SOSCI User Documentation

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1. Introduction

SOSCI ("Software Oscilloscope") is an open source software oscilloscope that aims to simulate a 10-channel analog oscilloscope.

Its main features are:

- Receiving samples over UDP
- Flexible and dynamic visualization of samples using channel-based configuration:
  - Toggle channels
  - Amplitudes
  - Offsets
  - Sweep speeds
- Presets for saving settings for later use
- A generator for simulating various types of waveforms
- A docker image for portability

1.1 Scope

This document contains information about the usage of the SOSCI application. It contains an explanation about how to send samples to the application, as well as a list of all frontend components and their usage.

It **does not** cover information about the architecture or building process of the Software.

1.2 Definitions, Abbreviations

Abbreviation	Definition
SOSCI	Project name, Software Oscilloscope
Frontend	The svelte frontend of SOSCI
Sample	A number representing a voltage

Package	A UDP package of 10 samples
Plot	A continuous line that gets drawn from a stream of samples
Amplitude	A number that scales the plot of a sample
Offset	A number that offsets the plot of a channel vertically
Time sweep	A number that defines what time a plot needs to cross a certain horizontal division

1.3 References

Reference	Description
Design / Architecture Documentation	Contains information about design & architecture details about SOSCI and it's components
User Documentation *This document*	Contains information about how to use SOSCI
Build Documentation	Contains information about how to locally build SOSCI and the CICD environment

2. Getting started

Assuming the frontend, backend and optionally the generator have been built and are running according to the Build documentation, here's how to get started using the oscilloscope.

2.1 How to access the frontend and backend?

The frontend is reachable under http://localhost:5000.

2.2 How to send samples via UDP?

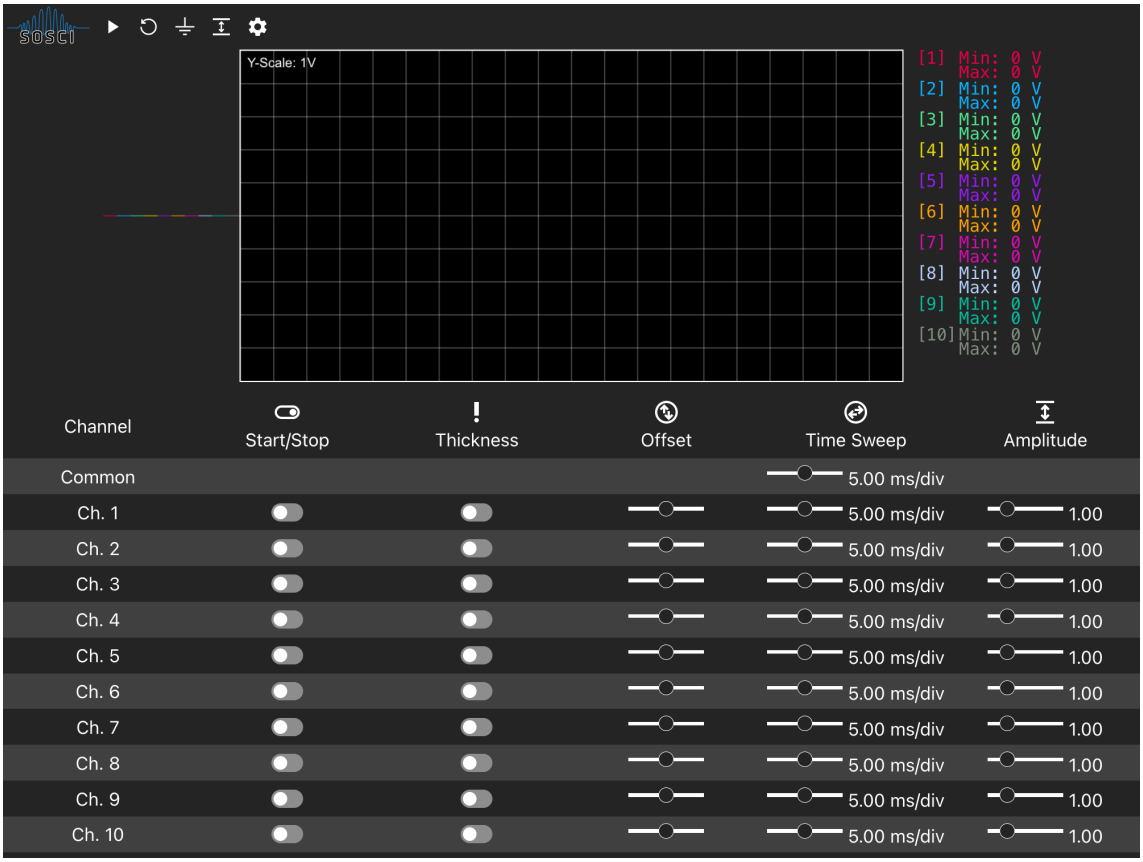
The backend is reachable via UDP under udp://localhost:34255.

