Motivation and application domain

In the field of mobile Augmented Reality (i.e. the one based on smartphone and tablets), it is necessary to obtain an ecological way to interact with the real and virtual environments. Ideally, the user should interact with the virtual elements in the scene, by using his/her hands, acting as in the real world. Hand detection and gesture recognition are topics that have been extensively addressed by the Computer Vision Community, but real applications of such methods in mobile AR are not common.

General objectives and main activities

The main goal of this thesis is to develop a prototype of hand detection and tracking, and simple gesture recognition, to be implemented on a mobile device (i.e. a smartphone or a tablet). Starting from the analysis of the state-of-the-art algorithms, available from the literature, one of the main activities will be to adapt an existing algorithm to be implemented into a mobile device and embedded into an AR application. The resulting application will be capable to detect a hand in front of the phone camera, track it and recognize a simple library of gestures (i.e. grasping, clamping). The application will handle the problem of occlusions (i.e. when the hand overlap virtual objects).

Training Objectives (technical/analytical tools, experimental methodologies)

1) To analyze the state of the art in hand detection and gesture recognition. To find an algorithm suitable to be implemented on a mobile platform.
2) To modify and adapt the algorithm with respect to the constraints of a mobile AR application.
3) To develop an AR application showing the possibility of interacting with simple virtual objects added to a real scene.
4) To quantitatively analyze the performance of the developed application, through an experimental analysis with healthy volunteers.

Place(s) where the thesis work will be carried out: DIBRIS - Valletta Puggia Via Dodecaneso 35