

**The best way to clear cloudy water is to leave it alone.**

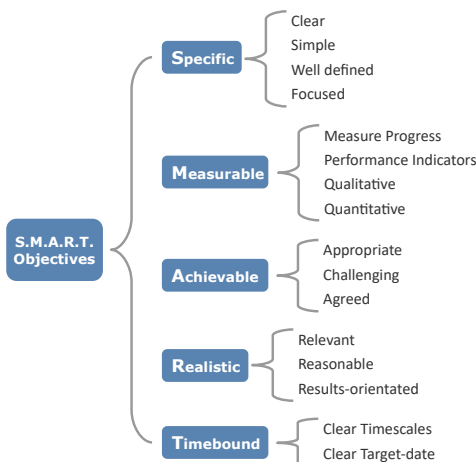
*Old Zen Wisdom*

## CEO's Note

Dear Reader

I once had a boss who really impressed me. On the one hand, he was highly intelligent and had an extremely sharp tactical and strategic mind. Or, to put it another way, he was able to analyze extremely complex situations in a razor-sharp manner within a very short space of time and immediately draw the right conclusions. Seeing him at work was incredibly impressive. One of his maxims was, «Waiting is always wrong!» According to Thomas Alva Edison: "Everything comes to him who hustles while he waits."

If you want to achieve something and you just can't reach it, it might be better to stop and think about your decision again. It may be that the constant running increases



*Courtesy of Biggerplate.com*

resistance to achieving the goal. And so it becomes more difficult to achieve it with each attempt. Or, according to the old Zen wisdom: "The best way to clear cloudy water is to leave it alone."

Stopping and thinking about whether I am aiming for the right goal, whether the circumstances make it possible to achieve it and whether the path I have chosen to reach it is the right one is not waiting. You are doing something very important. This prevents you from spending unnecessary energy, time and other resources on a path that does not lead to your goal or only with (too) big an effort. And perhaps you come to the conclusion that achieving the

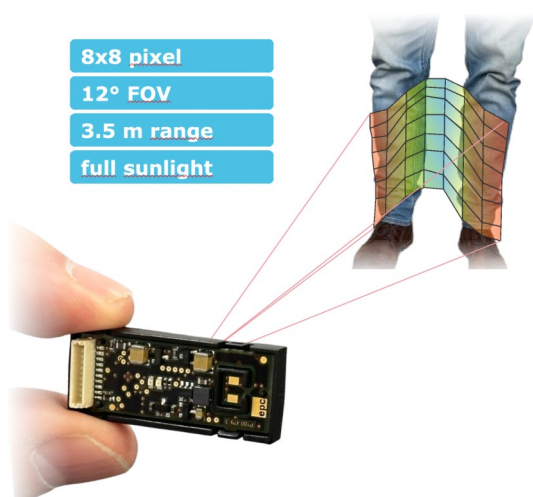
goal you set is not worth striving for. Then we come to the real point: Have I set SMART objectives?

Beat De Coi

## Tiny Open Frame TOF Camera

Are you a system integrator? Is your business industrial control, logistics, warehouse automation, mobile and stationary robotics? And are you tired in getting slow frame rate from your SPAD sensor? And even worse, your sensor becomes blind at strong ambient light? Have a closer look at our open frame TOF camera [«TOFcam-611»](#):

chip with its unique ambient light suppression, the camera can be used both in- and outdoor. As a result, distance and confidence images with a rate of up to 80 frames per second are available under full sunlight condition of  $\geq 100\text{kLux}$ . This allows a wide variety of new applications where typical SPAD sensors fail or their performance degrades.



*Open frame camera TOFcam-611*

It is a miniaturized and low cost 3D TOF camera, based on the ESPROS proprietary time-of-flight technology built around the epc611 TOF chip. A tiny IR LED illuminates the scenery, consuming very low power. Due to the high performance of the imager

	<b>Industrial automation</b>
	<b>Infrastructure sensing</b>
	<b>Mobile robotics</b>
	<b>Farming automation</b>
	<b>Container monitoring</b>
	<b>Activity monitoring</b>

This tiny module is very easy to use because it delivers fully calibrated 3D images. All the complex engineering and time consuming design tasks regarding optics, illumination and signal processing are already solved.

Customer specific versions are available upon request. Contact ESPROS sales [here](#).

This month we would like to introduce ESPROS' fairy godmother, who takes care of all the hungry employees at lunchtime, and thus their general well being.

**What is your job at ESPROS?**

I'm the Canteen Manager and I'm probably the person who meets the most people in the company over a week. I run the canteen, so lunchtime is my busy time. We have a fridge full of fresh sandwiches and meals, which many of our employees use daily while others bring their own homemade lunches. It's my job to ensure the canteen is fully stocked and tidy. And a bright airy place in which people can eat, chat and relax.

