

# Project Proposal - Acoustic Localization

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## Introduction

Acoustic source localization provides a means to tracking acoustic sources. In a distributed acoustic sensing platform, several small sensor array nodes are placed in the environment. Upon receiving an event matching a particular signature, the nodes estimate the bearing of the source and from the bearing estimates the system estimates the location of the source.

The Acoustic Embedded Networked Sensing Box (ENSBox) is such a distributed acoustic sensing platform. Each ENSBox node has a four-microphone array, from which the bearing of sources can be estimated. Critical to the ENSBox's ability to localize sources is knowing the relative positions of nodes. The ENSBox handles this by having each node emit a calibration noise from which other nodes can determine the location of. The ENSBox has so far proven to be quite successful, being able to perform source localization accurate to about 5 cm 2D positional error and 1.5 degrees orientation error over a partially obstructed 80x50 m outdoor area [1].

## Objectives

The aim of this project is to improve on the ENSBox by adding motes to the system. In principle, the more information the system has, the more accurate the estimates will be. The motes will be considerably simpler than ENSBox nodes in almost all respects. The processing capabilities will be a lot more restricted and there will be only one microphone sensor. The initial objective is to develop a simple method of locating the positions of the motes with the ENSBoxes (this is a similar problem to self-localizing the ENSBoxes). A large amount of work will go into experimentation, testing and analysis. Later objectives will include improving source localization with the extra information the motes provide.

## References

- [1] L. Girod et al. The Design and Implementation of a Self-Calibrating Distributed Acoustic Sensing Platform. *SenSys'06*, November 1-3, 2006, Boulder, Colorado, USA.