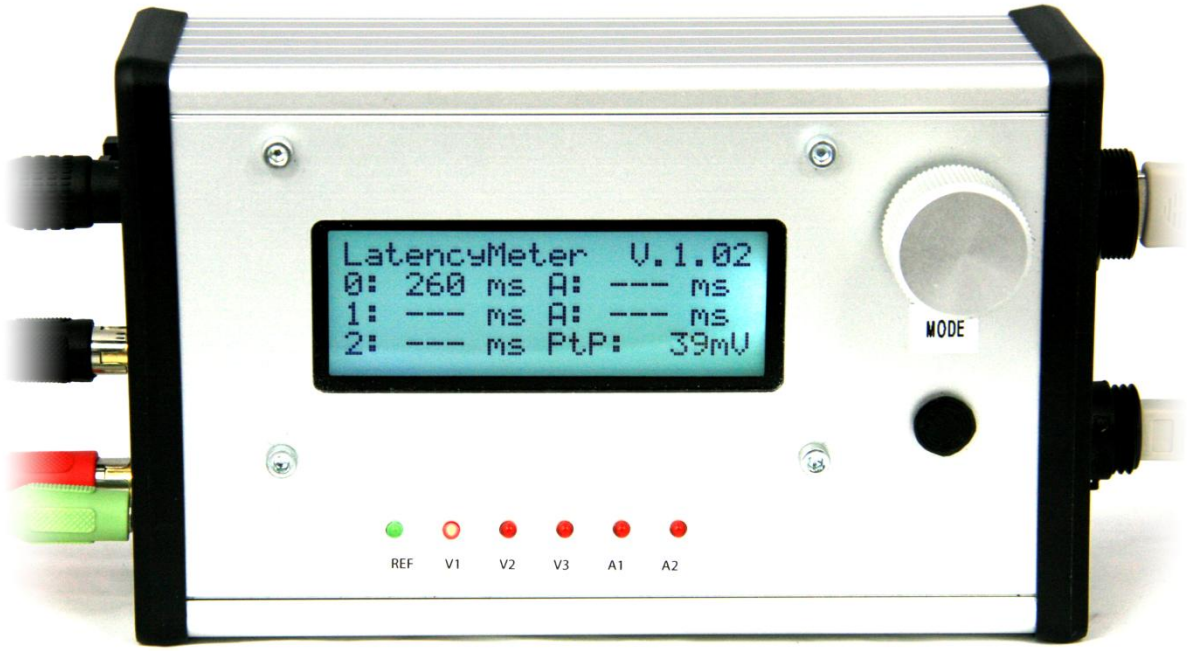
ScienceMosaic

Video and audio latency measuring system

www.ScienceMosaic.com (Teadusmosaiik OÜ)



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Disclaimer

We ("Teadusmosaiik OÜ") believe that our products are safe, while used in the intended manner and under normal conditions.

However it is entirely your ("Buyer's") responsibility to ensure safety of your application, setup or eventual system, where our products have been used as components. As well as it is your responsibility to ensure, that your eventual system meets with your specification. Our products are not intended for critical applications, where failure of the device may result in hazard to life or compromise any other ways safety of person or property (Life support and safety applications). Any unintended use is entirely at the risk of buyer, where we have no liability. We disclaim all liability arising from this information and its use.

IMPORTANT

Due to constant development of our devices, upgraded firm- and software, your actual device or software behavior may differ from that in this documentation. Therefore it is important to obtain latest documentation from our web site (www.sciencemosaic.com). All documents are indexed and named DY followed by three digit document number and eventually version number (eg. "DY002-v1.pdf").

CONTENT

This document contains detailed information and operation instruction of ScienceMosaic™ video and audio latency measuring system.

