AiryLab

Genika Trigger

Application note : synchronous stereoscopic image acquisition for 3D analysis

Presentation

Dr Karim Kelfoun from the Magmas and Volcanoes Laboratory in Clermont Ferrand studies volcanic bombs issued from eruptive craters. Their speed, frequency and number give him precious hints about the underlying volcanic dynamic that cannot be explored directly.

To model volcanic bombs trajectories, two different image streams are required from two different points of view with some distance in between. Image synchronization between the two cameras is critical in order to have a reliable trajectory reconstruction. The synchronization tolerance order is within 10 ms at most.

Airylab has been selected by the laboratory to provide a stereoscopic image acquisition solution (cameras and software) that can be deployed on the field in harsh environment (acid gaz, heat and cinders).

This solution has been successfully tested at the Stromboli in Italy in September 2012.

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Solution

The imaging solution relies on two Basler aca1300-30gm cameras managed by two Genika Trigger instances on the same PC. Both cameras are 100m away from the PC thanks to the Gigabit Ethernet link. The ICX445 CCD sensor from Sony is very sensitive in the IR band to detect the high heat generated by the bombs and gives a correct resolution using the focal length lenses required to cover a wide area within the crater.

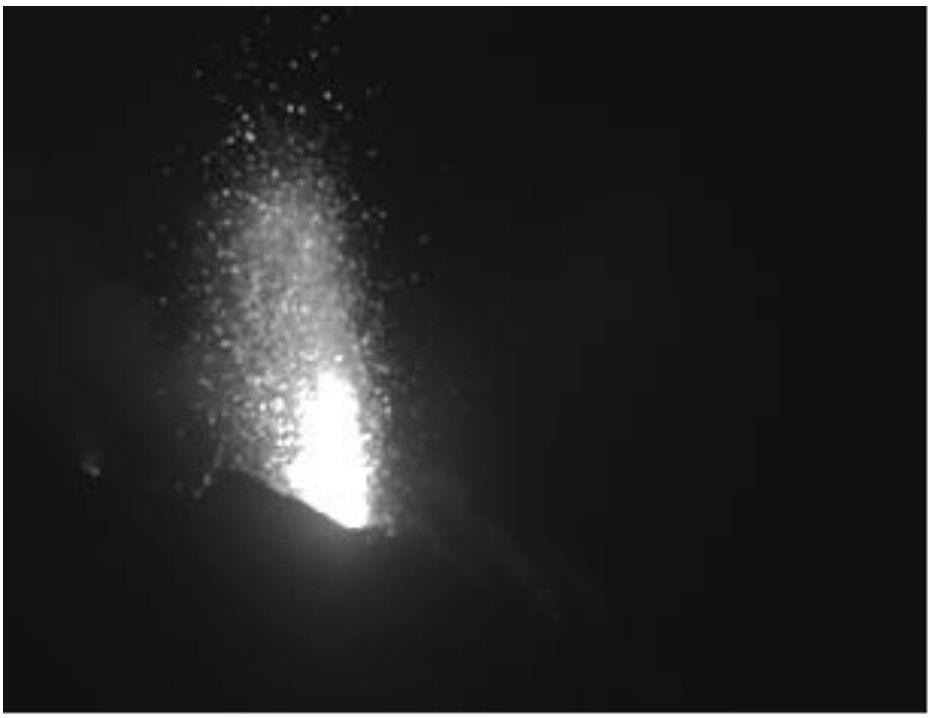
For long term acquisition it is not possible to let the system acquire images in freerun: both cameras generate almost 10GB every minute! Genika smart triggers have been used to detect the volcanic bombs and set off the acquisition when necessary. With this system a single laptop could handle the traffic.

Cameras are in master/slave mode. The Genika Trigger instance that controls the slave is set to hardware trigger mode. Each time the trigger signal is detected the camera exposes one image that is recorded along with its timestamp. The trigger-in port of this camera is connected to the trigger-out of the master camera.

The master camera is controlled by another instance of Genika Trigger on the same laptop in smart trigger mode. This camera acquires images continuously. Each image is analyzed on the fly by a smart trigger to check if a bomb is present in the image. In that case Genika Trigger saves the image plus the N next images and set off the hardware trigger of the camera to command image acquisition from the slave camera well.

As Genika Trigger needs to analyze the image before deciding whether it should be recorded or not, a few ms delay is introduced between the images of the two cameras. It would be possible to avoid this latency with a three cameras solution (one camera for analysis only and two cameras to acquire images in slave mode).

The GNK file format allows keeping the image timestamp along with the GPS coordinates and the smart trigger that sets off the acquisition.



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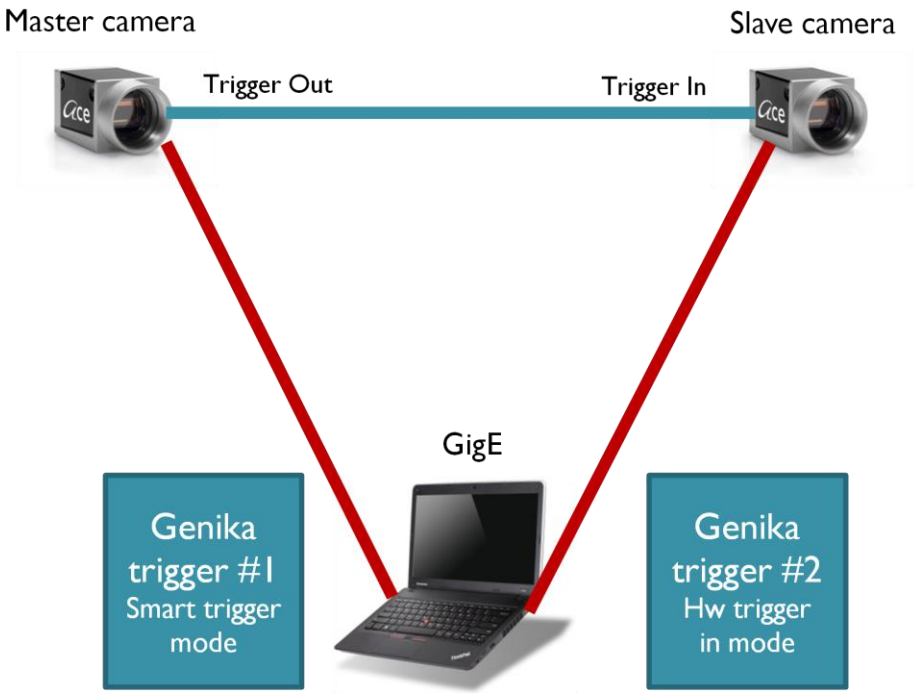
System components

- Lenovo laptop with Windows 7 64 bits and Basler Pylon 3.1. Two SSD for image acquisition.
- Genika Trigger 1.6 (two instances)
- Two Basler Ace aca1300-30gm in ruggedized enclosures
- 100m Ethernet and trigger cables, 12V battery



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