

NASCIO  
Networked Actuator Sensor Creative Input  
Output

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*workshop description*

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# Chapter 1

## Workshop overview

### 1.1 Description

The NASCIO is a USB interface based on the Create USB Interface. It can be used to generate input and output as an HID device. It can also be used as a standalone microcontroller for sensing the environment and lighting LEDs or actuating motors. Additionally, it can be extended to be able to communicate wireless with other NASCIO's.

The NASCIO is still in development, but has already been used successfully in several projects, such as the installations *Sonobotanic plants* and *Celestial Delusion*, and the interactive dance piece *Schwelle*.

The aim of the NASCIO is to provide a low cost, open source, alternative to the available commercial sensor interfaces.

### 1.2 Requirements

To participate in the workshop participants need to be prepared to do the following:

**Soldering** though no previous experience is required, it is recommended to have a little experience.

**Programming** the device needs to be programmed in C. Basic code is provided, but in order to be able to modify the board, some basic understanding of how to program the board will be acquired during the workshop.

**Using** in order to use the device the participant must be familiar with the use of HID devices or OSC in his or her preferred environment.

Generally, a serious interest to learn these skills is needed, as well as ideas on what to do with the board.

**The workshop can host a maximum of 10 participants.**

#### 1.2.1 Technical requirements

To host the workshop the following things are needed:

- large table for 10 people to solder around, with enough power plugs for all irons and laptops (so ca. 20 power connectors). *Important:* Table needs to have good lighting conditions. Easy access to water is also important.
- 1 soldering iron for each participant<sup>1</sup>. Soldering iron tip should not be too big (max. 3.5 mm). Enough soldering sponges to clean irons from excess solder.
- Some Windows XP computers to program the devices. I need access to the machines before the workshop in order to install all necessary software<sup>2</sup>.
- Some multimeters for electronic debugging<sup>3</sup>.
- Each participant should bring his or her own laptop with preferred musical environment, and a free USB port.

### 1.2.2 Costs

The materials cost 30 euros in total per set. This includes the board, electronic components to build the board, a USB cable, and some sensors to attach (buttons, potentiometer, LED, light sensor).

For the wireless version, the set costs 95 euros (2 boards + components, transmitter, receiver, and sensor set).

Additional sensors can be ordered in advance if participants have special requests, and will be provided at cost price.

## 1.3 Day one - *solder*

The first day of the workshop consists of putting together the interface. A board is provided on which the components need to be soldered. Additionally, on the first day choices are made which sensors will be attached to the board, and they are connected.

A general explanation of what is what on the board and what function it has is given.

## 1.4 Day two - *program*

The second day focuses on the programming of the device. An overview is given of how USB HID devices work and are defined. Then an overview is given of the code needed to let the device run. Code for a basic device is provided, and changes to adapt to the needs of the participants are made during this second day.

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<sup>1</sup>I can provide 2

<sup>2</sup>I will bring my own laptop which can be one of these computers

<sup>3</sup>I can provide 2

## 1.5 Day three - *use*

The third day focuses on using the device within a musical environment, such as SuperCollider or Pd; any program can be used if it supports HID input, or OSC input (using a small Python program *hidserver* from IXI)<sup>4</sup>.

HID output is supported only (as far as I know) in SuperCollider (on Linux or MacOSX).

## 1.6 Day four - *wireless*

The fourth day is optional, and aims to implement two devices communicating wireless with each other. A second board will be soldered and the devices will be reprogrammed to support wireless communication.

## 1.7 References

Marije Baalman <http://www.nescivi.nl>

Dan Overholt's Create USB interface <http://www.create.ucsb.edu/~dano/CUI/>

SuperCollider3 <http://supercollider.sourceforge.net>

IXI software - hidserver <http://www.ixi-audio.net/content/backyard.html>

Sensor WIKI <http://www.sensorwiki.org>

Sonobotanics <http://www.sonobotanics.org>

Schwelle <http://www.schwelle.org>

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<sup>4</sup>I am only really fluid in SuperCollider, so I can help there. For other programs I can provide example patches, but no further support