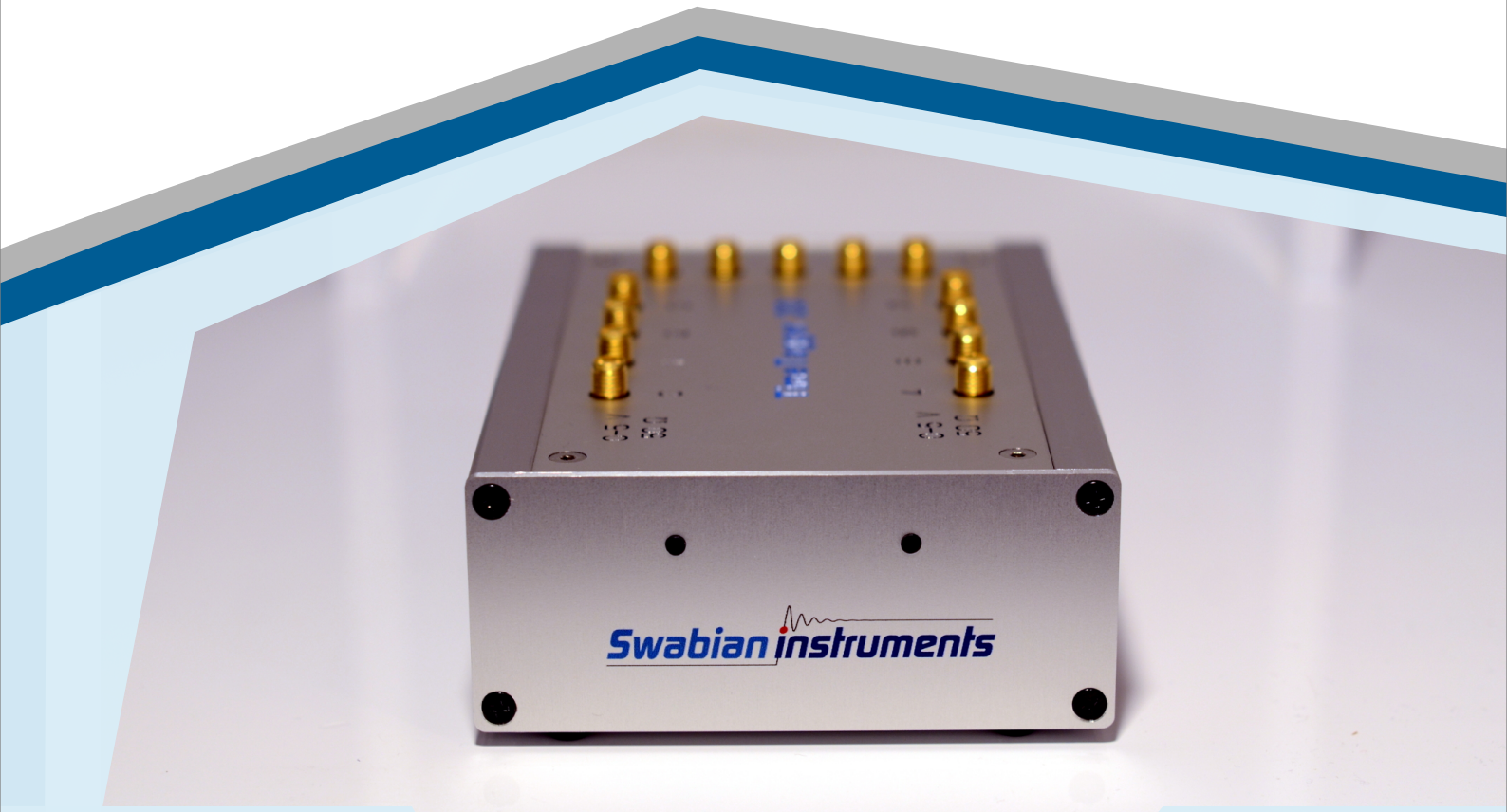
Swabian instruments

TimeTagger 20

picosecond time tagging



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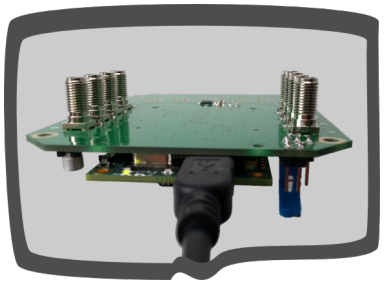
Motivation

Time Tag Streams

Time-to-digital conversion on the picosecond scale is a key process in numerous modern scientific and industrial data acquisition applications. While this is traditionally performed with stand-alone electronic systems that process the data within the device, we introduce the first time-to-digital converter that is based entirely on a time tag streaming architecture. Your computer receives all time tags and you are given the possibility to process the time tag stream with any thinkable digital measurement on-the-fly - and you can run all your measurements in parallel. For this to work, we have written a versatile easy-to-use software API (currently C/C++ / Python, other languages upon request) that enables you to create your Measurements with less than five lines of code.