Present document describes:

- Principles and Applications
- Content of the box and how to set it up
- Specifications
- Software overview

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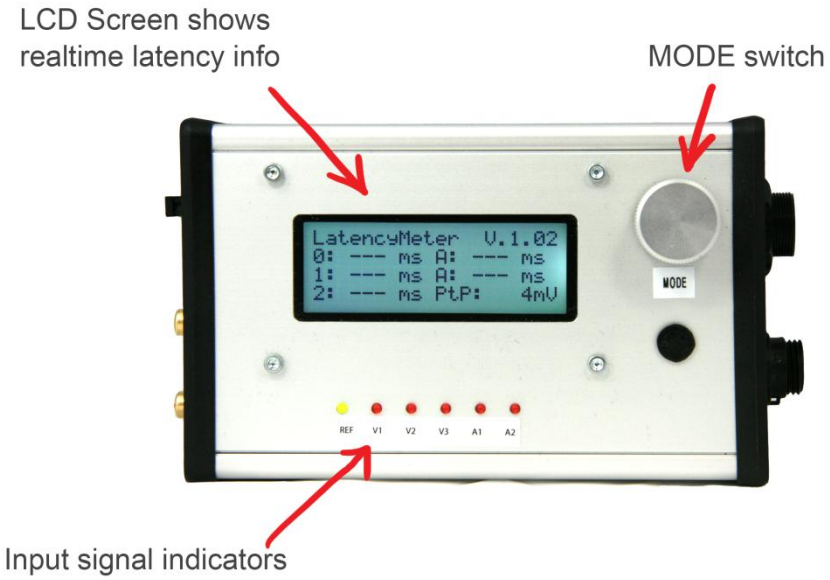
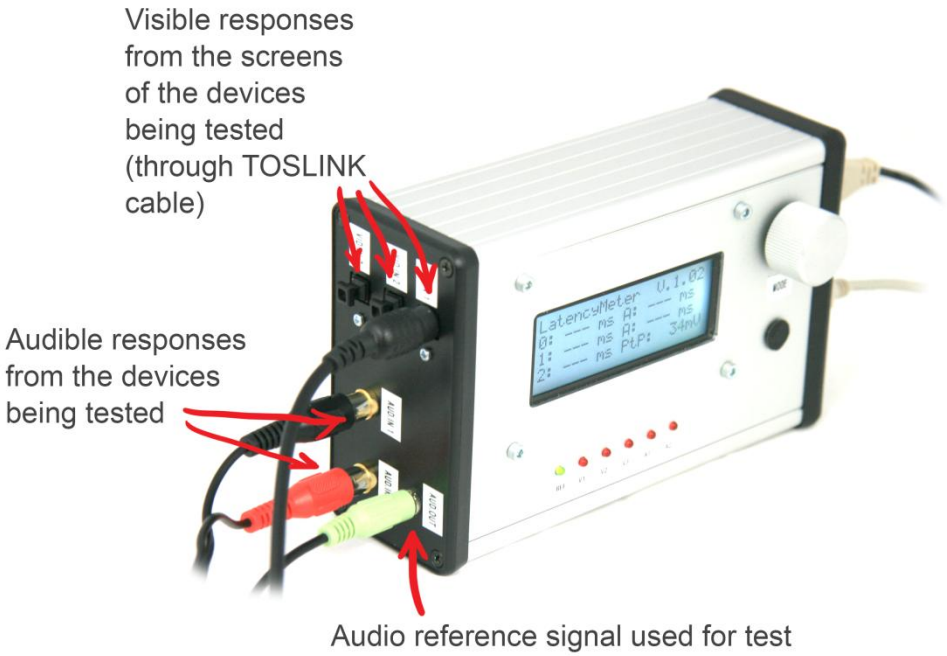
WHAT IS IN THE BOX?

