MEGAFRAME
A Million Frame Per Second Camera

The goal
Detect single photons and their time of arrival with picosecond timing resolution to achieve quantitative sensing, measuring, and computing.

The target device
A massive, parallel array of single-photon counters with in-pixel time-to-digital conversion and memory implemented in standard imaging CMOS technology.

Research fields
- Single-photon imaging technology leverages advanced, deep-submicron, CMOS processes to create massive arrays of single-photon detectors and parallel processing units on the same chip. The target fields are biology, physics, and medical imaging.
- Ultra-high speed native digital cameras are possible with the recent introduction of true photon counting detectors and processing circuitry integrated in CMOS technology.
- Fluorescence lifetime imaging microscopy (FLIM) enables quantitative imaging of biological samples. For example, ionic concentrations such as calcium, one of the ions used in neuron signaling, tracking cell-level processes in real time.
- Proteomics or the study of proteins. This field can be expanded thanks to the potentially increased speed of base sequencing.
- 3D imaging historical application of SPADs. The sensor’s pixels independently measure a light pulse's time-of-flight (TOF)

Consortium
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