When not using the generator, samples can be sent to the UDP endpoint (udp://localhost:34255) as packages of ten voltage values, as described in the design documentation.

3. Using the frontend

3.1 General

- Initially, the oscilloscope is turned off. You need to turn it on like described below.
- There are 10 channels with different colors.
- The frontend is only to be used in landscape (width > height).
- When using it on small screens, the bottom control panel is hidden and can be opened by tapping the caret at the bottom.
- There's a light and a dark mode, based on your OS color settings.



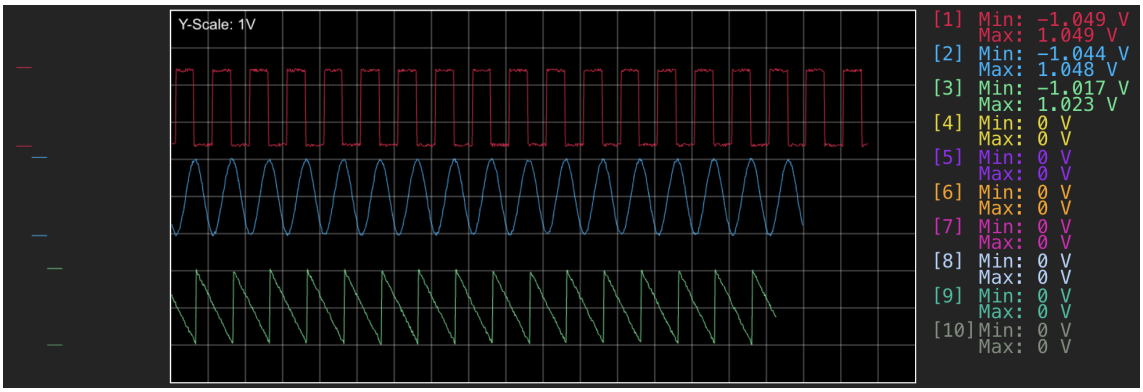
3.2 Top control panel

In the top left corner, you'll find a control panel for general control of the oscilloscope.

3.2.1 Controls (from left to right)

- **Start/Stop:** Toggle processing all incoming samples.
- **Reset:** Reset the indicators and the oscilloscop to the initial state and stop processing incoming samples.
- **Ground:** While pressed, set all rendered lines to zero.
- **Distribute vertically:** Distribute all enabled lines vertically to take up the whole oscilloscope space.
- **Settings:** Open the settings modal for saving and loading presets.

