CHIPS.

Newsletter
May 2018

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Coca Cola

CEO's Note

Dear Readers,

The markets for Photonics applications are growing extremely fast. According to a recent Yole report[1], a CAGR of 37.7% is predicted for the next five years in the 3D and sensing market. We see this trend as well. Due to our sophisticated CCD/CMOS imager technology, a set of completely new applications became feasible, e.g. imager with more than 20 million frames per second - something which was unthinkable a few years before. Or a quantum efficiency of more than 70% at 905nm, CCD with 250 MHz shift speed opens up a completely new world of applications.

Hence, if you want to be part and contribute to our success, do not hesitate to consider working in Switzerland.

We offer the chance to be a part in a young, dynamic, and rapidly expanding company. Open your horizons with us! You will be given plenty of room to act on your own initiative. We are looking for passionate people with a distinguished «can do spirit» who want to excel in their work. Although ESPROS is a technology driven company, the customer is at the center of all our activities.

And all this on a competitive CMOS/BSI process, developed in Switzerland, where others make vacation!

Innovation and teamwork are cornerstones of our operation and we commit ourselves to goals and results to reach our high ambitions.

Please get in touch with us if you want to learn more about your career opportunities. We are looking forward to receiving your application!

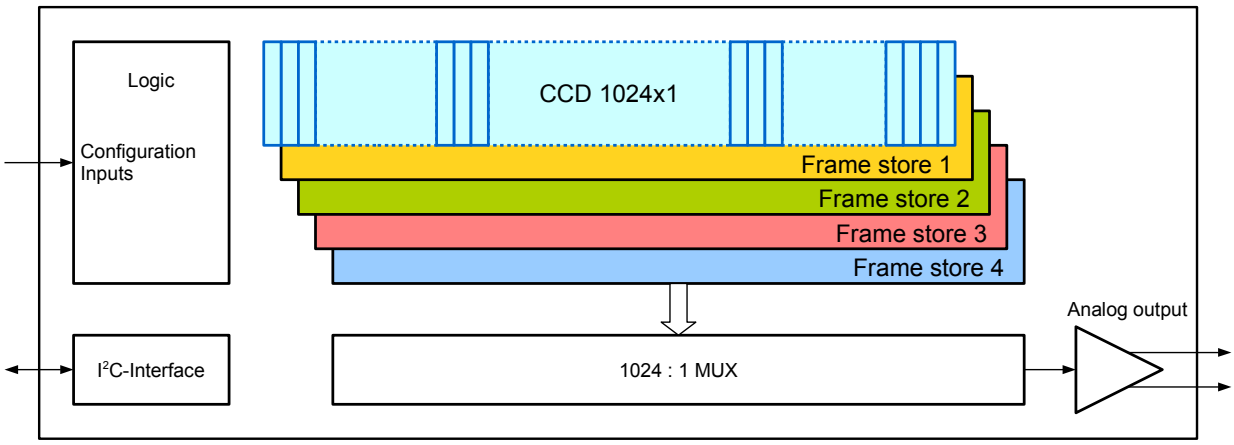
Beat De Coi

1 Yole Développement, 2017, 3D imaging and sensing

1st Announcement: ESPROS TOF Academy

TOF is a relatively new domain in engineering sciences. At least for most electronics and software engineers which have to develop IoT devices, mobile robotics, automotive sensors, or e.g. industrial sensors. To implement TOF sensors, new know-how has to be gained regarding illumination, optics, power and thermal management, 3D TOF image processing, camera calibration and compensation, ambient effects, image artifacts like motion blur, flying fish and flying pixel phenomenon. ESPROS will start soon a series of seminars which will help to close the gap to a professional implementation of TOF cameras, TOF range finders or TOF scanners. We will soon post here more information about our TOF Academy cycles.

The challenge of nearly all measurement systems is the acquisition of low noise data by using a wide dynamic range - and this under the assumption of speed. It is not easy to achieve it because the frontend, e.g. in our case the conversion from photons to an electrical signal, in most cases defines the limitation, especially in the imager world.



Built-in fast frame stores for high-speed imaging up to 500kfps

Now the trick: In order to achieve a higher SNR, multiple images can be captured and then averaged. The result is an increase of the SNR of √n images. However, it is possible only if the imager is fast enough to acquire images without motion blur. This first requires a very fast acquisition rate and second a very high sensitivity, because the exposure time has to be very short. Thanks to high performance CCD embedded in ESPROS' OHC15L technology, frame store buffers which store the image in the charge domain can be implemented. This feature is built in the epc901 line imager chip and allows the capture of up to four images in burst mode. They can be read out sequentially and then summed up to one "image." The result, for example in a triangulation sensor, is impressive:

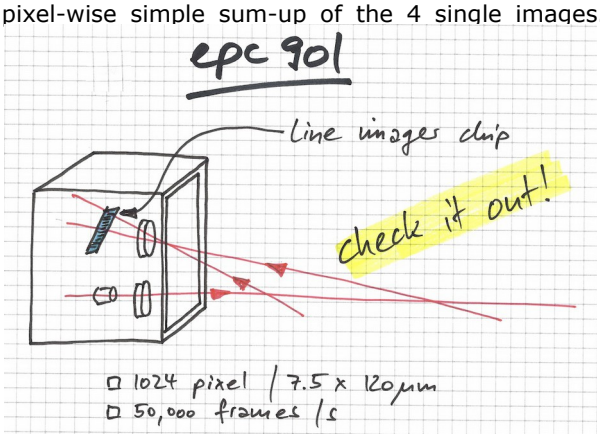
- Signal range increase by a factor of 4. E.g. by using a 12 bit ADC, 14 bit amplitude is possible
- Noise reduction by a factor of 2 due to temporal averaging
- Distance range increases by a factor of approx. 3
- High frame-rate reading with low loss in signal amplitude
- Motion blur reduction by high-speed image acquisition
- Reduced smearing effects

Let's make an example:

A single image acquisition with 5µs shutter/exposure time needs totally approx. 10µs (exposure and shift in/out of the frame store). Thus the collection of four images needs 40µs.

If a readout clock of 16 MHz is used, the readout of one image is roughly 62.5µs. So, readout of all four images needs 250µs which is six times more than for the image acquisition itself. The result is reduced motion blur and less smear: The image of a moving object gets sharper!

Dynamic increase and noise reduction is done by a pixel-wise simple sum-up of the 4 single images.



Triangulation principle

The resulting frame-rate of 4 kfps is given by the 250µs readout time to get the complete low noise, high dynamic and high speed image. Even in scanning triangulation systems, a resolution of 1° can be achieved by using a scanning speed of more than 10 scans per second. And this with an SNR of more than 66dB (1:2,000)!

Conclusion: Using the built-in features of the epc901 line imager in a clever way will open doors to many more enhanced applications. And all this without higher cost!

Datasheet: *www.espros.com/downloads/01_Chips*