



**When someone dreams alone,
it's just a dream. When people
dream together, it is the
beginning of a new reality.**

Helder Camara

CEO's Note

Dear Reader,

A long-time partner and friend leaves ESPROS. Bruno Tscholl, a founding member of ESPROS and a member of the Board of Directors since it was founded in 2006, is set to enjoy a well-deserved retirement. At the age of 79 he was granted this.

Bruno Tscholl has been with me in my entrepreneurial activity since 1986. Back then, after the foundation of CEDES in Landquart, I got to know Bruno Tscholl in his role as financial auditor. At that time, CEDES as a small SME, he advised me on difficult financial issues. Setting up a company, today this phase is called "startup", is a major challenge. This is not only very demanding in technical matters, but also at least as much in the area of financing. Back then, as a young engineer, I found financing issues neither understandable or sexy. It was interesting for me to use smart product designs to bring cheaper and more powerful products to the market.



Board member Bruno Tscholl

While product costing and financing are both money-related, but they're two different pairs of shoes. I understood the former very well, the latter not at all. Bruno Tscholl managed to introduce me to the mysticism of corporate finance. And at the same time, he brought me closer to the topic through his competence and his calm manner, with which he was able to summarize complex issues concisely.

Bruno Tscholl learned and refined this, among other things, as a long-standing member of the Graubünden Cantonal Council (1989 - 2004). During these 24 years in parliament, Bruno Tscholl has practically developed into the "fiscal conscience" of the canton. The respective government councilors who headed the finance department always had to have prepared very well when presenting their documents. He saw through every trick and uncovered them mercilessly. When he announced his resignation from parliament, the newspaper wrote: "While the departures are limited in quantity, they are sometimes painful in terms of quality. Practically all factions have to say goodbye to striking personalities who go beyond party borders were recognized." The qualities of Bruno Tscholl cannot be described more accurately.

Bruno Tscholl will now not be re-elected to the Board of Directors at the upcoming ESPROS General Assembly. For me, the collaboration with a highly competent consultant, caring mentor, extremely loyal business partner and above all a highly esteemed friend ends after 34 years. I deeply regret this, but our friendship will last forever. Bruno, we are very grateful to you. For everything you have done for CEDES, ESPROS and all their employees and their families. We dreamed together and continue our common dream in a different form!

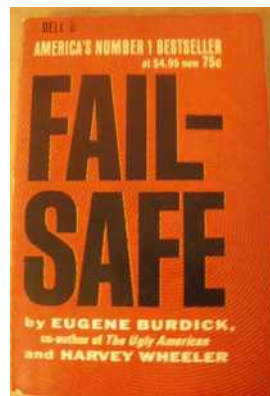
Beat De Coi

Fail-safe operation of cwTOF cameras

Time-of-flight cameras are often used in safety critical applications, e.g. in anti-collision sensors for robots. It's evident, that the sensor is working correctly or, in case of a malfunction, the control system of the of the robot detects a malfunction. A serious fault in a TOF camera is the failure of one or more pixels of the TOF imager. Whereas a «stuck-at» failure¹ is relatively easy to detect, a floating signal which can randomly take any state is not.

A pixel in an imager can be faulty in a way that it reports any level in grayscale from fully dark to

fully bright. This can also be the case in a TOF imager. Thus, in a safety critical application, the distance to an object reported by a pixel is assumed to be wrong. The pixel can report the correct distance within a given tolerance band or any other distance which is not correct. Such behavior is fatal in an anti-collision sensor based on a 3D camera. The question now is, how to detect incorrect distance reporting pixels.



The 1962 Novel dated back to the Cuban missile crisis by Eugene Burdick

1 «Stuck-at» failures are malfunctions in which a signal gets stuck at a high or low level. For example, a short circuit of a signal line with a supply. Stuck-at errors can only be either high or low or assume the state of an adjacent signal line.

There are several ways to do so:

1. **Comparison:** Comparison of the reported distance with a known distance (comparison). This can be applied e.g. in a door sensor where the sensor looks from top of the door down to the floor.
2. **Offset:** Adding a delay into the illumination path (or the demodulation path) to impose a virtual distance shift. By subtracting the distance shift imposed by the delay, the same or a similar distance as the one without delay should be resulting.
3. **Scaling:** Changing the modulation frequency but not changing the distance calculation parameters accordingly. This is similar like 3., but the distance shift is not fix, it is dependent on the distance value.

4. **Pattern:** By changing the modulation or demodulation pattern, good pixels report the same (correct) distance even in a different phase sequence.
5. **Fill & Spill:** Inject a defined amount of charge into a pixel and check the response of the pixel. This is a functionality which offers ESPROS' epc611, 635 and 660 imagers.

There are additional ways to detect faulty pixels. However, the five concepts listed above are very simple to implement. ESPROS TOF imagers fully support all these options.

A detailed description will be published soon as application note AN15 on our websites download section.

Interview with Jonas Zürcher; Senior Engineer IC Packaging

What are your responsibilities at ESPROS?

I'm responsible for all packaging related production processes. This starts with the solder balls attached to our TOF sensor wafers and ends with the assembly of our thinned chips including soldering, underfilling and optional mounting of optical elements such as lenses and/or filters. Furthermore, I supervise production related introduction of new TOF camera module products.

How long have you been working with ESPROS?

In January 2020, I started my fourth year working for ESPROS.

Where do you come from?

I grew up in Goldach, a village on the Swiss side of Lake Constance. Since more than 8 years, I have been living with my family in Chur.

What do you like about your job and working for ESPROS?

I like the diverse and multidisciplinary nature of my job. As a IC packaging engineer, I bring together the electrical and optical functionalities of our chips and modules while all the mechanical, thermal and reliability requirements have to be respected. The challenge is to identify and understand the interplay of all of these aspects and thereby find the best possible solution it is a demanding task in a very positive way. I also like the close interaction with chip design, product engineering, customers and suppliers.

Can you tell us about your hobbies?

Spending time and doing sports in the nature is the perfect relief for me. In summer, my favorite hobby is mountain-biking, including optimizing and servicing my bike. Cross country skiing is the counterpart in winter. Needless to say, free time with my wife and my young daughter is very precious for me.



Jonas doing his favorite hobby...

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