

### The PADDER

**Computer Music – Languages and Systems** 

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**Prof. Marco Olivieri** 

Homework 3 – Interaction Design

Work Team

**Audio Synthesis Enterprises** 

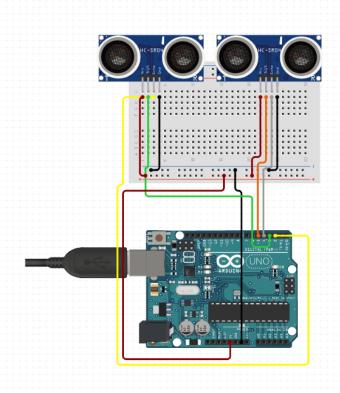
Lelio Casale Marco Furio Colombo Marco Muraro Matteo Pettenò





### **Hardware Components**

- An Arduino Uno Board and two URMO9
   Ultrasonic Sensors
- Each sensor is connected to a voltage source pin (red cable), a ground pin (black cable) and an analog input pin (blue cable)
- Each sensor represents a type of notes (black notes and white notes)
- Black notes sensor has priority to the white notes sensor



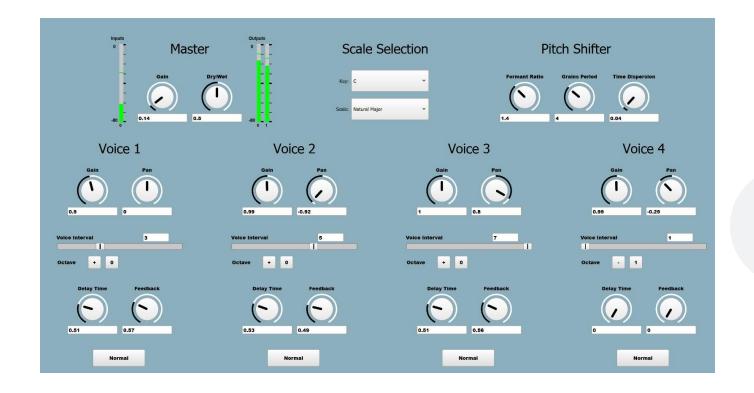
### **Wavetable Synthesizer**

- Pad-like sounds suitable for background harmony.
- Mixture of two different sounds, each one consisting of six partials with different amplitude ratio.
- Wave-shaping
  - **Effects** and **Filters** to be applied on the final harmonized signal.
    - Reverb
    - High-Pass and Low-Pass filters
    - LFO modulating signal amplitude

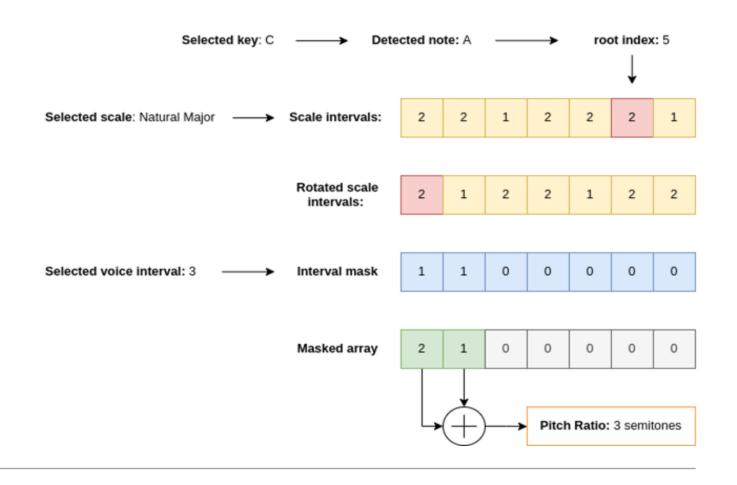
### HarMMLonizer

#### **New features**

- Smart pitch ratio computation
  - Key and scale selection
  - Per voice interval selection
- Optimized pitch shifter
  - Key and scale selection
  - PitchShiftPA
- Improved master section
  - Reverb
  - Filters (Resonant LPF and HPF)
  - o LFO
  - ADSR Envelope



