

Master 2016

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**Processing of Synthetic Aperture Sonar Signal using Back-Projection
and Beam Forming Algorithms.**

ABSTRACT - Masterthesis

The drawback of the conventional sonar system that uses a physical aperture technique is that it provides angular resolution inversely proportional to the aperture size such that the spatial resolution degrades with increasing distance. This problem is solved by using synthetic aperture sonar (SAS) technique. The synthetic aperture uses the relative motion between the antenna and imaged scene to generate high resolution image from low resolution aperture data.

The aim of the thesis is to design a SAS system that scans the simulated area. The echoed signals from the area are back projected to create an image. First we have one transmitting element and one receiving element. Then we increase the number of receiving elements. This increases the movement speed of the aperture. Then we use the physical antenna to form n number of beams. We then use the beam numbers to find out which beam corresponds to a particular pixel of the image. Then we can create a particular pixel by processing only the corresponding beam there by reducing the computational complexity. Finally we scan a target and estimate its point spread function. We then observe the change in point spread function by varying the crab angle and various sonar parameters.