SmartScope – Reinventing the Oscilloscope

LabNation

The SmartScope is a mobile oscilloscope, an electronics measurement device. It requires connection to host (pc, laptop, tablet or smartphone) to be controlled and show its measurements.

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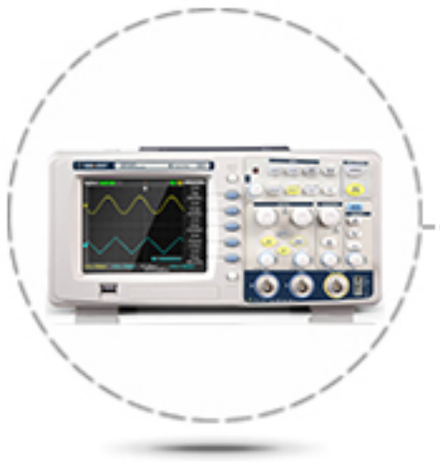
- For everyone: Engineers, Hobbyist, Students
- What’s in the box?

All-in-one test and measurement device

The SmartScope combines 3 high-end instruments into 1 mobile, smart device.



Oscilloscope

Logic Analyzer

Wave generator

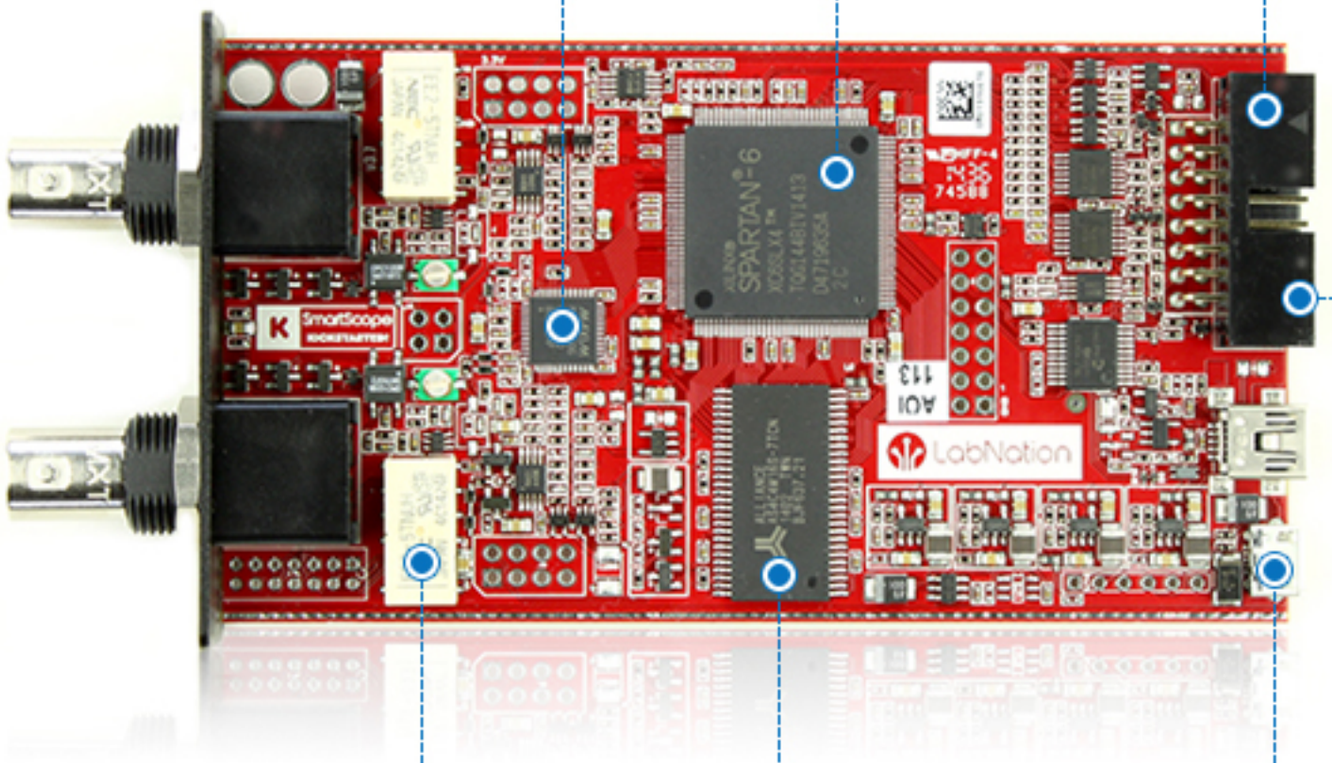
3 tools in one device

Hardware overview

Channels sampled at 100MHz/s each

100% Silent

Arbitrary Waveform Generator



8 digital inputs at 100MS/s each

4 digital outputs at 100MS/s each

AC/DC coupling on analog inputs

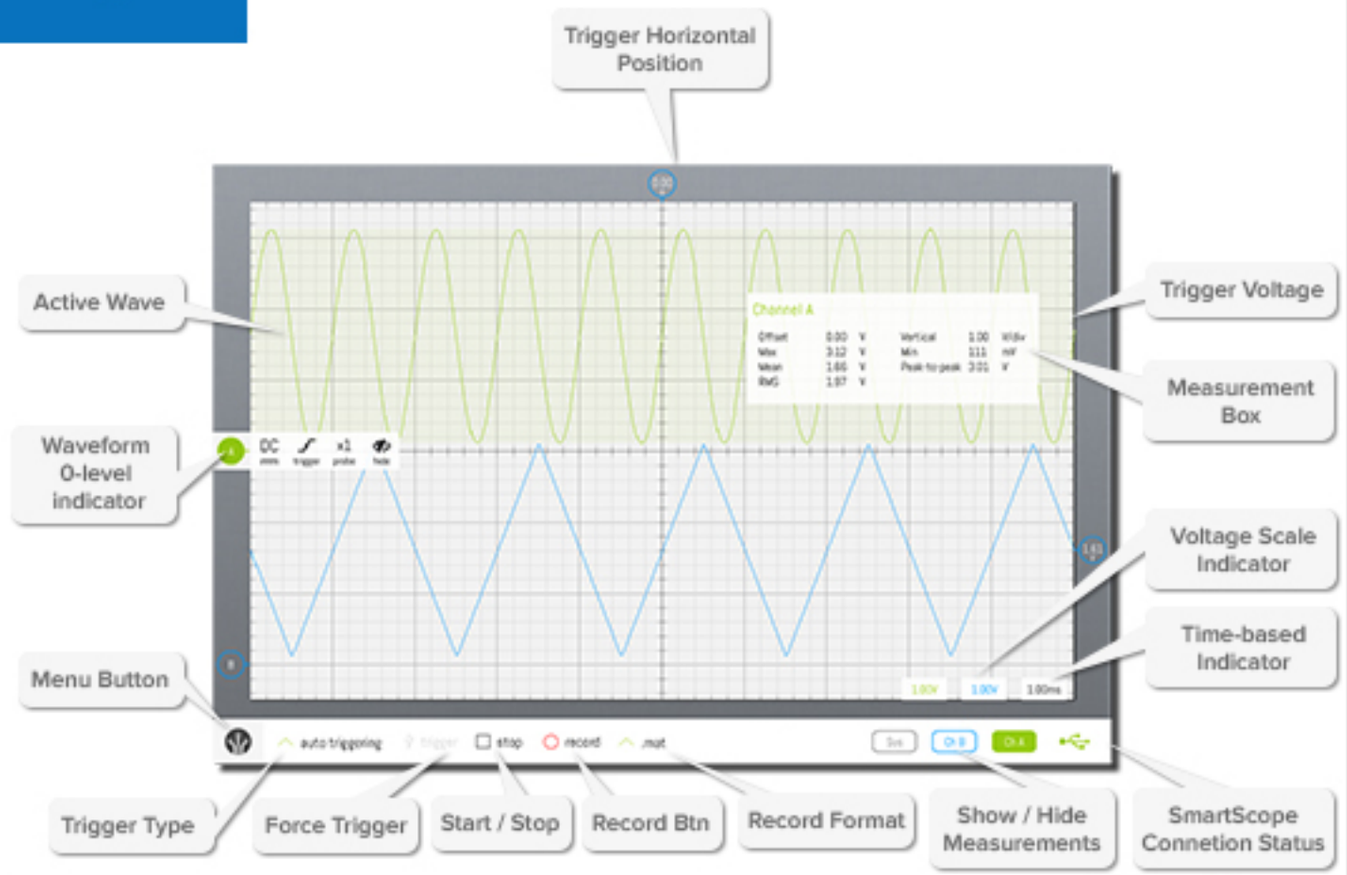
64Mbit RAM: x10000 zoom

Pair 2 SmartScopes for 4 channel operation

Oscilloscope

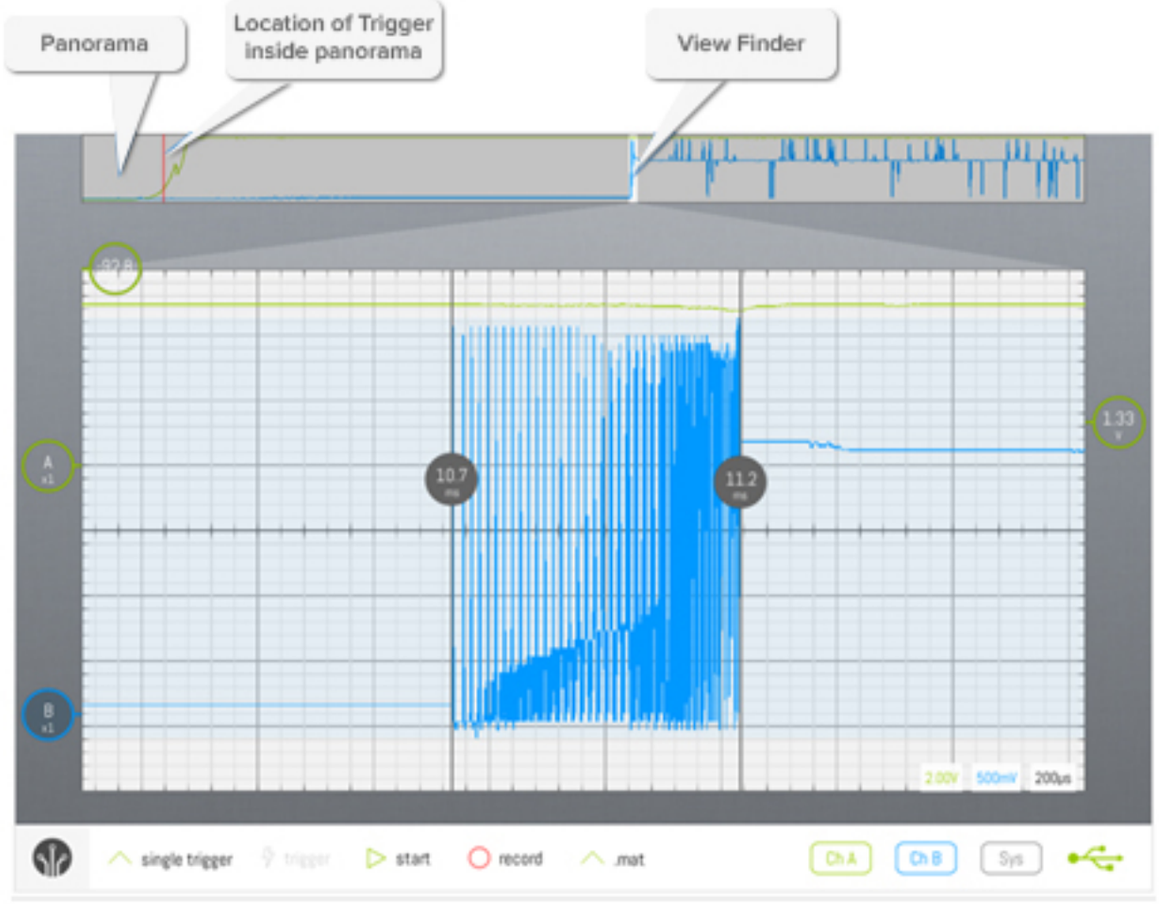
The SmartScope's Specification for Oscilloscope

Bandwidth	**30 MHz**	*-3dB point*
Sample rate	2 × 100 MS/s	
Channels	2	
Max pre-trigger position	16 × full scale	
Max post-trigger position	Full scale	
Max full voltage scale	10V/div	*±35V input range*
Min full voltage scale	20mV/div	
Analog input range	-35V, +35VMax	
input peak-to-peak	40V	
Signal coupling	AC / DC	
Precision	8 bit	
Input impedance	1 MOhm // 10 pF	
Waverforms	200 waveforms/s	
Data delay to host	< 10ms	
Sample depth	Up to 4 million samples	
	per channel	
External trigger	Yes	