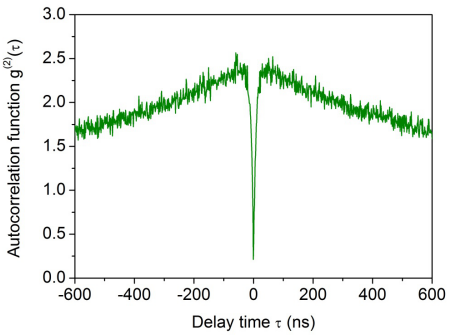
Hardware

- < 60ps time resolution
- Input Voltage range 0 to 5 V
- Trigger level range 0 to 3.3 V
- Dead time 6 ns

Need your own hardware signals?
Upgraded custom hardware, e.g. with enable gates, user defined triggers, user defined IO ports, etc. is available upon request!

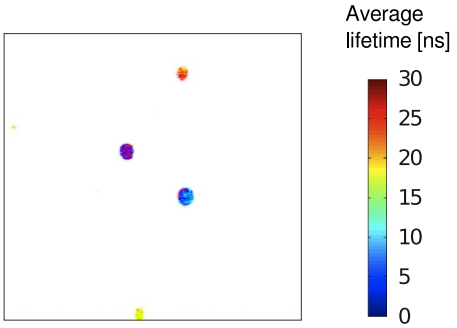
Applications

Autocorrelation



Autocorrelation function showing photon antibunching of a single molecule under cw optical aexcitation

Fluorescence Lifetime Imaging



Fluorescence Lifetime Imaging (FLIM) on single NV-centers in nanodiamonds.

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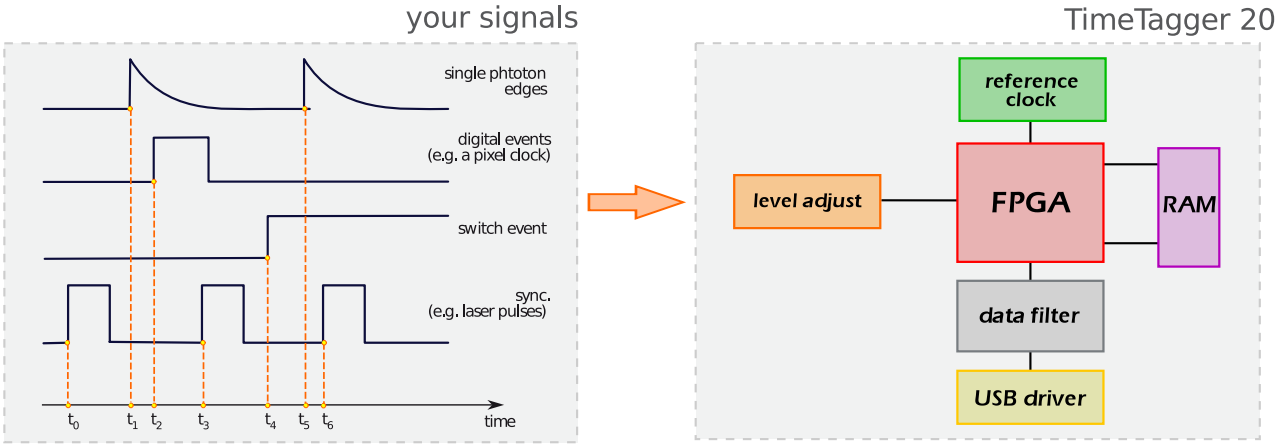
Details



Architecture

Electrical signals enter the system through an input stage that allows you to adjust the input trigger level in the range 0 to 3.3 V. The digital signals are then passed to a highly integrated FPGA core that detects rising and falling edges on all input channels synchronously with <60 ps resolution. The core generates a continuous list of time tags and streams them to your computer via USB.

Software

The software package includes a web application (currently under development), high level language bindings specifically for Python 2.7.x and 3.4.x and a C++ API. It enables you to create measurements interactively from wthin a web browser or tablet or from your own programming language with less than five lines of code. The software package includes, the following measurements

- auto- and cross-correlation
- fluorescence lifetime imaging
- counter time traces with optional pixel triggers and gating
- 2D/3D Image acquisition
- parameter swept 2D histograms optionally with various types of control triggers

Supported operating systems: Windows XP/7/8 (x32 / x64), Linux (x32/ x64)

Custom hardware filters are available upon request!

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Specifications

General parameters

Input channels	8 x SMA
Power supply	USB powered
Data interface	USB 2.0

System performance

Time resolution	< 60 ps
Dead time	6 ns
Maximum data	5 M tags / s
Input signal range	0V to +5V
Trigger level range	0V to +3.3V

Mechanical data

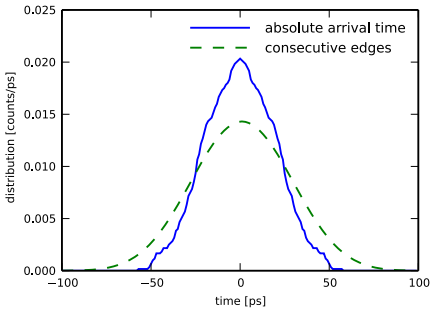
Device size	86 x 42 x 100 (mm)
Rackmount option	available upon request

Options (available upon request)

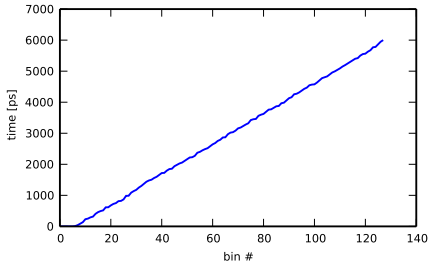
General purpose IOs	4 x SMA

All specifications are subject to change without notice

Jitter



Integral non-linearity



Contact

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