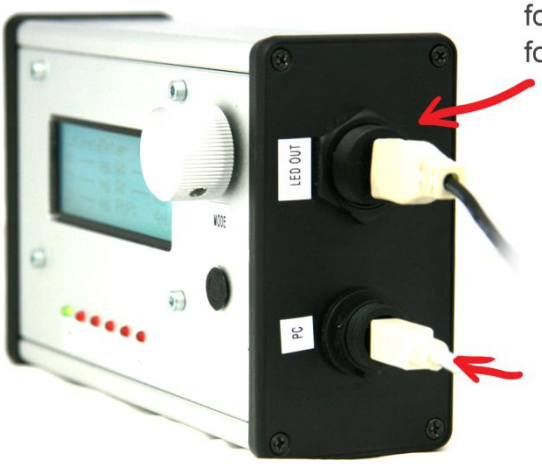
Standard latency meter kit comes in protective suitcase with:

- 1x ScienceMosaic™ video and audio latency measuring device
- 1x Reference LED with 2 meter cable and USB connector
- 3x ScienceMosaic™ screen adapters
- 1x Mini-USB cable for PC connectivity

DEVICE INTERFACES







Reference LED
for visible signal used
for tests (USB connector)

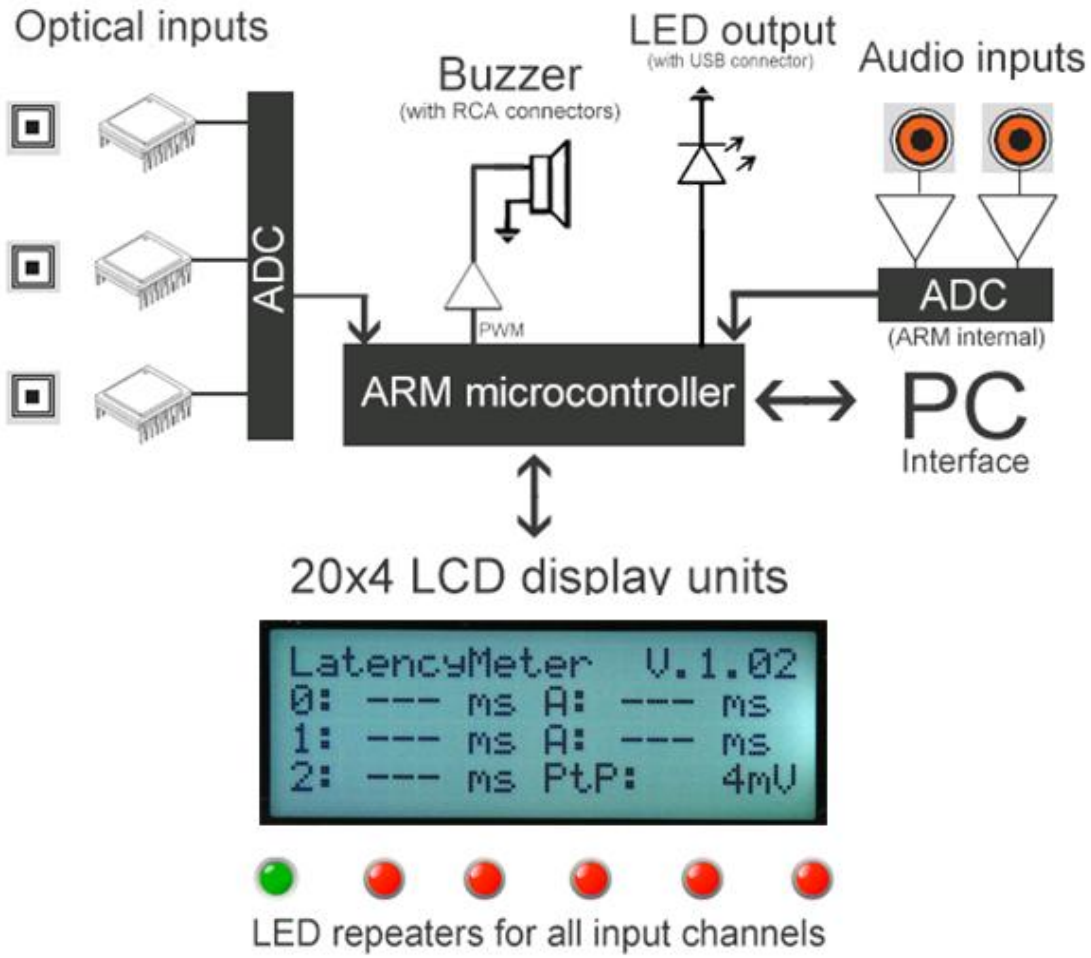
USB interface to PC

Reference LED module (10mm white LED)

PRINCIPLES AND APPLICATIONS