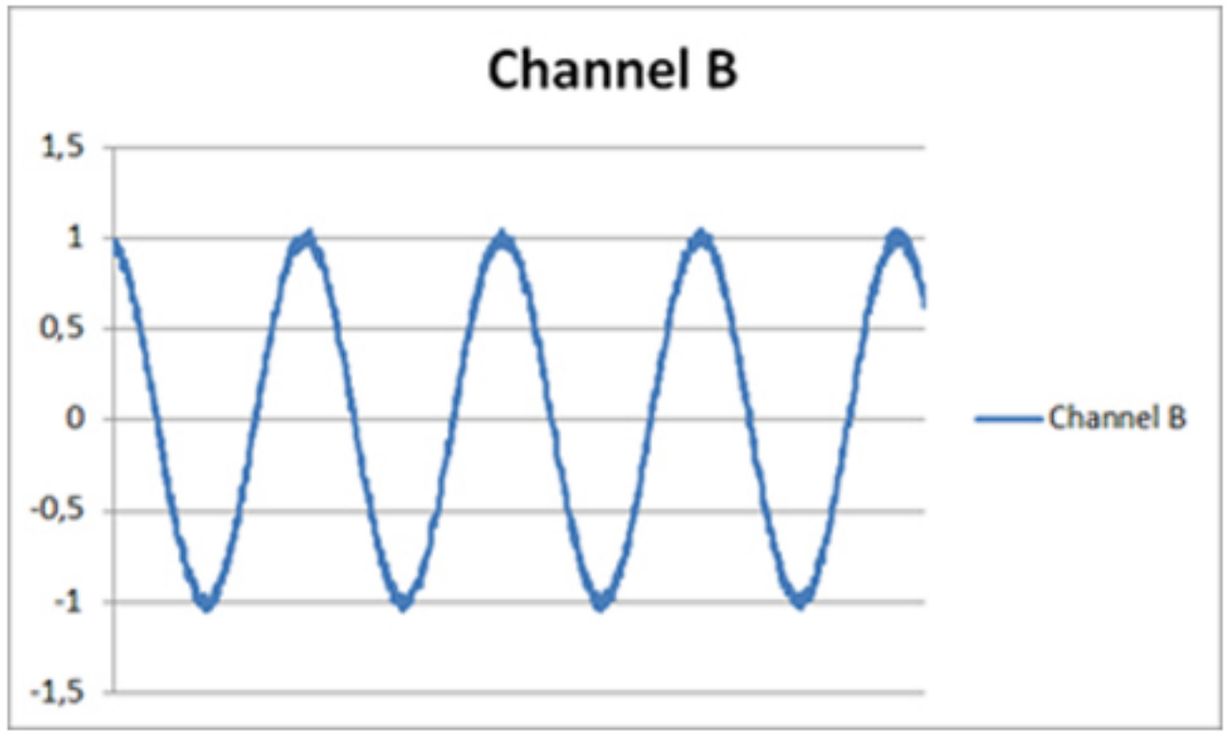
Panorama (RAM zoom) functionality

The SmartScope comes with 64Mbit of RAM, which by default is used to provide a 4M (4e6) sample buffer for each channel. In general, this means that whenever you stop an acquisition, you can zoom in about 1000 times on the waves currently displayed. This can be very useful in case you want to trigger on an event, and study in fine detail all causing and resulting effects which happened before or after that event.



Data export

- The SmartScope software allows you to save your data in 2 formats:
  - .csv files can be opened in Excel for easy processing
  - .mat file can be opened in matlab for advanced processing of larger datasets
- Unlike traditional scopes, the SmartScope can write up to 200 waveforms/second to file!

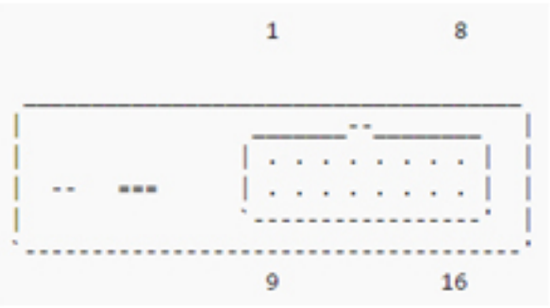


Logic Analyzer

Logic Analyzer's Specification for Oscilloscope

Input Channel	8
Input Impedance	100kOhm // 2pF to GND
Sample rate	100 MS/s
Logic level	3,3 V or 5 V
Diode protection	Bidirectional
Input data buffer	4M samples
Waverforms	200 waveforms/s
Data delay to host	< 10ms
Protocol decoders	I2C, SPI, ...

- Included decoders:
  - SPI, I2C, UART
- Multi-layAdd your own plug-in decoder!
- ered decoders
  - I2C to Register names



