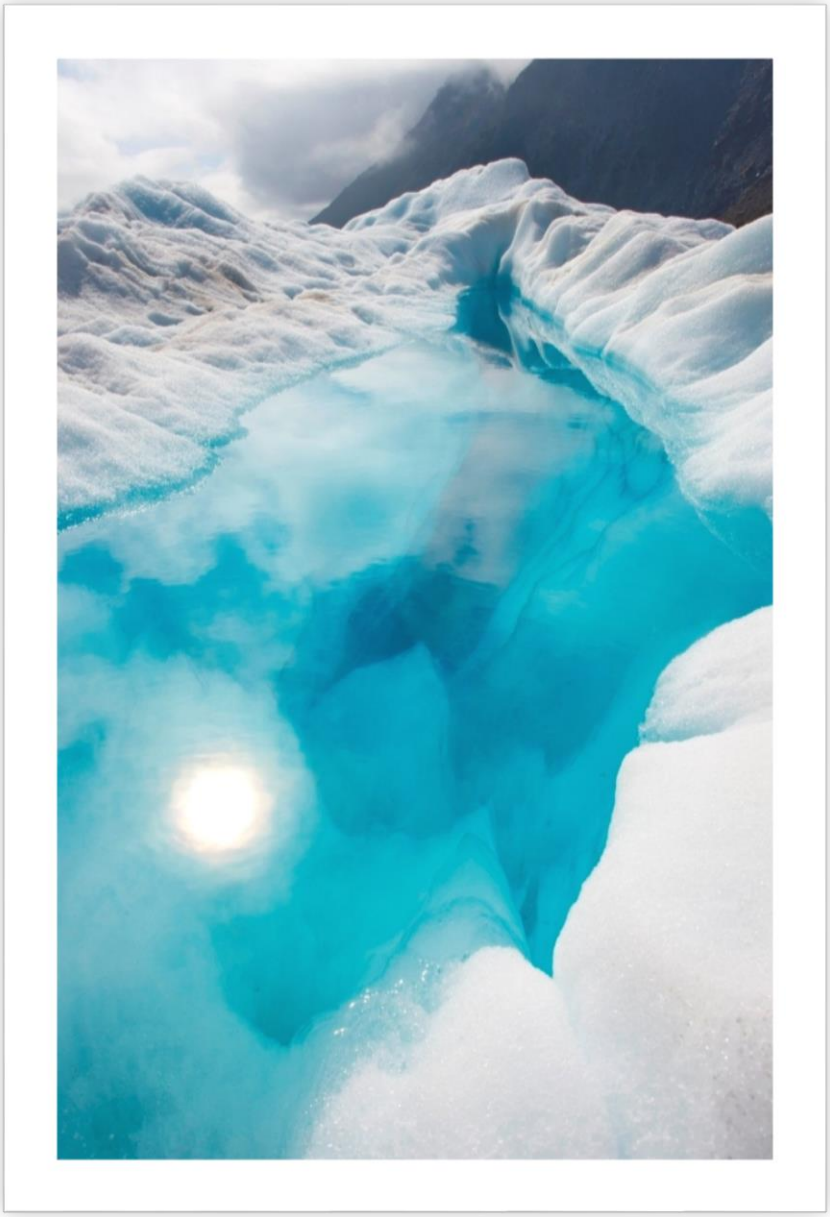

Moving Object Imaging

SENSORS AND DIGITIZATION EXPERIMENT NO 5

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Objective

The goal of this practical lab is to study an imaging solution to analyze the moving objects with respect to specific features of the system.

Introduction

This experiment is focused on to analyze the moving object with respect to the calibrated camera DALSA S2-1X-02K40. The camera must well-focused to capture the letters of the moving object. It should be calibrated by the distance between the camera and the moving setup.