ScienceMosaic™ video and audio latency measuring system is intended to provide accurate way to measure latencies between different video and audio signals. It is designed as an on-field tool for video and audio equipment designers and QA specialist to get fast understanding what are to latency parameters in the audio/video system they are working with.

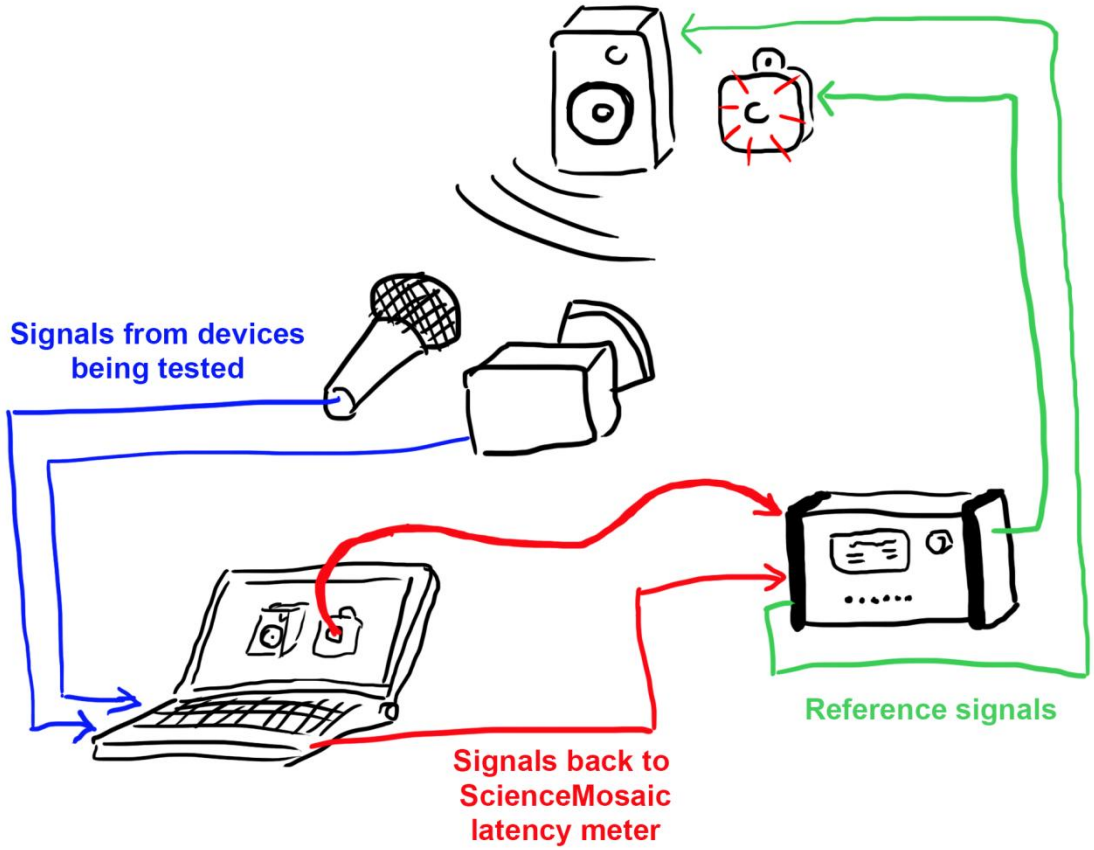
Latency measuring system generates visible (LED with different blinking patterns) and audible (speaker with different beeping patterns) reference signal and it has 3 optical inputs (with TOSLINK connectors) for different visible signals and 2 RCA audio inputs for different audio signals.