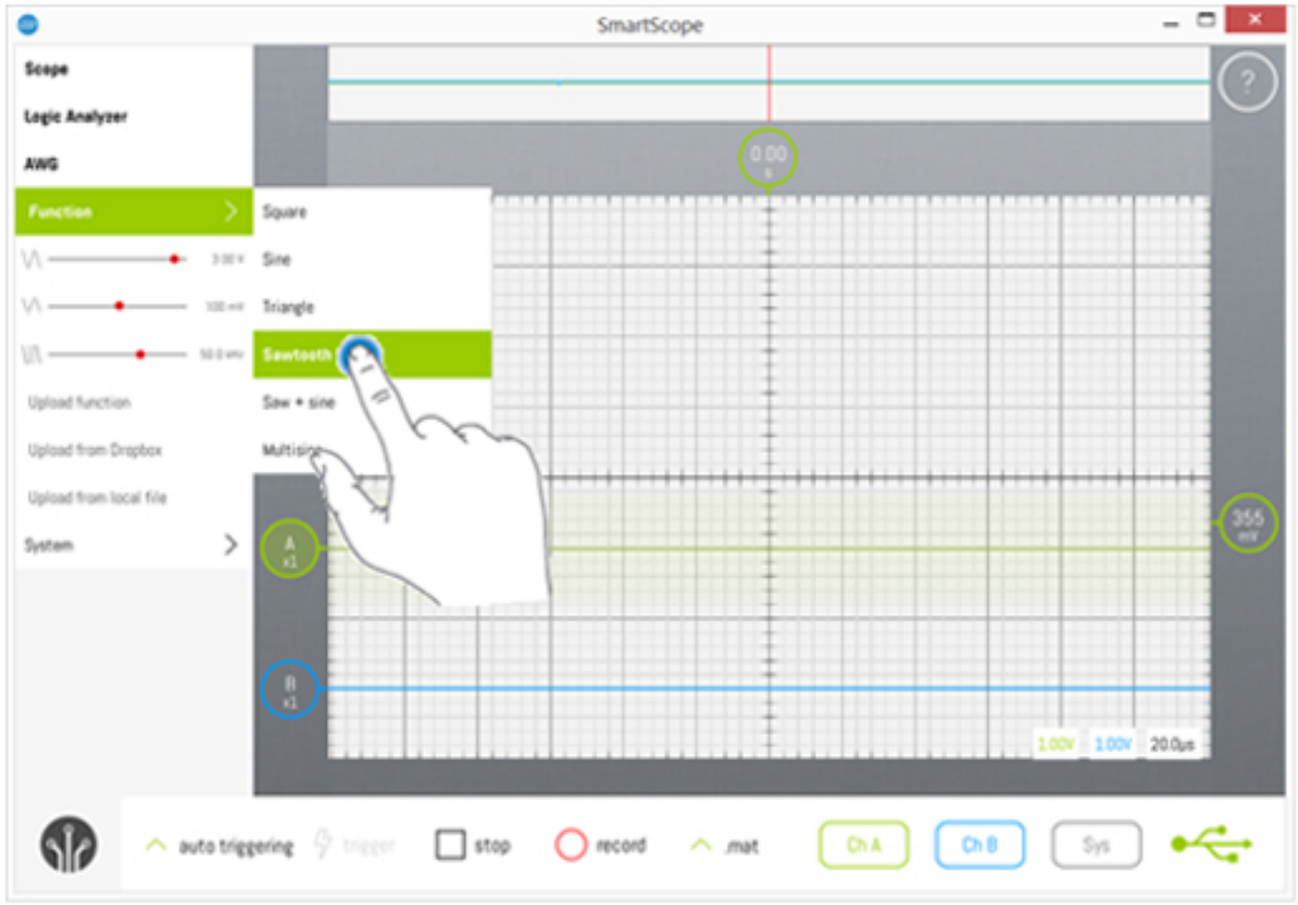
Port 1-8 = logic analyzer input

Wave generator

Wave generator's Specification for Oscilloscope

Data rate	50 MS/s	
Output Level	0 - 3,3 V	*Opamp driven*
Max slew rate	30ns/V	
Step	13 mV	
Output channels	1	
Sample Deapth	2048	

- Upload waves from the GUI
  - Either predefined shapes
  - Either from .csv files
    - Dropbox support



Cross platform compatible

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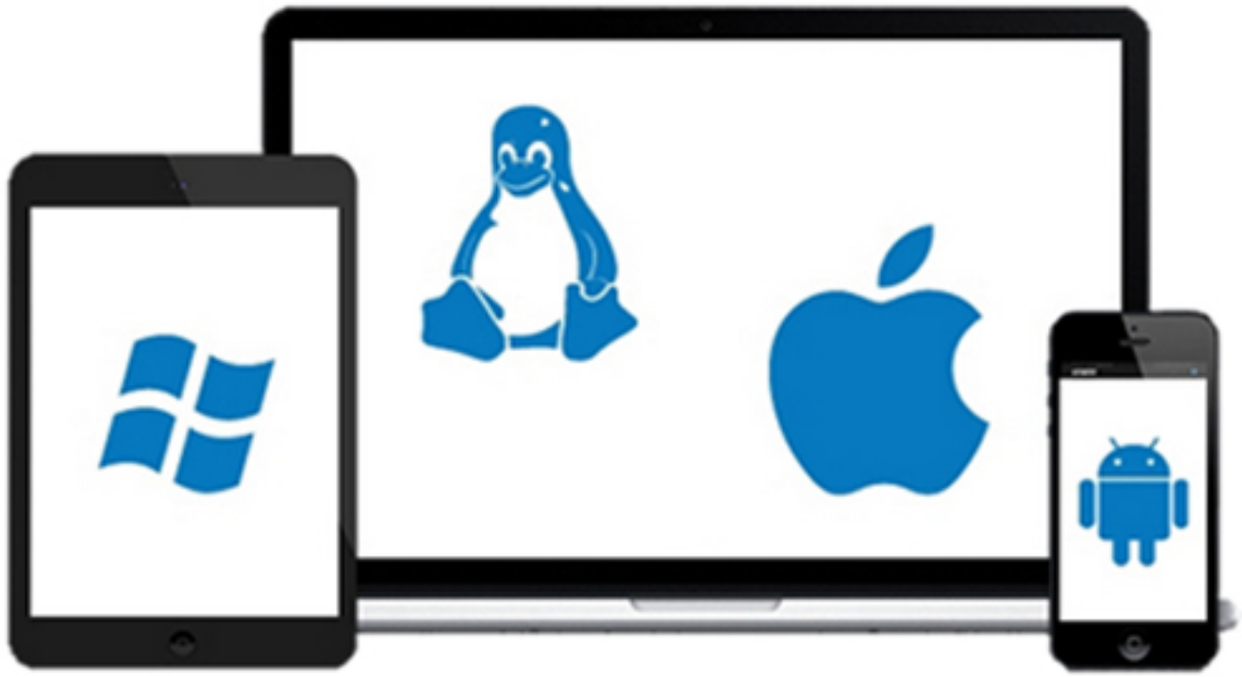
The world's first lab device to target OS X, Linux, Windows, Android and IOS compatibility!

