**Weekly logs**

17th Jan:

I’ve been starting to look for different approaches on how I can physically build the system I want to or at least try. I found some schematics which may be a good starting point for building a special Arduino Shield needed for capacitive sensing. Schematics are hard to decode but I’m going to try to understand them and make the shield to imitate the Touche technology. The components I’m going to need are: resistors (10k, 1M, 3.3kOhm), Capacitors: 100pf, 10nf, Diode: 1n4148, Coil(inductor): 10mH, and probably some crocodile clip cables, on top of that obviously Arduino and a breadboard or solder board.

23th Jan:

I’ve been researching and reading about Touche technology and also reading about capacitive sensing to understand more about it and conductivity. Touche is very similar to a capacitive sensing mechanisms found in smartphones or tablets but it works on a different basis. Instead of operating on one frequency it measures and monitors the capacitive signals across the broad range of many frequencies. This is called - “Swept Frequency Capacitive Sensing (SFCS), the technology makes it possible to detect not only when a surface is being touched or not but, by taking into account data such as the different capacitive properties of different body tissues, also the complex configurations of the hand or body that is touching it.”[[1]](#footnote-0) I’m not sure that by recreating some of the Touche functionality by building a Touche arduino shield will bring me the more advanced sectors of Touche functionality like detecting the complex configurations of body or different properties of tissues but it will definitely bring the capacitive sensing functionality

10h Feb:

I’ve been looking at ways to sonify data in Max. Also I’ve been researching different generative artworks to get inspiration considering the aesthetics. I’ve also started to build the first prototype with the resistor method to create a platform for growth.

17th Feb:

I’ve been looking for any artists, performers, installations, artworks etc. that may use capacitive sensing. I’ve also got a test Touche shield built and can run a little demo using Chuck and Ableton where im receiving midi values. I’m going to show the demo as a video to my tutor . I’ll probably end up using Max/Msp as I didn’t really work in Chuck much but the code I have enables me to output some kind of data to Ableton.The best readings I’m getting are from from the Arduino sketch which I will show to my tutor video which proves the success of the circuit. I’ve also got a code in Chuck that works with Ableton where I mapped the parameters of midi instrument to the input conductivity data which is translated through Chuck to MIDI values to Ableton. I’m encountering problems though as the data stream is not stable. Arduino test and readings prove that the circuit works and is showing conductivity data. I also have example code to get the readings in Max/MSP but somehow i can’t get it to work yet. I want to somehow get the conductivity data translated into notes in the MIDI channel in Ableton next, because now I’m controlling only parameters of the instrument.

24th Feb:

I’ve been researching different methods for bioelectric feedback. I came across an article that used EEG electrodes to gather voltage from plants. I’m continuing tests on resistor method, testing different resistors. It appeared that different resistors have different qualities in terms of interaction. I tried to choose the one which allows for direct touch and gets the best response

9 Mar:

I have started to design a Max/Msp patch which creates generative soundscapes. I’ve chosen the generative technique of choosing random pair of notes from the scope to be chosen and triggered by a simple button input before I start implementing the interaction with the plant.

16 Mar:

I’ve built the second prototype using more advanced circuit than the resistor method. I encountered many problems with getting the right and clear data. I got to overcome that by measuring the signal after the capacitor rather than before. I achieved a nice looking graph with significant peak which corresponds to most sensitive capacitance level. I’m using this peak as the most important measurement data point for interaction. Later I have managed to gather capacitance data from plant and translate it so Max can read it easily.

23 Mar:

I’ve connected the capacitance circuit to Max and was able to get readings from the plant. I’ve also split the data into scopes corresponding to gestures such as: light touch, powerful touch, stem shake and touch on the soil. I’ve connected those gestural inputs to different sound parameters in Max.

30 Mar:

I’ve built another circuit for bioelectricity measurement. I want to translate this data to achieve a visual artwork.. I was able to translate the bioelectric data from the plant to voltage values. Through Arduino I’m sending the data to Processing. I’ve found generative arc drawing techniques on Processing forum as a template and then I modified it. I’m sending voltage data to processing so it can affect the visualization. I’ve achieved a organic leaf-like looking visualizations which I’m really happy with as they are relevant to the aesthetics of the project.

3 May:

I’m experimenting with different sound textures. The gestural interactions with the plant seem to trigger different music events in Max. Sometimes the gestures overlap and interfere but I realized that it is almost impossible to get error free and completely separate inputs in terms of capacitance interaction. I’ve also find out that the scopes considering gestural types differ depend on humidity levels in the plant.

10 May:

I’ve combined the capacitance method with bioelectric field measurement method in the final design. I achieved a nice platform for musical expressivity. Different gestures seem to affect different music events and the voltage levels from the plant create a visual artwork in the background in real time. It’s a success.

1. “Touché technology detects how you touch” - Darren Quick, <https://newatlas.com/touche-touch-technology/22413/>, 04.05.2012 [↑](#footnote-ref-0)