Equipment

For the proper arrangement of the experiments, we will consider:

- PC Computer
- Frame Grabber: DALSA XCELERA- CL LX1
- Digital Camera: DALSA S2-1X- 02K40
- 50mm Lens
- Video cables
- 12V Power Supply
- Moving Industrial parts
- Signal Generator
- Oscilloscope
- CamExpert Software – TELEDYNE DALSA

Calibrating Camera

The first step to start the experiment is to connect all the required given above equipment in proper manner and then to turn on the power. Once the cables are connected and the camera is powered on we should explore the precise software on our desktop i.e., CamExpert. Open the software and check for the camera window for the images to be captured.

The camera which we are using is DALSA S2-1X-02K40, it is a line scan camera. The concept of linear sweeping is associated with the construction of a line-by-line image using a linear sensor so that the camera moves relative to the object to be captured or the object is displaced relative.

Linear camera technology was developed for inspection applications of continuously produced materials such as paper, cloth, metal sheets, etc. However, it is currently being imposed in many other production and inspection processes, which require high resolution and / or high speed at a competitive price.

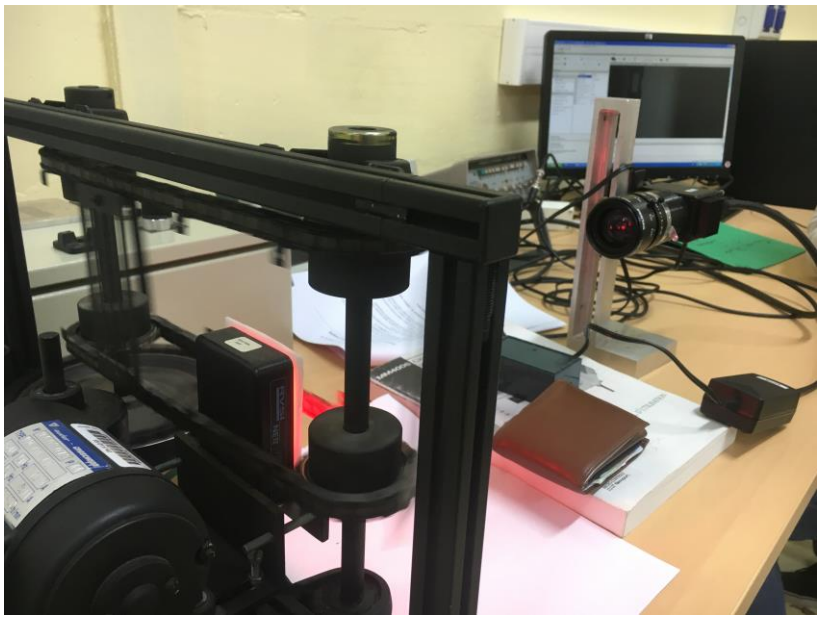

Figure 1. Setup for moving object

Once the setup is properly arranged as per the figure 1, we will proceed to take the pictures of our moving object with an optimal distance, acquired by trial and error until we saw correctly the image on the screen.

It is important to set the parameters inside the software as it follows:

- Camera type: line scan
- Color type: monochrome
- Pixel depth: 6
- Horizontal Offset: 400
- Vertical Active: 6000
- Pixel Clock input frequency: 40

