

AFFORDABLE AUTONOMOUS UNDERWATER VEHICLE (AUV) FOR SEARCH, INSPECTION AND MAINTENANCE OPERATIONS IN TURBID UNDERWATER

Goal of the project:

Developing an underwater enhancing technique that can work in real-time for affordable Autonomous Underwater Vehicle (AUV)

Short description of the project:

Autonomous Underwater Vehicles (AUVs) are devices able to follow a predefined route or is computing and adjusting the route as a result of sensor measurements. They were developed and used successfully on various applications; such as oceanographic surveys, bathymetric measurements, underwater maintenance and inspections activities (e.g. of the hydroelectric dams, bridges, sea wind turbines and oil sea platforms structure). Taking advantage of the latest advances in hardware and software, an ever-increasing number of underwater studies rely on AUVs that offer increased operational range and reduce potential hazards compared to classical methods involving divers or manned submersibles.

However, the existing AUVs performances are currently very limited due to the poor underwater visibility. In general the existing restoration techniques are too computationally expensive for AUVs. This project proposes a radically novel paradigm that provides the basis for more direct, interactive and efficient underwater studies, while reducing the associated costs. The technologies developed in the context of this project will allow the scientists to directly study, in an immersive way and in real-time, the environment surveyed by the AUVs, while allowing remotely interacting with the vehicle in a natural and intuitive manner.

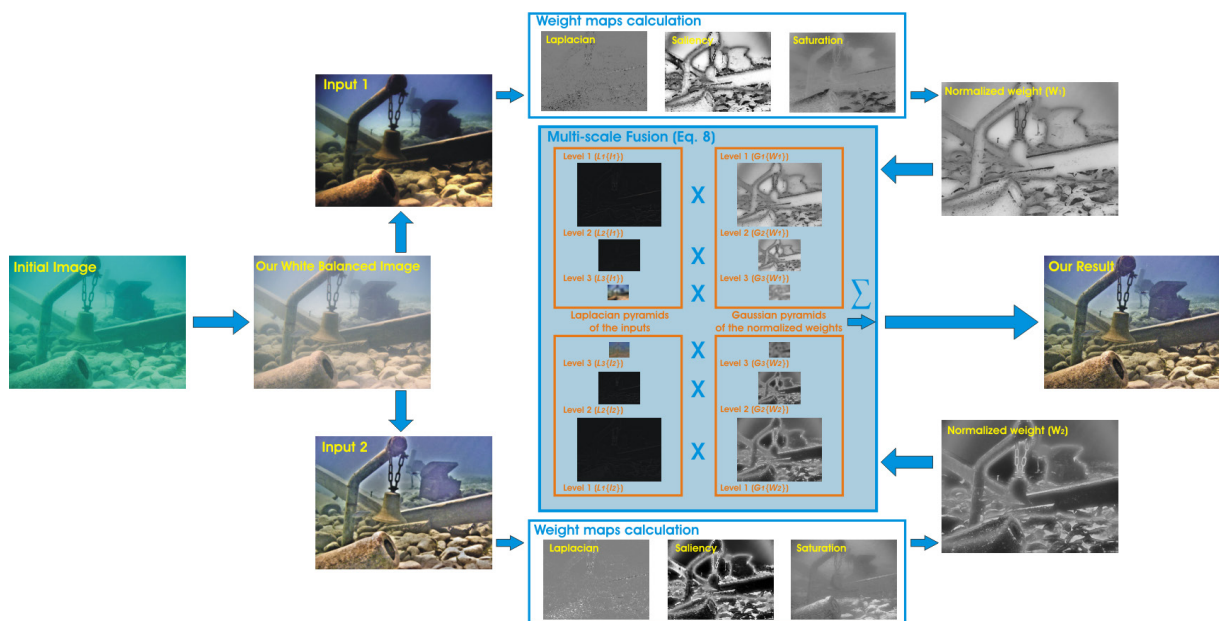


Figure 1: Overview of the proposed method.

Project implemented by

Politehnica University Timișoara, Romania

Implementation period:

January 2017- June 2018

Main activities:

The main activities of the project:

- identification of specific requirements of underwater imaging technique to be implemented on a specific hardware platform;
- design of an exploration path for specific functionalities;
- designing and recording of specific underwater image scenarios;
- implementation of the underwater imaging technique;
- optimize and integrate the underwater enhancing technique;
- publish the results;

Results:

- Developing an effective underwater enhancing technique
- 2 WOS/ISI papers and 1 BDI paper
- 1 ISI journal (IEEE Transactions on Image Processing, Q1, impact factor 4.8)

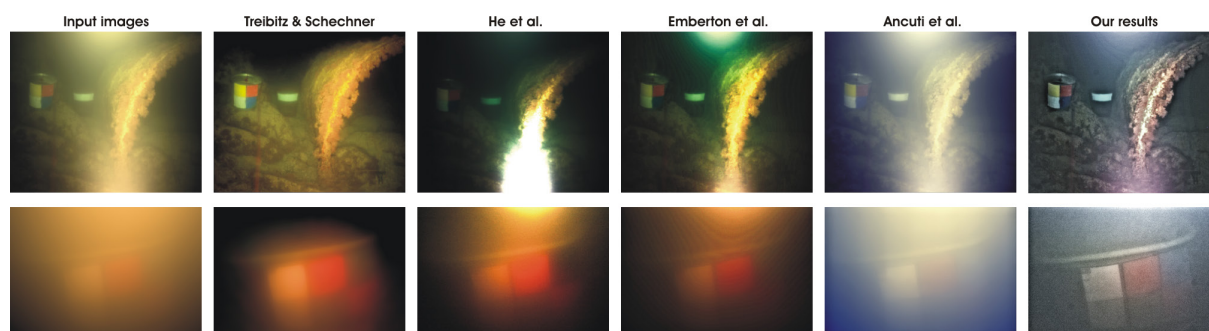


Figure 2: Underwater dehazing of extreme scenes characterized by non-uniform illumination conditions. Our method performs better than earlier approaches of Treibitz and Schechner, He et al., Emberton et al. and Ancuti et al

Applicability and transferability of the results:

The outcome of this project may be applied in the field of underwater imaging and in the AUV's industry.

Financed through/by

Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI), Bucharest, Romania

Research Center

Research Center of Intelligent Systems

Research team

Assoc. prof. Cosmin ANCUTI, PhD
 Assoc. prof. Horia BALTA, PhD
 Eng. Codruta ANCUTI, PhD
 Arpad KIS, PhD Student

Contact information

Assoc. prof. eng. Cosmin ANCUTI, PhD
 Faculty of Electronics, Telecommunications and Information Technologies
 Department of Measurements and Optical Electronics
 Address: 2 Vasile Parvan Blvd., room B312, 300223, Timișoara,
 Email: cosmin.ancuti@upt.ro
 Tel: (+40)-0256-403363, Fax: (+40)-0256-403295