### **Pitch Ratio Computation Algorithm**



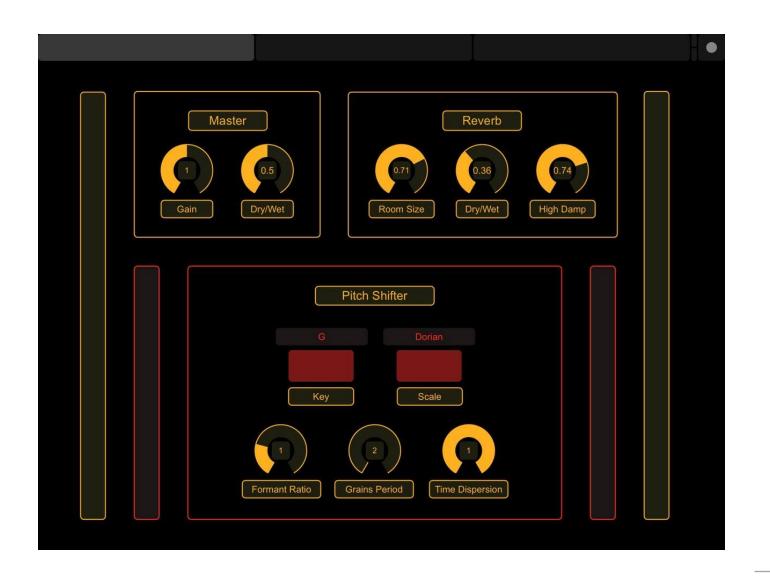
# **E**TouchOSC

The Graphical User Interface (GUI) was implemented through TouchOSC (Mk1 version), a fully modular control surface that runs on all iOS and Android devices.

TouchOSC **supports** sending and receiving messages through **OSC** (Open Sound Control) and **MIDI** (Musical Instrument Digital Interface) **protocols**.

The **PADDER layout** consists of three different pages.