- PC and Laptop
  - Keyboard
  - Mouse
  - Touch (when available)
- Tablet and Smartphone
  - Touch



windows

MAC OS

Linux

iOS

Android

Intuitive touch interface

LabNation

We have challenged the 60-year old knob-based oscilloscope interface and redesigned it from scratch optimized for today's computer interfaces

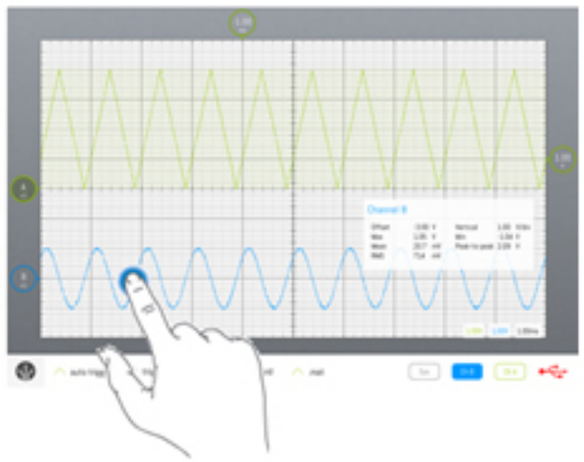
1956 2010 **2015**

Intuitive touch interface

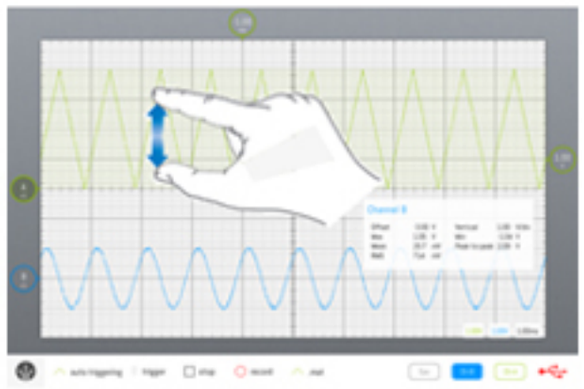
LabNation

Simple pinch and swipe movements replace multiple complex operations

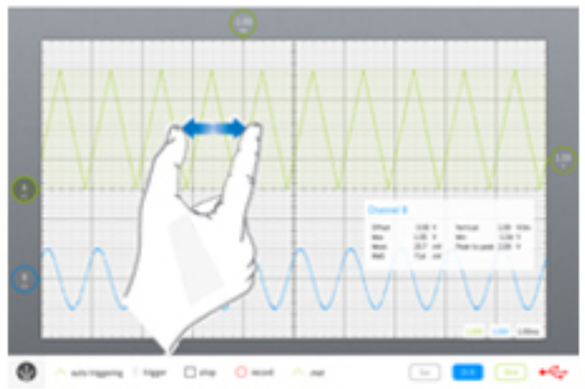
1 Tap to select active wave



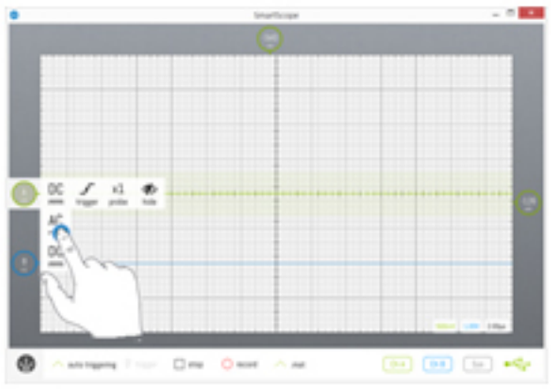
2 Voltage scaling – Vertical pinch



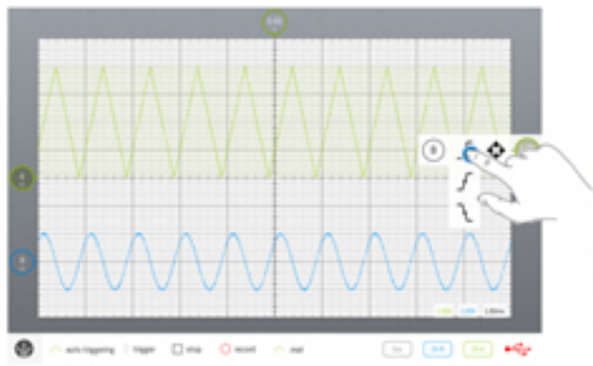
3 Timebase scaling – Horizontal pinch



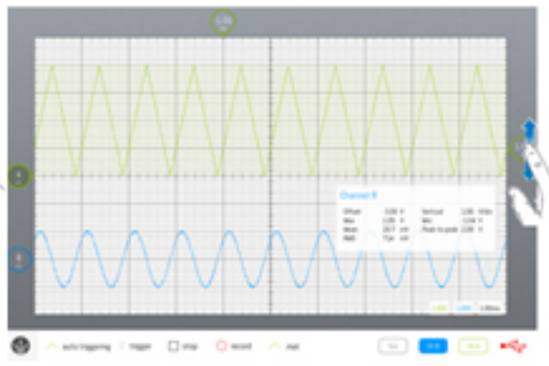
4 AC and DC coupling



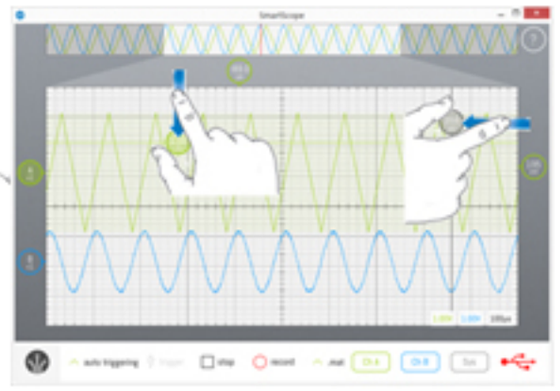
