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LIDAR CAMERA OWL

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SPAD based time-of-flight (ToF)

The new compact LiDAR (light detection and ranging) camera Owl stands for fast and reliable distance measurements.

Owl comprises a line sensor based on the newest on-site SPAD (single photon avalanche diode) technology. These high-sensitive photodetectors can – analogous to a sight of an owl – get along with extremely low light. Even a single photon can be converted to a dedicated electrical signal in the photodiode.

Therefore, SPADs show a high potential for many applications where accurate and fast range measurements even for long distances are important. One example is the use in autonomous moving vehicles where photons have to be detected which were reflected from far objects over more than 200 m distance.

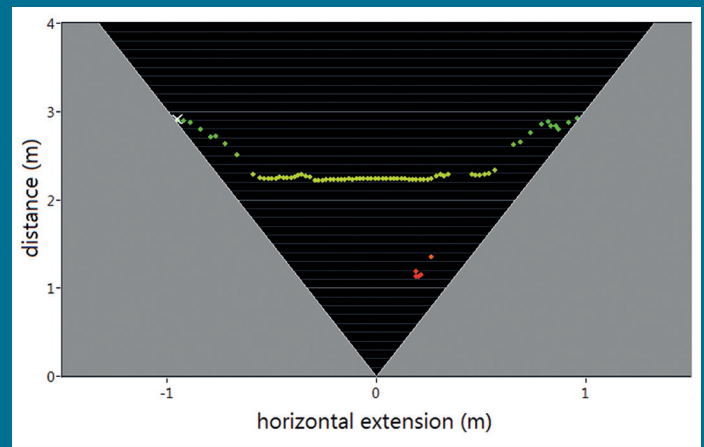
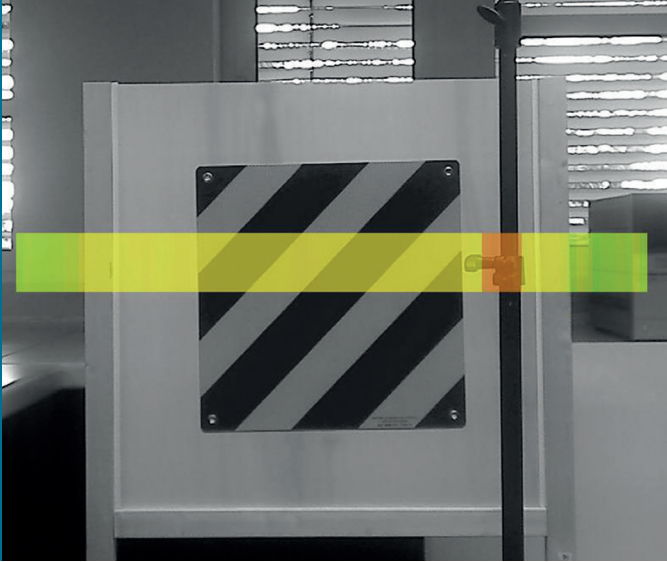
Besides the quality not to “overlook” low light signals the big advantage from the

SPAD-measurement mechanism is that the photodiode will not saturate even with higher photon rates. If a high photon rate arrives at the pixel the sensor will still be online and will provide reliable measurement results. A high dynamic range of 106 dB is achieved.

Solution for high ambient light

Another improvement of Owl is that an innovative readout circuitry on chip level is implemented. The variable sensitivity of the SPAD-pixels allows for robust measurements even with high ambient light, for example with sunlight. The signal-to-noise ratio is even high for the detection of objects in high ambient light without the loss of measurement speed.





Leading edge properties

Owl is a flash LiDAR camera with two laser modules working at 905 nm wavelength. Containing 128 pixels the line sensor can be read out in real time, in 25 Hz, where 400 measurements are done in each frame.

Two laser diodes emit 10 ns short pulses in the frequency of 10 kHz. Three operating modes are available:

1) Only one laser diode emits, 2) both diodes in unison and 3) both laser diodes in push-pull mode. The latter mode allows a doubling of frame rate or the statistic amount.

The solid state camera copes without any moving mechanical parts for laser beam or receiving optics and measurement distances of 50m are achievable.

With the geometric dimension of 100 mm x 130 mm x 120 mm and an easy operation with USB 2.0 connection, Owl offers the best opportunities to test the newest LiDAR-technology in manifold applications.

Specifications

LiDAR method	Flash
LiDAR architecture	Solid state
Geometric dimension (h/w/d)	100 mm x 130 mm x 120 mm
Camera connection	USB 2.0 B
Power supply	12 V
SPAD detector	
Line sensor	1 x 128 pixel
Quantum efficiency	3 %
Direct ToF clocking	Time to digital converter (TDC) in each pixel
Resolution TDC	312.5 ps
Resolution measurement distance	< 5 cm (without any data image processing)
SPAD dead time	20 ns
SPAD dynamic range	106 dB
Optics	
Laser source	Two laser diodes, 75 W
Wavelength	905 nm
Puls width	10 ns
Repetition rate	10 kHz
Field of View h/v	40° / 1°
Lens	C-mount w/o ARC
Optical filter	Yes, bandwidth 60 nm

3 Webcam picture combined with sensor information

4 Corresponding polar map