

MASTER'S THESIS

A real-time acoustic imaging system using digital signal processor array

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**A REAL-TIME ACOUSTIC IMAGING SYSTEM
USING
DIGITAL SIGNAL PROCESSOR ARRAY**

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**A thesis submitted in partial fulfilment of the requirements
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ABSTRACT

Acoustic imaging is a technique for remote sensing of objects. Instead of using light, sound is used as a coherent source of wave to carrier information. In the past, researchers have developed different imaging system using acoustic waves in various medium, for instance, air, water and underground, using different image reconstruction scheme. Most of these methods suffer from the need for huge computational requirements that make real-time measurement unfavourable.

In this thesis, we attempted to build a high-performance, portable, and low cost real-time acoustic imaging system using the latest advances in digital signal processor technologies. As a pilot study, the system will focus on using 40 kHz ultrasonic waves to locate objects in a 2-D space in air using the method of back-projection pulse holography. This will give a 2-D scan of the immediate vacuity facing a 1-D transducer array with a range of 3 metres.

The project has successfully demonstrated a real-time image reconstruction in 2-D space using a digital signal processor array with a refresh rate of about 0.33 frame per second. A vast range of potential applications include exploration in archaeology, medical diagnostics, and robotic vision have been open up.

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