DEFAULT MEASUREMENT SETUP

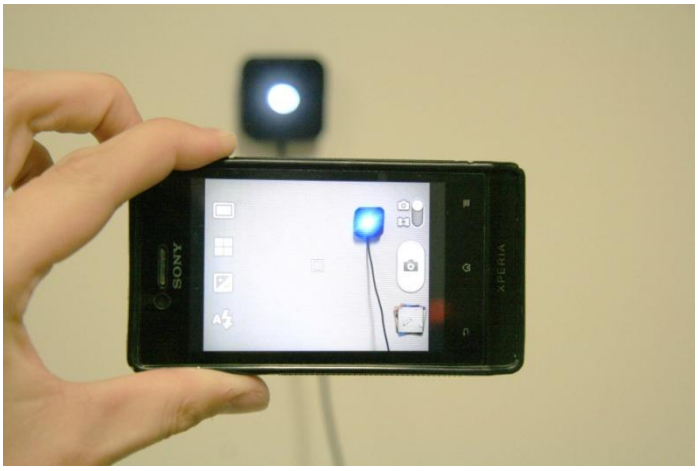
If you want to measure latency of visible and audible signals you need to build following setup where reference signals are captured and later represented back to the latency meter.

Simple setup



Setting up reference LED and speaker

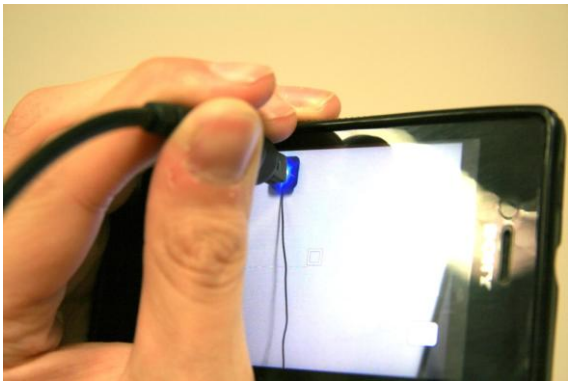
Reference LED should be positioned stationary about 1 meter from camera being tested and should not be located in center of the captured video frame.



Reference audio speaker should be located about 20-40cm from microphone being tested. Volume should adjusted so that the PtP (Peak-to-peak) signal value on the LCD screen shows more than 1000mV. Test lab environment should be completely silent during audio latency tests.

Fitting optic fiber to capture visual signals from screens

TOSLINK optic fiber should be pointed directly to the center of the image of reference LED on the device screen so that brightness differences between LED on and off states would be maximized.

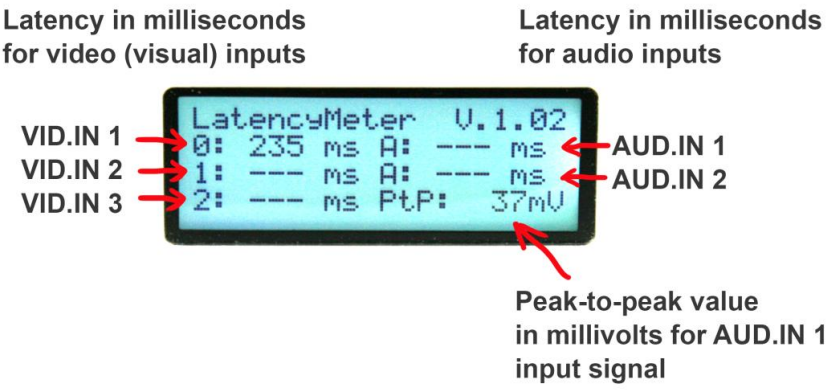


Always set your device **screen brightness to maximum** to increase the accuracy and reliability of the measurement.