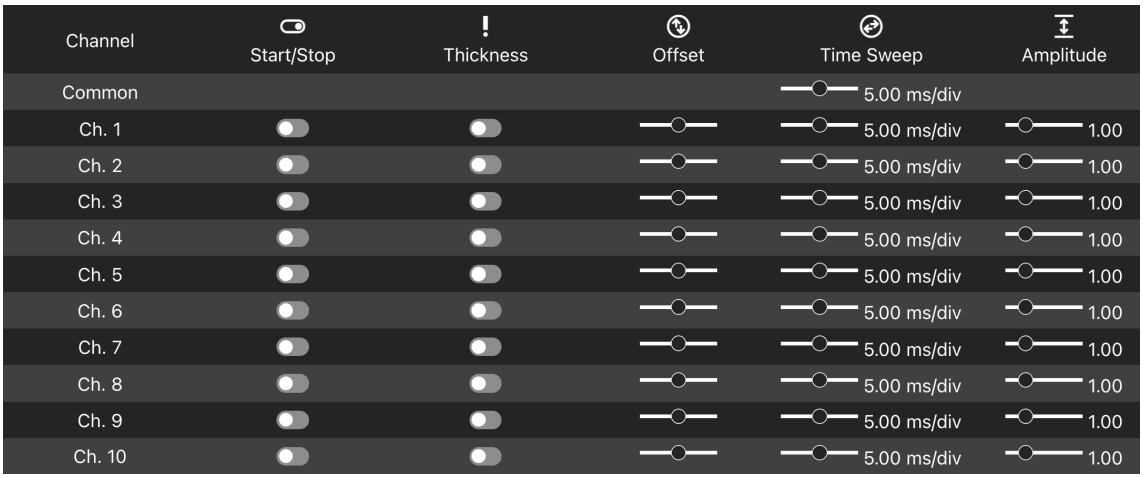
3.3 Oscilloscope



3.3.1 Components:

- **Line indicators:** Show the min and max values of all enabled channels with respect to their indidividual offsets and amplitudes.
- **Plot:** Renders the lines of enabled channels with respect to their individual offsets, amplitudes, sweep. speeds and thickness
- **Text indicators:** Show a textual min max value representation of all enabled channels.

3.4 Bottom control panel

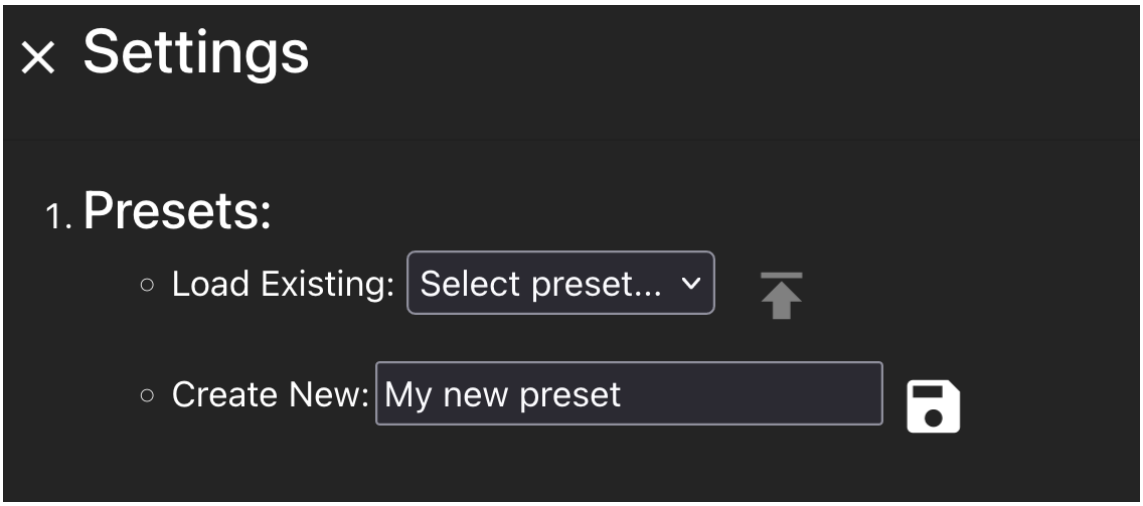


The bottom control panel provides channel-based settings that influence the representation of incoming samples.

3.4.1 Controls

- **Start/Stop:**
  - Toggle processing of a channel's samples.
  - Affects the plot and the indicators.
- **Thickness:**
  - Toggle thick rendering of a channel's plot line.
  - Affects the plot.
- **Offset:**
  - Set the vertical offset of a channel's plot line.
  - Values range from -1 to 1 and are related to the plot's vertical height. A value of 1 means that the zero line of a channel is located at the top end of the plot.
  - Affects the plot and the line indicators.
- **Time sweep:**
  - Set the speed in which a channel's line crosses one horizontal division of the plot.
  - Affects the plot.
- **Amplitude:**
  - Set the value that's been multiplied with a channel's plot line.
  - Values range from 0.2 to Infinity and represent the reciprocal value of the vertical scaling. A reciprocal value of 0.2 (0.2 = 1/5) means that the channel's values show as multiplied by 5.
  - Affects the plot and the line indicators.

3.5 Settings



3.5.1 Presets

A preset consists of all settings for each channel. These are:

- Amplitudes
- Offsets
- Thickness
- On/Off
- Sweep Speed

The settings modal provides a form to save and load the current settings.

- **Creating a new preset:** Enter a name for the preset and click the save icon on the right.
- **Loading a preset:** Select your preset from the dropdown and click the load icon on the right.