- General Controls
- Pitched Voices Controls
- Synth Pad Controls

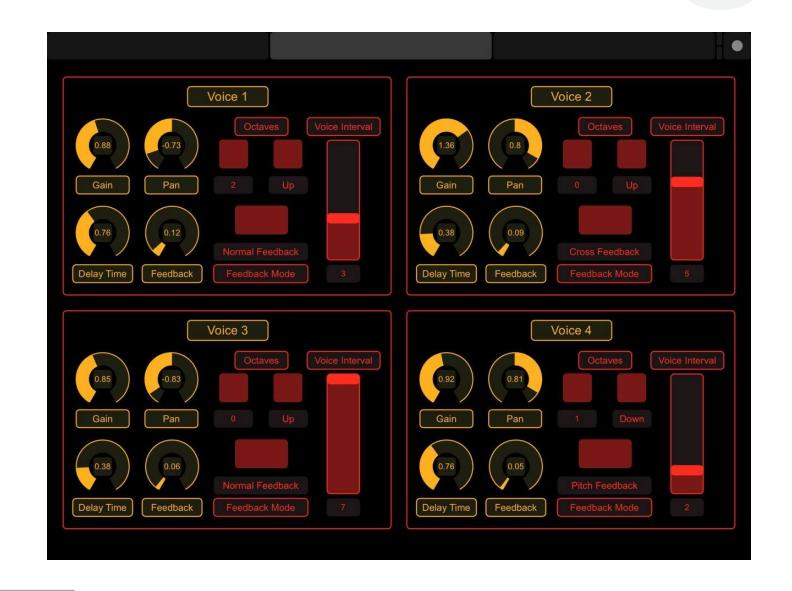


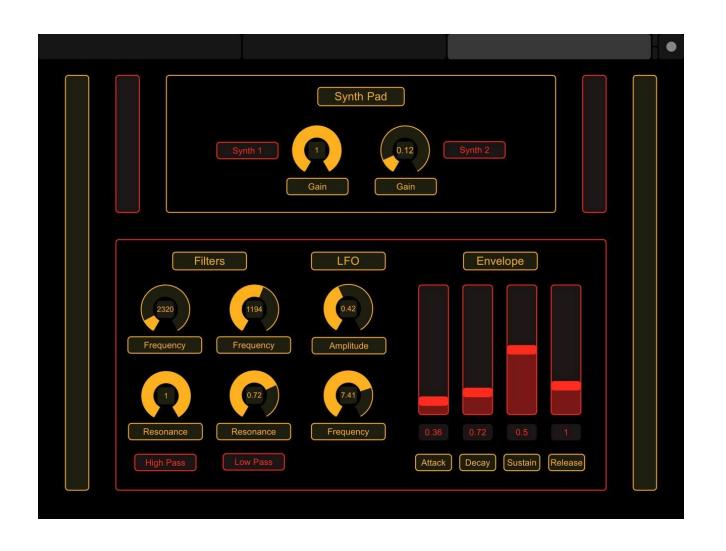
### Page 1

# **General Controls**

### Page 2

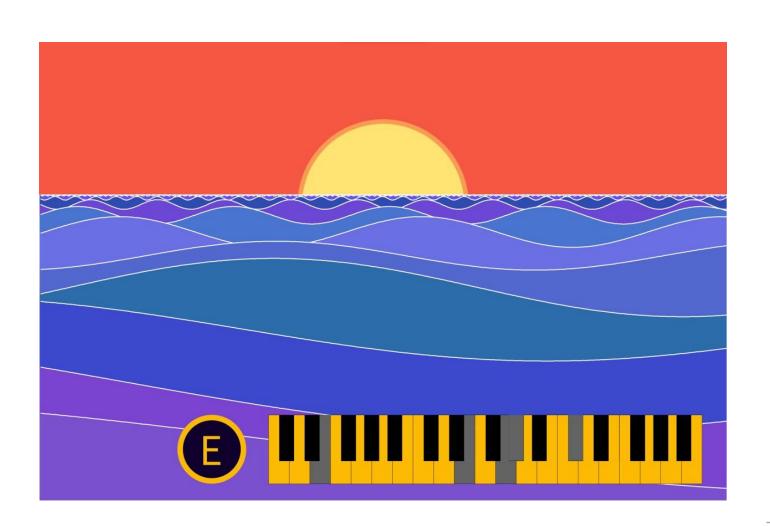
# Pitched Voices Controls





Page 3

# Synth Pad Controls



### Visualization

#### Functional Blocks

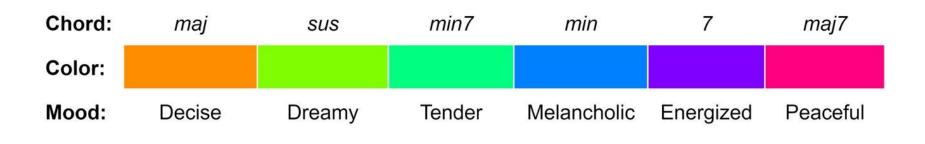
- Note played by the user
- Three-octaves keyboard, displaying the root note received from the Arduino sensor and the generated notes composing the chords.

### Background animated seascape

- Sea perspective designed from scratch to give sense of distance.
- Every element changes accordingly to the changing of the chords.

### Seascape

- The sun is animated and its radius oscillates between its maximum and minimum set dimension as notes are played.
- Wave velocity and amplitude are adjusted each time the chord changes.
- Mapping between chords and moods and between moods and colors.
- Each time a new chord is recognised, a new color that reflects the new mood is played.



### **DEMO VIDEO**





### The PADDER

## Thank you!

**Audio Synthesis Enterprises** 

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