Using the ScienceMosaic™ TOSLINK screen adapters

We have designed a special TOSLINK screen adapter to make fiber pointing on the screen as easy as possible. It has wide flat bottom which is made of material that doesn't scratch the surface of the screen. We suggest to use *Pritt white Sticky Tac* to fix TOSLINK adapter onto screen without damaging its surface. It's also easy to clean Sticky Tac off the screen after the measurement are done.
(http://www.prittworld.co.uk/en/consumer/parents-home/products/sticky-tac.html)

Reading results from the LCD screen



Measuring in PC mode

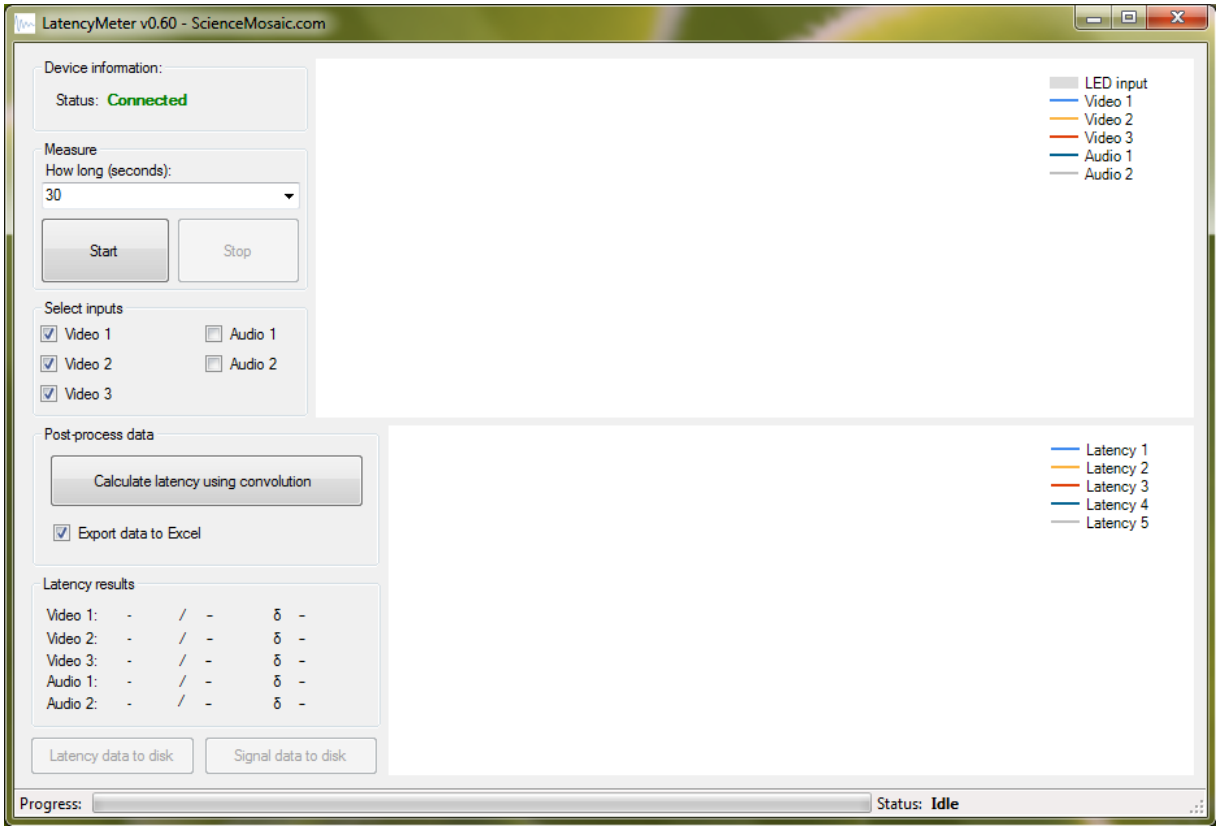
PC mode is designed to perform measurement with improved accuracy and reliability. In PC mode all the signal analyzes in done in desktop software called LatencyMeter. Latest version is freely available for download from our website (http://sciencemosaic.com/)

