Omnidirectional vision system for robot navigation

Mika Aikio[1]

[1]*VTT Technical Research Center of Finland, Kaitoväylä 1, 90571 OULU, Finland*

Autonomous robot navigation requires combination of several optical technologies to function reliably. For ranging information, laser scanner can be used, but is usually limited to very small vertical opening angles thus requiring several sensors on the robot. Nevertheless, not all targets can be reliably detected by a laser scanner, for example, the distance to the load a robotic forklift is carrying or unloading is comparatively difficult task as the forklift itself tends to mask the beam.

For this reason, it was seen that there is a need for a 360 degree vision system that allows moderate vertical fields of views and could be used as in stereo vision to provide more accurate information on the distances. PAN-ROBOTS is an EU project where the aforementioned technique is tested. The first vision system optics are designed, and the components are currently in the manufacturing phase. The optical layout of the system is presented in Figure 1.

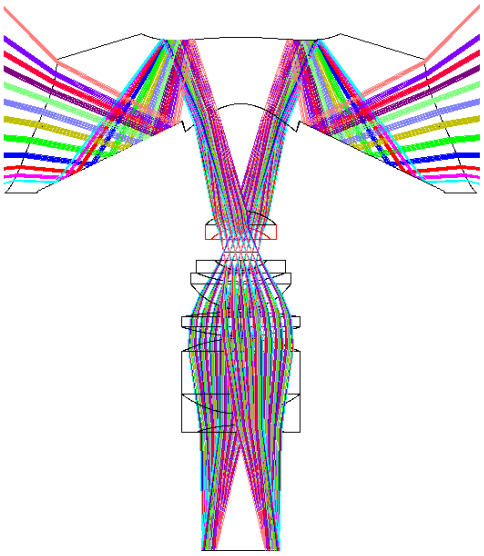

Figure 1. Omnidirectional lens camera

The objective is designed to fulfil following requirements:

Drawing capability: 150 lp /mm

Light collection power: F/3.0

Horizontal Field of view: 360 deg

Vertical Field of View: 62 deg (-17 … + 45 deg)