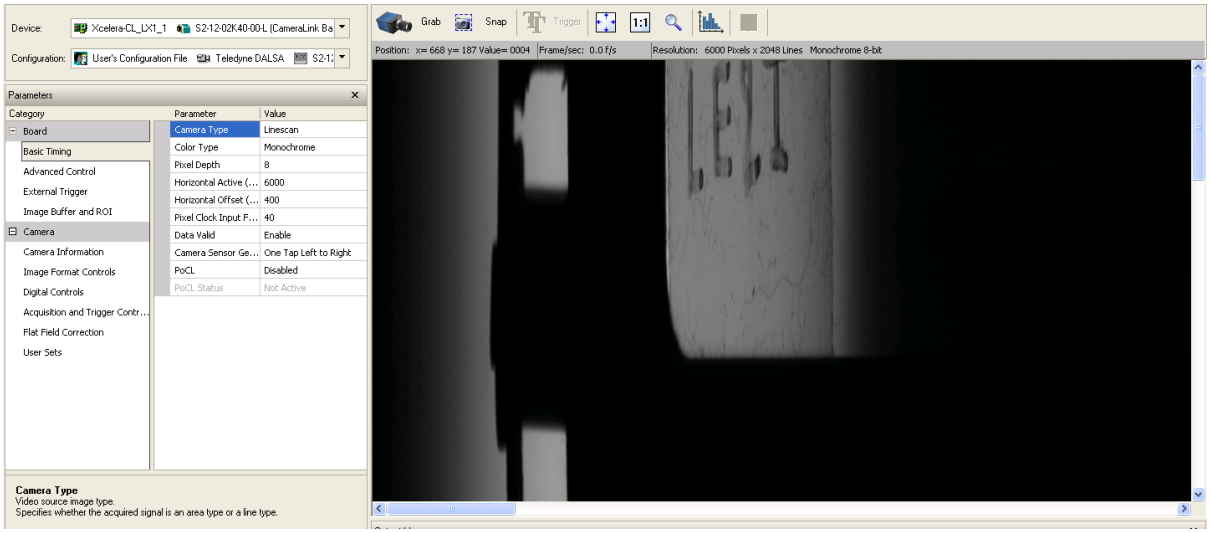

Figure 2. Image of the moving object

As we have seen in the screenshot taken, we have been able to acquire an image of the word “LE2I” written in the stick tape which is attached to the moving object.

Camera triggering by external source

Now the goal is to acquire the same kind of images but with an external trigger, where the acquisition is controlled by an external signal provided by oscilloscope which is called as input for the receiving camera trigger port. The generation of the trigger can be done due to a rising or falling edge, as well as positive or negative value of the triggering signal.

That means it is time for an expansion of our setup, that will now include an oscilloscope and a signal generator labelled in figure 3.

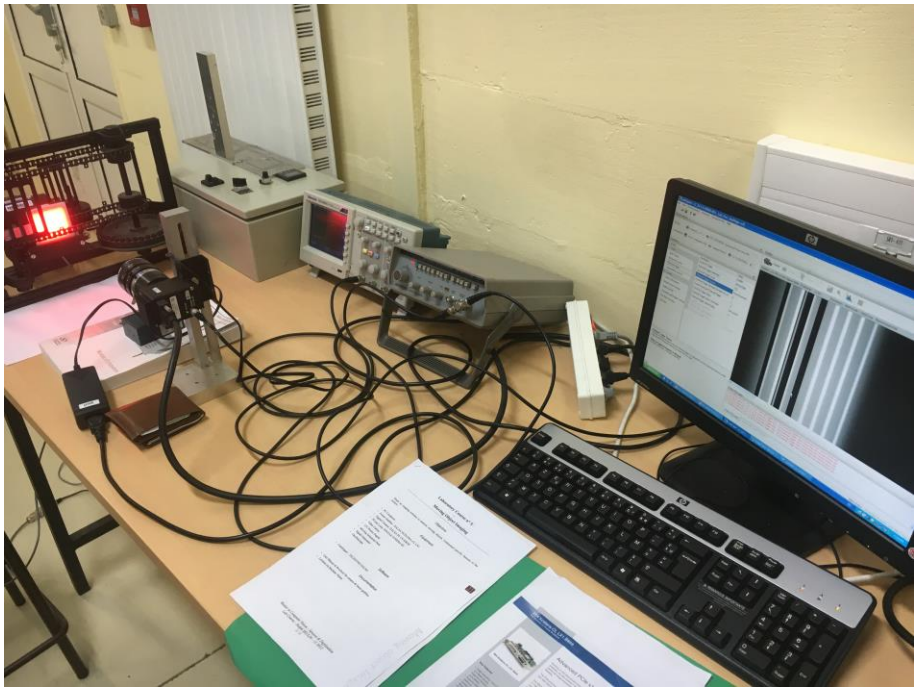

Figure 3. Setup of the moving object with signal generator

Figure 4. Oscilloscope and Signal generator

Once the setup is done, we can start grabbing images triggered externally, so we can observe the whole platform working.

