



**TITLE:**

**New underwater acoustic transducers and instruments for the Ocean acknowledgement and exploitation**

**LAB & PEOPLE**

- Name of the hosting lab: Signal Processing Laboratory (siplab)  
General activities of the lab: Underwater Acoustics  
Website: <https://www.siplab.fct.ualg.pt/>  
Number of staff / PhD: 4
- Supervisor name and contact: António Silva (asilva@ualg.pt)

**TOPIC OF THE INTERSHIP**

- Scientific context of the internship (max 20 lines): At our lab we are currently exploring and developing new underwater acoustic transducers of two types: (i) based on piezoelectric polymers (PVDF); and (ii) spiral acoustic sources. The piezoelectric polymers are being explored due to their broadband characteristics which allows to overcome the narrowband limitations piezoelectric ceramics which is a key factor for high bitrate underwater communications. The spiral acoustic sources are being explored due to their capability of transmitting the source direction which allows for a single hydrophone to determine the direction and distance to the acoustic source. After the initial demonstrations of the previous transducers feasibility the future work will also address the application of those transducers to underwater applications and new instruments development as broadband underwater acoustic modems and spiral sonars. In addition, at the lab this team is also working in the future smart fiber optic cables which will bring new capabilities for the underwater fiber optic cables which are currently used for intercontinental communications.

Keywords: Underwater acoustics, broadband acoustic sources, spiral acoustic sources, underwater communications, SONAR, smart cables

**Bibliography:**

- Viegas, R.; Zabel, F.; Silva, A. In-Lab Demonstration of an Underwater Acoustic Spiral Source. *Sensors* **2023**, *23*, 4931.

<https://doi.org/10.3390/s23104931>

- R. VIEGAS, F. ZABEL and A. SILVA, "Underwater acoustic spiral source : pool tests and calibration", IEEE/MTS OCEANS 2023, Limerick, Ireland, June 2023.

- R. VIEGAS, D. POZZATTI, F. ZABEL and A. SILVA, "Integrated approach for modeling acoustic propagation and projectors/hydrophones electronics", IEEE/MTS OCEANS 2022, Hampton Roads, VA, USA, 17-20, October 2022.

- A. SILVA, A. HUGHES, D. POZZATTI, F. ZABEL, R. VIEGAS, and M. S. MARTINS, "Development of a high-power multilayer PVDF acoustic



## 2023 Master internship at University of Algarve

projector for 40 to 80 kHz band", IEEE/MTS OCEANS 2022, Hampton Roads, VA, USA, 17-20, October 2022.

- Martins, M.S.; Faria, C.L.; Matos, T.; Goncalves, L.M.; Cabral, J.; Silva, A.; Jesus, S.M. Wideband and Wide Beam Polyvinylidene Difluoride (PVDF) Acoustic Transducer for Broadband Underwater Communications. *Sensors* **2019**, *19*, 3991.

<https://doi.org/10.3390/s19183991>

- M.S. MARTINS, N.A. CRUZ, A. SILVA, E. PEREIRA, S.M. JESUS, T. MATOS, F. ZABEL, L.M. GONCALVES, B. FERREIRA, A. MATOS, C. FARIA, M. TIEPPO, "Network Node for ocean data exchange through submarine fiber optic cable repeaters", IEEE/MTS OCEANS 2022, Hampton Roads, VA, USA, 17-20 October 2022.

- Tasks and duties entrusted to the student: Instruments development and testing in lab and at sea; Reports and scientific papers writing;
- Skills to be acquired or developed: technologic and scientific research capabilities on underwater acoustics, transducers and instruments

### PROFILE OF THE DESIRED STUDENT

- Minimum level of study required: Graduation
- Field(s) of study: Underwater acoustic transducers and applications (e.g. localization, navigation, SONAR and communications)
- Scientific skills: Matlab, Python, basic electronics, basic signal processing
- Language skills required: English

### THE INTERNSHIP ASSIGNMENT:

Desired duration of the internship (in months): 4 to 12 months

Desired Starting date of the mission: at any time

Indicative weekly schedule: 35h / week

Remuneration: Not Available

*Erasmus grant:* Application should be made by the student at the sending institution

Internship agreement: *an internship agreement will be signed.*

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To SEA-EU students:

If you're interested please send your CV and letter of motivation to the scientist in charge, [asilva@ualg.pt](mailto:asilva@ualg.pt)