ELECTRONICS DIVISION



Design and Development of an Acoustic Beamforming algorithm for Sonar and Sonobuoy Simulation Models

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Scope of the work is to design, develop and test an Acoustic Beamforming algorithm with the purpose of emulating the sonar real capabilities, within a simulated digital environment. The beamforming algorithm will be designed to receive as input multiple audio streams, associated to an array of spatially distributed hydrophones and to provide as output a beamformed magnitude spatial response analysis.

The algorithm will be integrated and validated within a SONICS Simulation Model, that emulates both sonar and sonobuoys signal and data processing for different tactical domains (naval, submarine, helicopter, ...).

In details, the system will provide the following main functionalities:

- Spatial magnitude emission patterns for active sonar techniques
- Spatial magnitude gain patterns for passive sonar techniques
- Gain response analysis with different hydrophone array geometric configuration

Acoustic Beamforming algorithm: inputs, outputs and functionalities

Acoustic Beamforming algorithm

- Sonar Array Geometric
 Configuration
- Ownship position, velocity, orientation and status
- Sonar Command Data (passive and active techniques)
- Multiple real-time generated audio signals

Available Data

- Spatial magnitude emission patterns for active sonar techniques
- Spatial magnitude gain patterns for passive sonar techniques
- Gain response analysis with different sonar array geometric configuration

- Real-time localization of emulated targets
 Real-time analysis of echo return and emulated target
- emissions
- > Received signal FFT

Expected Data

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Software Development

SW Development:

All the tasks will be developed on LED Workstation. (Unclassifed data but company confidential)

Output: real-time multiplatform executable/library

Coding language: C\C++

Tool: Open Source C compiler, Qt 5.13, Model Based Suite (MATHWORKS or equivalent)

• Operative System:

Red Hat Enterprise 8.1 – 64bit Linux Microsoft Windows 10 Enterprise (or superior)

• Timing:

6 month by the Project Thesis start, optionally extension up to 8 months

• Location:

LED Ronchi dei Legionari site, at least 20% of time

Relevant Skills:

STEM Master Degree on going is required, the most relevant courses are TLC, Electronic, Computer Engineering or Physic. Code development in C\C++ and Matlab\Simulink knowledge is required.