As it is seen in the following images, in the oscilloscope we can see when the pulse for triggering externally is sent from the signal generator and when it is not.

Figure 5. Triggering and not triggering images on oscilloscope

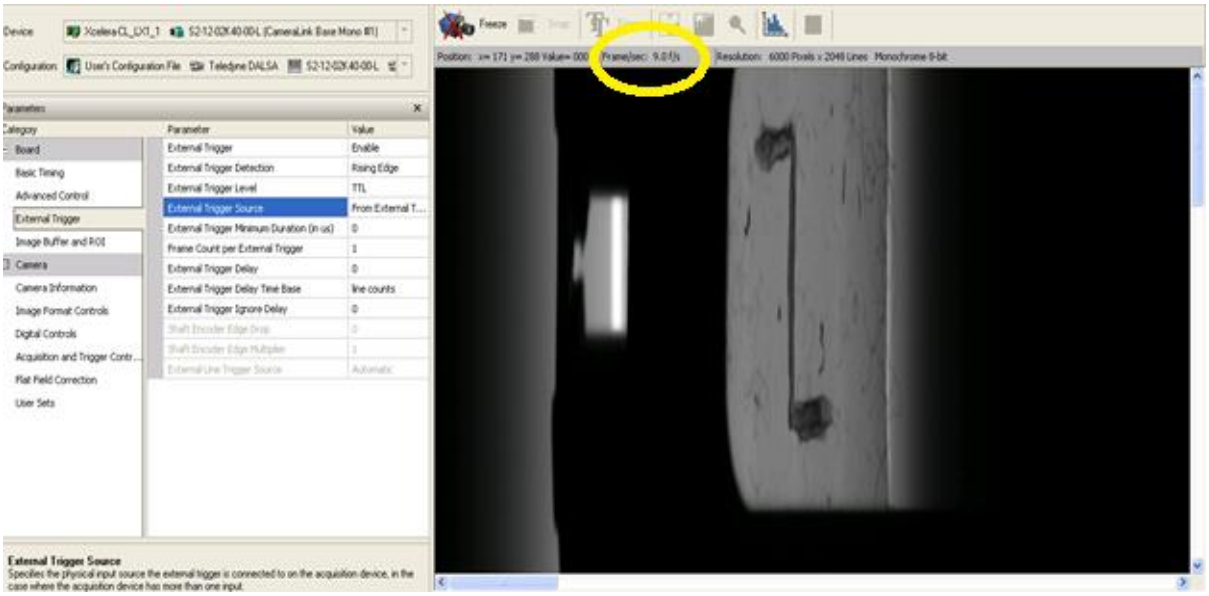

Figure 6. Frame changing rate

So, as it is seen, we have been able this time to acquire a very high resolution image of the “Z” written in the same stick tape with which we were working before. The frame rate at which the images are acquired is now set externally (in the above image is remarked such parameter, that variates according to what is said from the signal generator).

Having an external trigger supposes a great advantage in many industrial or non-industrial applications, for example in medical imaging, in which the acquisition of images must be, in many cases, taken synchronously. In general, each area in which this is an absolute requirement is candidate to have an external triggering on their imaging devices. Having it synchronous ensures that all the operations required for taking an image are done in specific time. An

industrial application for this could be snapping electronic components passing at great velocity in front of the sensor in a logistic chain.

CONCLUSION

We have conducted experiments to detect the sentence and the letter “Z” which are written on the tape sticked to the moving platform. The external source has used to change the focal length of the camera by oscilloscope. The results are displayed and tabulated with different images.