**What do you most enjoy about your job?**

Well, Napoleon said an army marches on its stomach. So I like to think that making sure the ESPROS team is happily fed is an important part of our working routine. And having a comfortable canteen to relax in for a coffee or sandwich is also part of this. Of course I also like to chat with the employees when I'm organizing things. It's a great way to keep up to date with what's going on.

**What do you like to do in your spare time?**

I like to keep fit and love to go walking with good friends.

**If you could have a superpower, what would that be and why?**

Because I love chatting with people, I would love to be able to speak all the languages of the world (without having to learn them!) because then I could always chat with someone in their native language.



**ESPROS reduces to the max at Photonics West 2024**

January has come and that means [SPIE. Photonics West](#) in San Francisco is just around the corner. From January 30th till February 1st, ESPROS will once

Miniaturization is our main topic at the trade show. «Micro» was the key word at the end of the last century. Everything became smaller and smaller. Microelectronics created decisive opportunities for miniaturization. It allowed complex electronic circuits to be shrunk to a fraction compared to discrete circuits. The size reduction was about three orders of magnitude.

At the beginning of this century, a new term emerged: «Nanotechnology». Suddenly the focus was no longer on the micrometer, but on the nanometer. So, from the first miniaturization step to «micro» another three orders of magnitude to «nano».

This miniaturization allows, for example, the construction of robots that can be used in the human body. But such small robots also need sensors that can measure position in the nanometer domain and are much smaller than today's solutions. Come and see an impressive example at our booth #4535.

**Introduction**  
Miniaturization became the key word towards the end of the last century. Everything became smaller and smaller. Microelectronics created decisive opportunities for miniaturization. It allowed complex electronic circuits to be shrunk to a fraction compared to discrete circuits. The size reduction was about three orders of magnitude. At the beginning of this century, a new term emerged: «Nanotechnology». Suddenly the focus was no longer on the micrometer, but on the nanometer. So from the first miniaturization step to «micro» another three orders of magnitude to «nano».

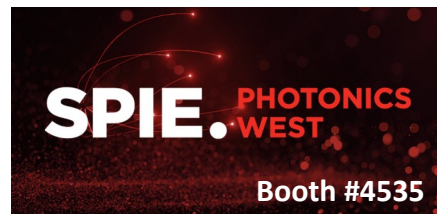
**Implementation**  
The demonstrator consists of a Blue Laser Diode, the dimensional scale with reflective and absorbing areas. The light hitting the aluminum patterned areas is reflected back to a line imager chip (ep901). From there, the pattern is translated to an intensity image which then can be processed by a computer.

**Concept**  
Key of the new concept is a dimensional scale which is produced with semiconductor manufacturing concepts. The scale is embedded into a silicon chip. Because semiconductor manufacturing is mature since more than two decades, precision in the nanometer scale is very cheap. In addition, silicon (Si) and the typical metal layer material aluminum (Al) have excellent properties in the optical domain. Silicon is an excellent absorber whereas aluminum an excellent reflector. By applying the right layer structure, the optical contrast can be tuned up to 11,000%.

**Demonstrator**  
Absolute position accuracy of 1 nm has been showed with appropriate ambient conditions. The precision is approx. 3 nm without filtering. By applying a Kalman filter with a gain of 0.05 (history of 20 measurements to predict the next sample), the precision is below 0.5 nm (1 σ).

**Applications**  
The presented concept allows massive miniaturization of position sensors. It has been shown in a rotary encoder with a code disc diameter of 11 mm, an absolute angular accuracy of 28 bit can be achieved. Thus, it's feasible to manufacture rotary encoders in a 5 x 5 x 5 mm cube with a resolution of up to 25 bit. Linear encoders, displacement sensors, vibration and shock measurement devices, etc. are candidates to be miniaturized using the presented technology.

**Photo Lithography**  
Semiconductor manufacturing processes are based on photo lithography, material deposition, etching and implant, supported by other processes like material removal. Implementing a position device, photo lithography plays the key role. It is the transformation of a geometrical structure, e.g. a pattern, to a photo resist on the wafer at the substrate. The photo lithography process allows precision in the nanometer scale at very low cost. Due to a fully integrated manufacturing ecosystem, the design on dedicated CAD tools goes seamless to wafer production. In addition, almost no limitations of patterned shapes and structures allow patterns which are dedicated to specific application requirements.



again be exhibiting at the world's premier lasers and optoelectronics event. Visit our booth #4535 to see our latest products.

Looking forward to seeing you in San Francisco.

You want to purchase our products? Check out on [Digi-Key](#) or get in touch with our [sales team](#).

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