

## 1. ARDUINO DATA COLLECTION:

- Tool: Arduino Bioelectrical Sonification Device + Real plant
- Process:
- Build an Arduino device capable of collecting real-time bioelectrical data from a living plant using surface electrodes.
  - Use Arduino IDE scripts to process the incoming signals and convert them into corresponding MIDI note messages.
  - Transmit the MIDI data through the Serial Monitor for further interpretation and integration.

Expect Output: A functioning hardware system that captures and translates live plant bioelectrical activity into MIDI note data in real time via the Serial Monitor.

## 3. VIRTUAL PLANT CREATION IN BLENDER

- Tools: Blender
- Process:
- Choose evening primrose as the virtual plant reference, based on its ability to respond to environmental stimuli (e.g., increasing nectar production in response to insect vibrations).
  - Modelled the stems, pedicles, and blooms using visual references. The focus was not botanical accuracy, but instead allowing the people to perceive the plant's virtual form in the virtual environment
  - Externalises invisible biological structures such as chlorophyll, plant cells, and cortex layers, allowing audiences to see internal life processes that are typically hidden.
  - Used the Shader Editor to experiment with light, colour, and surface qualities that could evoke a sense of flow, energy, and organic transformation within the plant body.

Expected Output: A virtual evening primrose plant model that not only represents the external form of the plant but also visualises internal biological details, such as chlorophyll, cellular structures, and cortex layers, through abstract, dynamic materials. The model is designed to externalise invisible inner processes, enabling audiences to perceive the plant as an expressive and responsive living form.

## 2. PROCESSING MIDI NOTE & GENERATING SOUND USING PYTHON

- Tools: Python (for data reading, MIDI processing, and sound synthesis)
- Process:
- Connect to the Arduino port to receive the generated MIDI note.
  - Convert MIDI data into audible output through digital sound synthesis.
  - Playback: Output MIDI-triggered instrumental sounds based on live plant activity.

Expect Output: Live, generative audio created from the plant's bioelectrical signals, allowing real-time interaction between plant activity and synthesised sound.

## GRADUATION PROJECT MIND MAP

## 4. REAL-TIME AUDIOVISUAL INTEGRATION IN TOUCHDESIGNER

- Tools: TouchDesigner (Real-Time MIDI Sound Input + 3D Virtual Plant Model)
- Process:
- Receive and import real-time MIDI-based sound output from the Arduino-Python system into TouchDesigner.
  - Analyse incoming sound signals using audio analysis tools to extract features such as amplitude and timing.
  - Map these features to control visual parameters of the virtual plant, including colour intensity, movement patterns, and rhythm.
  - Use the sound-responsive data to dynamically animate the plant model, allowing it to visually reflect its own bioelectrical activity.

Expected Output: A generative visual representation of a virtual plant, shaped and animated in real time by its own bioelectrical signals, enabling viewers to experience plant activity as a form of audiovisual expression.