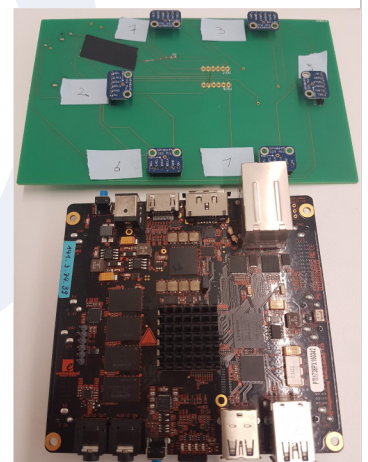


Sound Source Localization with Multiple Models

Targets emitting electromagnetic or acoustic signals can be localized by multiple sensors that measure accurate times of arrival (TOA), time differences of arrival (TDOA), and/or wavefront directions (bearings). Multilateration algorithms obtain position estimates based on such measurements.

At ISAS we already developed an array of microphones that can be used to measure TOAs, TDOAs, and bearings measurements. It is an extension board for the BeagleBoard-X15 that runs with a standard Linux and a custom ALSA audio driver.

In order to experimentally perform sound source localization, multiple of these microphone arrays should be deployed. Ground truth positions will be provided by the HTC Vive localization system as well as the robot arm in our Holodeck. With the recorded real data set, various established and recently developed novel multilateration algorithms will be compared.



Within the scope of this work, the following research questions can be addressed:

- Installing multiple microphone arrays, connected to a server via LAN
- Installing a sound source on the Holodeck robot arm; programming trajectories
- Evaluate various multilateration algorithms and combinations of them on the real dataset
- Implement and evaluate novel multilaterations and tracking algorithms

Requirements:

Students with a background in electrical engineering, computer science, physics, or mathematics. Pre-knowledge in Linux internals, programming, and state estimation is welcome. Strong self-motivation, reliability, and critical mind are expected.

Emphasis:

Theoretical Study

Software Implementation

Hardware Implementation

We offer:

- excellent support and advice
- highend infrastructure
- contact to industry and research partners

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