

## COUNTEX – new pulse counter

### Development status

#### Phase 3

**Technology validation and implementing it in real environment.** Testing the technology outside of the laboratory and its adjustment to external conditions.

### IP protection status

Know-How

### Partnering strategy

Collaboration, licensing



### Institution



Palacký University  
Olomouc

**Palacký University Olomouc**

### Challenge

In our laboratory, we study quantum phenomena at the level of single photons. These experiments require measurements with detectors of high sensitivity that can detect even a single photon. The output of such detectors is voltage pulses, the number of which we counted with standard readout modules. As time went on, our experiments grew, and so did the number of input channels needed, so we ended up with the NIM module that got filled with readout modules, which was not only highly impractical but also put a lot of demands on the space in the lab. With each module we needed to interact with, the time required to measure that overhead also grew. We did ask ourselves: "Could we come up with a better solution?" So the goal became to be able to use more input channels, have a faster response time, and last but not least, have an instrument with modern connectivity.

### Description

Countex is an electronic pulse counter based on FPGA (field-programmable gate array). It enables high-speed reading of periodic and non-periodic signals with a time resolution of nanoseconds. It also offers advanced functionality and connectivity. The main advantages for users of the Countex counter include its variable measurement sensitivity, connectivity, plug-and-play interface, multitude of input channels, excellent acquisition performance, and wide usability. All channels are equipped with a comparator whose comparison level can be digitally adjusted. This means that there is no need to shift levels in the -5 to 5V range or use separate discriminators before reading. With this setup, we can also automatically set the appropriate comparator level or perform pulse height analysis. Thanks to the simple communication over the virtual serial port, you can use Countex with any operating system and microcontroller. Alternatively, you can also connect to Countex via WiFi and Ethernet. We will supply free open-source control software and example source code so that you can integrate Countex into your programs. The user interface, directly on the device, allows you to start using it as soon as it is plugged into the socket without any programming. If you connect to your local computer network, you can control the Countex in your web browser, such as on the mobile phone. Countex comes with up to 16 input channels, which you can connect your detectors via BNC or SMA

connector. With Countex, you won't miss a nanosecond pulse with pulse pair resolution.

## Commercial opportunity

In addition to simple counting, Countex offers the ability to create histograms of the count, analyze the pulse height, and possibly record the arrival time of a detection event. It is an instrument designed for scientific work in various types of laboratories where both periodic and non-periodic signals are detected. The end customers are laboratories working with electronic and optical instruments or laboratories dealing with the detection of other types of radiation. The partners for further cooperation or licensing are therefore the manufacturers of the laboratory instruments. Especially manufacturers of electronic and optical instruments.