CHIPS.

Newsletter
January 2018

Our vision start with a dream.

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CEO's Note

Dear Readers,

In the year 1985 a conference about picosecond electronics took place in Munich. As a young engineer I had the opportunity to join this conference. From then on, I got thrilled about contactless measuring distances with optical systems. Kind of an optical sonar. The performance and usability of optical sensors, e.g. light barriers, were quite limited at that time. My vision was simple: Making optical sensors better to enable them for more applications!

Ok, measuring the distance of one spot was fine and there have been already some products on the market: long range, resolution in the tens of centimeters. However, I considered more: 3D imaging with centimeter resolution! My dream was to build a 3D camera and in 1988, the first prototype of a 160 columns by 6 rows (FOV 120° x 60°) imager was running in our lab. It was a pTOF scanning system, intended to be used to control automatic sliding doors. And it worked! The only problem was, that it was quite a bulky device, not solid-state and built with expensive parts.

So the next dream was to make this small, cost-effective and even more powerful. In 1994, the lock-in pixel was born. A device which allows phase shift measurement in the charge domain. To achieve this, CCD and CMOS have to be merged on the same silicon substrate. And, it has to be extremely light sensitive too in the near infrared. All this in combination was not available from foundries so the next dream was to make this somehow possible. Well, the logical conclusion was to develop a new semiconductor technology! That's what ESPROS has done, starting in the year 2006. Today, we have this technology, called OHC15L. It is used in many leading edge products, like a full family of 3D-TOF chips from a very small 8 x 8 to a QVGA imager. And, our OHC15L technology has also been the baseline for a new 250 x 144 pixel pTOF imager (LiDAR). Due to it's extremely high QE of more than 70% at 905nm and 250MHz CCD clock, LiDAR imaging close to photon shot noise limit is possible!

My vision of 3D-TOF imaging started with the dream to make better optical sensors. As simple as that!

Beat De Coi

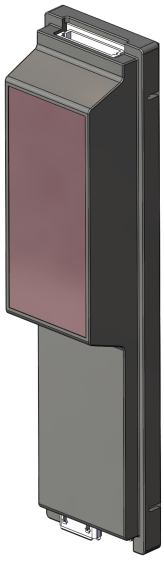
Showcase: TOF>cam 635

Following the strong interest from our market to have a TOF camera for the 5m range, ESPROS will show a prototype of the new TOF>cam 635 at Photonics West at the end of January. This camera provides a calibrated, compensated and filtered 3D point cloud with 160 x 60 pixel resolution and up to 5m range. Thus, the user can focus on his application software instead of dealing with rather complex camera operation. The result is a faster time-to-market. Applications are, e.g

- Service robots and AGVs
- Humanoid robots
- Robot vacuum cleaners
- Door control
- People counting
- Drones
- among many others

The spacial resolution is good enough for applications like obstacle detection, people counting or many industrial use-cases.

Thanks the high performance sensor chip with unique ambient light suppression in the charge domain, the camera works under full sunlight conditions. The TOF>cam 635 outputs depth and gray-scale images and allows a variety of new applications. This module brings you right in front with the latest technology of 3D depth sensing.



The field of view of 60 x 24° allows a wide range of applications which need a wide field into one direction, but not such big field into the other direction. For example, AGVs need typically a wide horizontal but a limited vertical field of view. The same requirement is for people counting applications in entrances and corridors. Such applications typically span the full walkway width but need just a limited slice in the direction of movement.

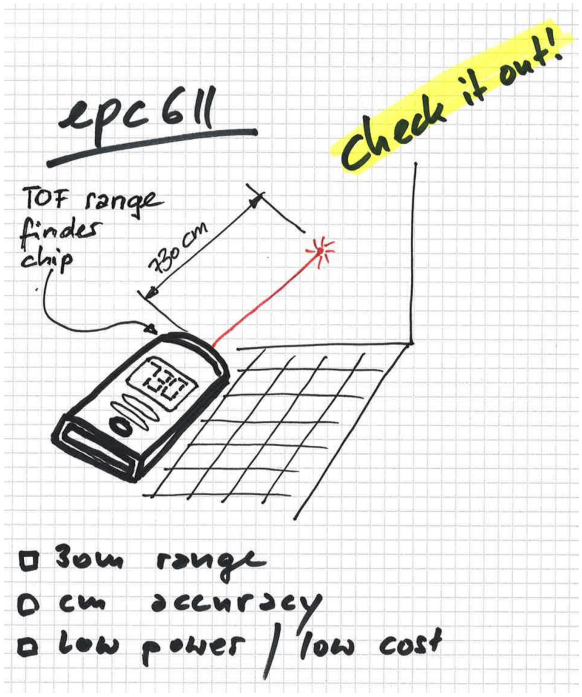
The TOF>cam 635 will be presented for the first time to the public at the Photonics West Show 2018 in San Francisco.

epc611 Application example: Hand-held range finder

Due to its small size, low cost, high sensitivity and low power consumption, the epc611 range finder chip is the perfect device as the heart of a hand-held range finder as shown in the sketch on the right. It allows an implementation of a range finder with centimeter accuracy and operating range of up to 30 m or even more with reasonable effort. The following features are achievable with the epc611 chip:

- Up to 30 m distance measurement range
- Measurement rate of up to 1000 measurements per second
- Low power consumption
- Sunlight tolerant up to 100kLux
- Temperature compensation
- Small sensitive area of 80 x 80 µm
- Very sensitive in the VIS and NIR

Ask your ESPROS contact for design support. He is pleased to provide you a sample schematic diagram and low level software which operates the chip and outputs distance data. Also calibration and compensation algorithms are available.



FPGA based epc660 camera

At Photonics West we will show an FPGA-based QVGA TOF camera in an open-frame design (the picture shows the camera in a housing). This camera is designed to be implemented into applications like automated guided vehicles (AGV) or any other mobile robot which requires 3D ambient information. The module is quite powerful: It generates up to 50 frames per second of real point cloud data, already filtered and compensated. Due to the very high ambient light suppression capability built into the epc660 chip, the camera can also be used outdoors.

The camera streams a clean point cloud to the host system using an Ethernet connection. A clean point cloud means: calibrated and compensated distance information per pixel according to the latest research at ESPROS. Additionally, the amplitude of each pixel is added to the depth information. This amplitude information can be used for further image processing. To increase the dynamic range of distance measurement up to three integration times can be freely set by the overlying system. Images with different integration times will be captured in a temporal series – each additional image with another integration time will reduce the achievable frame rate. This mode is designated as temporal HDR. All important features of the epc660 chip like ROI, spatial HDR and binning are supported and can be controlled by special command sequences sent over Ethernet.

Save the date!

SPIE. PHOTONICS WEST

SPIE Photonics West
30 January – 1 February 2018, booth 4423, Moscone Center San Francisco

We are looking forward to your visit at our booth!

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