#### Project Title: Electronics for Side Scan Sonar

#### Requester: Tyler Turcotte and Dr. Corey Bachand

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#### City: Fall River State: MA Zip Code:02723

#### Date: 08/14/2019

### Please note that all RFP Forms must be completed by or before August 1 of a project cycle. If you have any questions regarding the RFP process for Senior Capstone Projects, please contact the College of Engineering at 508-999-8539. Email inquiries may be sent to rlaoulache@umassd.edu

**Title:**

# Electronics for Side Scan Sonar

**Description:**

This project focuses on developing the electronics to support side scan sonar (SSS) imaging of an

underwater environment. Side scan sonar device are often deployed on a towed platform behind a ship

or installed on autonomous underwater vehicles (AUV) to acoustically image the ocean floor (could be

for mapping, ship wrecks, or other man-made and geological features). In operation, the slow-moving

SSS transducer sends out short pulses and receives reflections from the ocean floor, in order to create

slices of the acoustic profile normal to the direction of travel. Combining these slices with positioning

data from the tow platform allows a mosaic image of the ocean floor to be constructed. The SSS

transducers operate into the MHz range and have very narrow (~1-3 deg beamwidths), in order to

produce high resolution images. The main objective would be to develop the synthesis, acquisition, and

control electronics to generate and sample the pulses, likely through the use of a FPGA. The customer

has experience producing SSS transducers, power amplifiers, and preamplifiers to interface with the SSS

transducer. An ideal outcome would be a customized set of electronics that is mechanically packaged in

a compact form factor for convenient integration with a tow body.

**Scope:**

*The team will reevaluate the need for FPGA development for side scan sonar electronics*

1. *Determine if FPGA is satisfactory to transmit and receive signals.*
2. *Transmit and receive the signal onto an FPGA/or other hardware using supplied transducer and hardware.*
3. *Detect an object underwater.*
4. *Be able to transmit and receive these signals to and from a host computer.*

**Known constraints *(if any)*:**

* Hardware (subject to change)

*ZedBoard Zynq-7000 ARM/FPGA SoC Development Board*

*AFE5812EVM ADC Eval Board*

*FMC-ADC-Adapter*

* Software (subject to change)

Nothing Decided

* Interfaces (subject to change)

*Serial Control Interface*

**Deliverables:**

*-A working Side Scan Sonar unit using development boards (or custom boards) that can transmit, receive, detect, and interface with a host computer.*

**Legal Information:**

Check below if this project involves:

IP Ownership by Sponsor (please contact rlaoulache@umassd.edu)

Non-Disclosure Agreement (please contact rlaoulache@umassd.edu)

**Project Classification:**

Select one of the classifications— Intradisciplinary1 or Interdisciplinary[[1]](#footnote-1):

Intradisciplinary *(select a single discipline)*

Bioengineering

Civil and Environmental Engineering

Computer and Information Science

Computer Engineering

Electrical Engineering

Mechanical Engineering

Physics

Interdisciplinary *(select multiple disciplines)*

Bioengineering

Civil and Environmental Engineering

Computer and Information Science

Computer Engineering

Electrical Engineering

Mechanical Engineering

Physics

**Special Instructions:**

*(To be completed in September by the team that undertakes the project)*

Team Number: ­­­­\_\_\_\_\_\_\_\_

#### Student 1: \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*(Project Manager)*

Student 2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#### Student 3: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_

#### Student 4: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#### Student 5: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#### Faculty Advisor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_

#### Project Mentor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_

1. Intradisciplinary: working within a single discipline.

   Interdisciplinary: integrating knowledge and methods from different disciplines, using a real synthesis of approaches. [↑](#footnote-ref-1)