ABSTRACT

This thesis presents a solution to the problem of calibration for omni-directional cameras and the definition of a new module for classification purposes adapted to the optics of the sensor.

The functional principle of an omni-directional camera is based on the use of a special mirror in the upper part of the camera, so that luminosity can be captured in the environment in the range of 360 degrees of circumferences in one image. Omni-directional sensors are used in many applications, as video-surveillance application and navigation of mobile robots.

The amplitude of the field view obtained with this camera and the compact organisation of information is useful in many systems.

These cameras, however have a resolution that is limited and not homogeneous in the field of view, and they introduce distortions in the image, due to the use of catadioptric systems.

The full Project, under development at ELSAG S.p.A., is aimed at creating a video-surveillance system, ensuring a panoramic field of view, based upon a fixed camera, and capable to find a moving object and to track it on the screen. The quality must be similar to the one of moving camera systems.

In order to improve the processing capabilities of the system it is necessary to increase the extracted information from the omnidirectional image.

The work of this thesis was concerned such aspect, with particular emphasis to the creation of a procedure of calibration that is independent regarding the type of used
catadioptric sensor and to its positioning and the definition of a new module of classification in order to increase the performances of videosurveillance system.