5 Triggering – Rising/falling edge



6 Changing the trigger voltage



7 Adding and removing cursors



Compatible with mouse and keyboard controls

Controls	Touch	Mouse	Keyboard
Show this Screen			F1
Time Zoom	Pinch	Scroll up/down	Home / End
Voltage Zoom	Pinch	Shift + Scroll up/down	Pgup / Pgdown
Viewfinder Zoom	Pinch	Scroll up/down	Ctrl Home / End
Viewfinder Move	Drag	Drag	Ctrl
Toggle panorama	Touble Tap	Double Click	P
Select Waveform	Tap	Click	Tab
Move Waveform	Drag	Drag	
Add Cursor	Drag from Border into Grid		
Remove Cursor	Drag Cursor into Border		
Menu	Tap / Click Labnation Logo		

Take the SmartScope on the road, thanks to the single-cable connectivity

LabNation

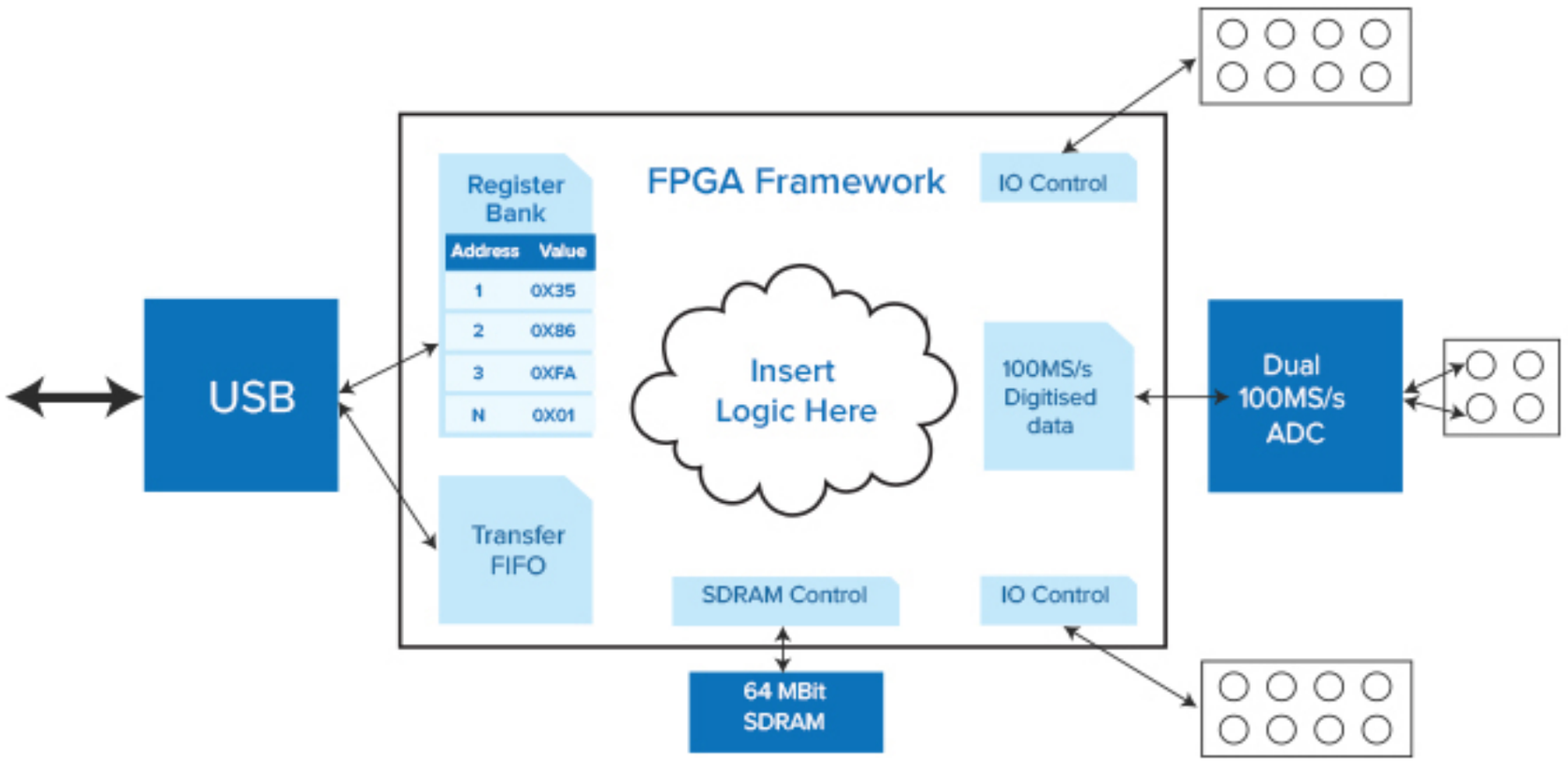
FPGA Framework

0.1” extension headers allow custom extensions

- Digital 1.8V and 3.3V ports
- 2x analog inputs

All source opened in structured packages:

