

MSc Research Thesis

Research Training period or vocational training period is going to be held in the Underwater Vision Lab at Universitat de Girona, Spain.

Research Topic: Depth Estimation and 3D dense reconstruction of Underwater Environment

Brief description of the project:

Determining the three-dimensional geometry and reflectance map of a scene in underwater environment is a difficult task because the light is affected by an exponential wavelength-dependent absorption effect in underwater environment. But this disturbing absorption effect can be used to find a new way to accurately estimate the dense scene depth-map. This algorithm using absorption effect is already tested on several synthetic images for different noise level [1]. For proving this phenomenon experimentally we require the acquisition of a multispectral image of the underwater environment with appropriate camera and light source setup. There could be 2 or 3 light sources and one camera with different 3 band pass filters, which will allow us to take multispectral images. Then these images can be used to perform 3D dense reconstruction to find out the error between the ground truth and our 3D model. This idea can be extended by using multiple cameras with different band pass filters or by using some other sensor to get the ground truth, so that we can estimate the error in our 3D dense reconstruction. In addition using this method [1] is also used to compute normal vectors of every reconstructed point without taking any information from neighborhood.

Reference:

[1] - A Novel Approach to Estimate Depth and Reflectance Maps in Participating Media, Rafael Garcia, 2006.