To turn on "PC mode" you have to push/click the MODE button on the latency meter and choose "PC MODE" from the men (by rotating the "MODE" button) . When latency meter is in the "PC mode" it displays message "PC MODE ACTIVE".

Now you are ready to measure with our LatencyMeter PC software.

LatencyMeter PC SOFTWARE

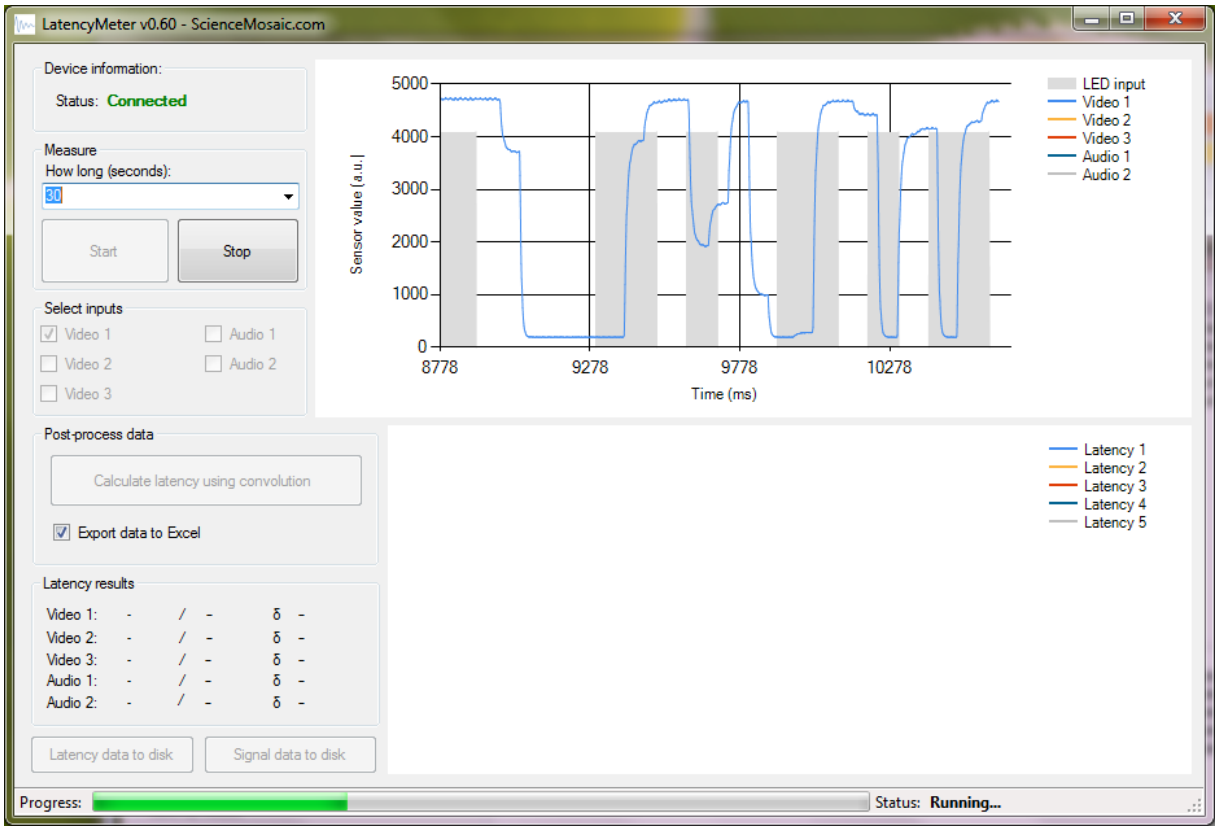
PC software allows you to capture longer sequences of input signals and calculate accurate latency values using cross-correlation of these signals. It's a reliable and accurate method (also used in Microsoft AV labs).