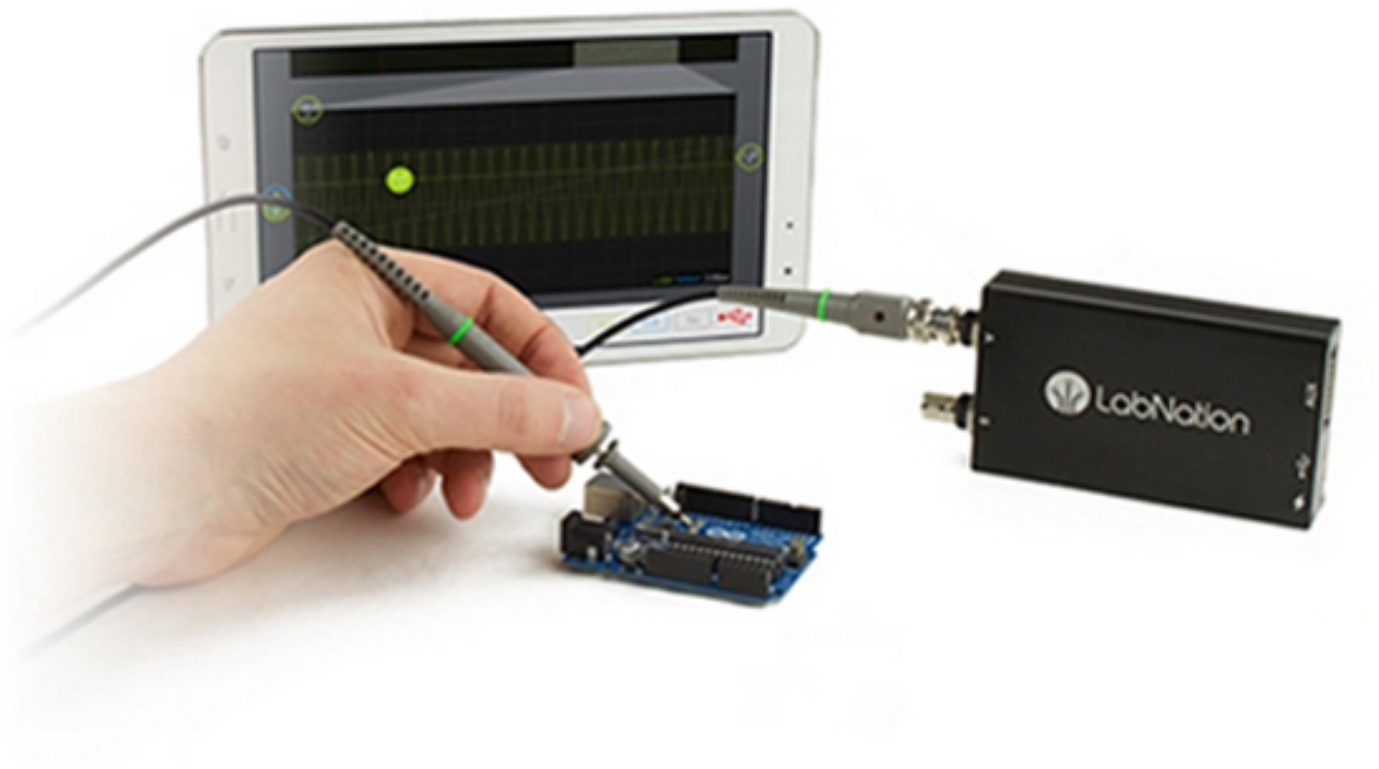
- Hardware schematics
- FPGA code
- USB controller code
- Cross-compatible host API (C#)



Target Markets

Target Market for Product

- Hardware engineers (work/home)
- Hobbyists, DIY, Makers
- Students / teachers



Value for money – what's in the box?

Product Package contains & pricing

- 1 x SmartScope
- 2 x 100MS/s analog probes
- 10 x logic analyzer clips
- 10 x dupont wires
- 1 x mini USB cable

RRP: € 229,- / $ 229,-

General information

Interviewee

Riemer earned a M.Sc. Eng in Electronical Engineering at the Vrije Universiteit Brussel in 2005. After going for a PhD on real-time 3D cameras, he co-founded a company designing 3D cameras now distributed by several major California -based companies. As such, he had the rare opportunity to lead a hardware patent from prototype to mass-production, while at the same time experiencing a start-up grow to 100+ employees. Throughout 2013 he designed and validated the first prototypes of the SmartScope, which KickStarted LabNation in February 2014 by 1459 backers, with more than 2000 devices produced and shipped out before the end of the same year. Riemer currently acts as CTO for LabNation and as consultant for a start-up designing smart glasses, where he shares his knowledge on how to transform a concept into a product on the shelf.

Next to hardware, Riemer has a passion for writing C# and graphical applications. He authored 3 books on XNA with positive reviews. He received the Microsoft MVP award in 2007, 2008, 2009 and 2010.

Important Links

- www.lab-nation.com
- http://wiki.lab-nation.com/index.php/Main_Page
- https://www.kickstarter.com/projects/751733865/smartscope-reinventing-the-oscilloscope/description