Physical Computing Workshop: Day 3

Microcontrollers, APIs, sonification, and big data

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Learning Outcomes

— Get an overview of the possibilities of interaction in physical computing applied to music.
— Identify the main characteristics of the Arduino board.
— Explore the creation of interactive systems for music using the Arduino board.
— Get familiar with how web APIs work.
— Be able to integrate data from web APIs to an Arduino program.
— Explore mappings from big data to sound.
— Be able to adapt javascript and Arduino code to a custom-made musical instrument.
— Demonstrate a custom-made musical instrument in a performance setting.
— Reflect on the custom-made musical instrument and performance using a blogging style.

Preparation: Reading

— Read / skim through the following article and be ready to discuss it in class:
  - Collins, N., 2010. Interaction (chapter 6). In Introduction to Computer Music. Wiley.
    https://goo.gl/zor5gN

Preparation: What to Bring to Class?

— Your own laptop.
— Headphones / earplugs.

Preparation: What We Do Provide?

— 7 Music Angel speakers for the performance per site.
— 6 Arduino Kits per site.
— Slides: xx.
— Code: xx.
— A handout: xx.

Pre-knowledge Activity: Interaction

Be ready to discuss topics related to interaction from the suggested reading.

Outline

— Block I: Getting familiar with the Arduino board
— Block II: Basic interactive behavior activities: mappings from big data to sound
— Block III: Rehearsal and performance

Exercise 1: Arduino as an IKEA kit and "Hello, World!"

— Explore the content of the Arduino experimentation kit, ideally in pairs.
— Follow the initial steps of the booklet: get familiar with the components and install the Arduino IDE software (page 3 of the booklet.
— Have a close look at the breadboard.
— Have a close look at the Arduino board and the types of pins.
— The "Hello, World!" in Arduino: Blinking LED exercise (pages 8–9 of the booklet).

Exercise 2: Using a Pushbutton to Control the LED

— Follow the indications from the link.

Exercise 3: Fade an LED

— Follow the indications from the link.

Exercise 4: Arduino 8-bit sound generation

— From blink to bee exercise (pages 7–9 from the [link]).
— Playing tones (pages 9–10 from the link).
— Arduino's tone library (pages 10–12 from the link).
— Chained melodies (pages 12–14 from the link).
— Converting sound to text (pages 16–17).
— (Optional) Follow the indications of the Music Piezo Elements exercise (pages 18–19).

Exercise 5: Serial output from P5.js

— Follow the instructions from the link.

Exercise 6: Visualize live sensor data with P5.js and an Arduino

— Follow the instructions from the link.