

1 Public Executive Summary

The initial prototype of a 2K Viper camera with satellite cameras consists of two main components, the camera rig with three cameras and the capture and processing server. The camera rig was designed and built to provide appropriate flexibility for various setups along with the necessary stability against twisting and bending. Since the rig alone has a weight of 23kg a special heavy-duty tripod has to be used which carries the rig along with a central Viper FilmStream camera and two Dalsa Pantera satellite cameras. The lenses for the satellite cameras were chosen to match as close as possible the viewing angle for the central camera.

The capture server provides slots for a CameraLink capture card for the satellite cameras, a HD-SDI capture card for the Viper camera, a Raid controller and a high performance graphics board. In addition 16 hard disks are combined to three RAID-0 systems to provide the necessary bandwidth to store three full HD videos.

For good depth estimation a proper synchronization of all cameras is very important. The central Viper camera provides the synchronization signal embedded in a CVBS¹ signal. Using a dedicated sync box it is converted to a TTL² signal which is then used to trigger the timer on the CameraLink capture boards. With an additional offset the timers trigger the satellite cameras in a way that image k of the central cameras triggers image k+1 of the satellite cameras.

Special care has to be taken for the initial mechanical setup. All cameras have to be aligned on the camera rig and adjusted in a way to ensure a maximal overlap. The setup has then to be calibrated using a calibration pattern. After the trifocal capture the sequences have to be pair wise rectified. The rectified image pairs can then be used to estimate the depth map for the central camera. Results can be evaluated using a dedicated depth player.

The grabbing software is implemented as a highly configurable framework which allows the flexible usage of different types of cameras. A dedicated synchronization module supervises the capturing process and alerts in case of deviations. The depth-estimation software needs two rectified image pairs as input. For each stereo pair left-to-right and right-to-left disparities are estimated and used for a first consistency check. By projecting the disparity estimated with one stereo pair on the other pair and comparing the results the final reliability measure is generated. The prototype was shown during the first annual review in Manchester.

¹ CVBS: Analog video signal (colour, video, blank, sync)

² TTL: Transistor-Transistor Logic