[4] Analog Devices, http:// www.analog.com/

[5] Images Scientific Instruments, http://www.imagesco.com/sensors/flex-sensor.html

[6] Serial communication, RS-232 is emulated by rfcomm, a Bluetooth protocol.

[7] PERFORMA 07, http://www.performa-arts.org/

[8] Nordscen, Nordic Resort, http://www.nordscen.org/nordicresort/