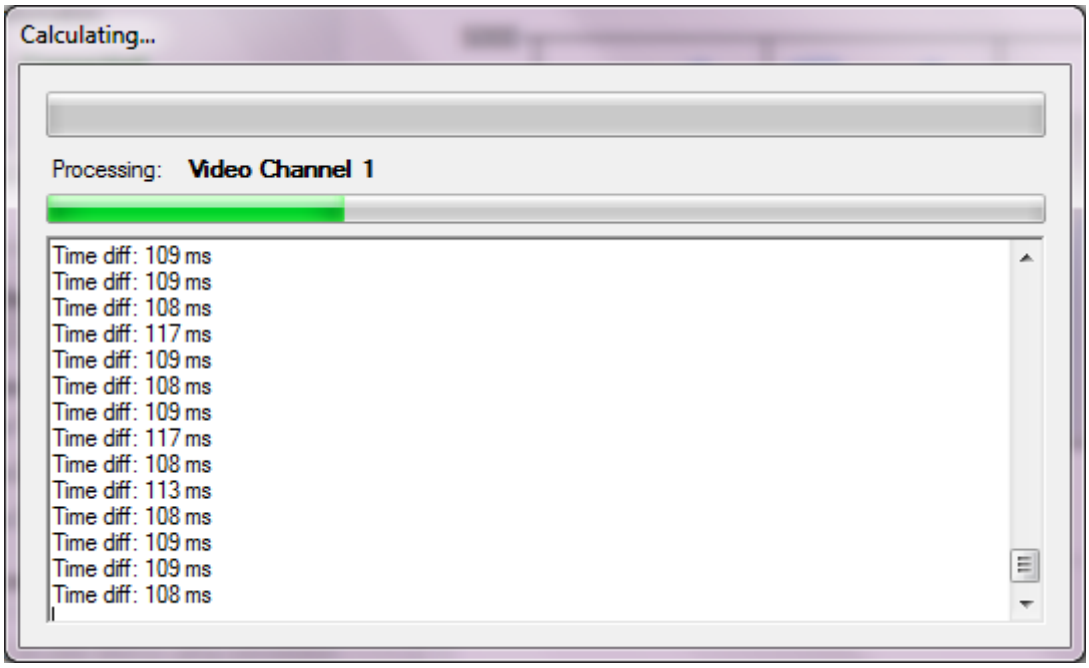
User controls explanations:

Device infotmation:	Status:	Indicated the device status. Shows "Connected" or "Disconnected"
Measure:	How long (seconds):	Define measurement length (default 30 seconds)
	Start	Start new measurement
	Stop	Stop running measurement
Select inputs:	Video 1, Video 2, Video 3, Audio 1, Audio 2	Allows to switch inputs on/off according to user needs
Post-process data:	Calculate latency using convolution	If the measured signals data looked good and measurement was finished then this post-processor calculates accurate audio-video latency
	Export data to Excel	If this choice is checked then the post-processor opens Excel application window and generates measurement report after the data processing is finished
Latency results	Video 1, Video 2, Video 3, Audio 1, Audio 2	Final results are show here for every enabled channel (average latency, standard deviation of latency)
Latency data to Disk		Export latency calculation results (CSV format)
Signal data to Disk		Export measured signal data (CSV format)

Measurement is currently running on Video 1 input:



Post-processing is running:



Results are shown in LatencyMeter application:

Mobile phone camera used in this test had **117 millisecond** latency (with standard deviation 7.1)

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Automatically generated excel report: