# Sonar Imaging in an Unmanned Underwater Vehicle (UUV)

#### Texas State University Presentation 9/22/2017



ALAMO COLLEGES DISTRICT San Antonio College



### SAC Undergraduate Research Program (SURP)

- Started in 2010 with one team and increased to six teams this year.
- Over 75 students participated in summer undergraduate research since 2010.
- Students receive a stipend funded by NSF and USDoE grants.
- Created partnerships with the Witte Museum, Texas State University, UTSA, Hays County Emergency Management and other institutions.



### Summer 2017 Team Members



Irene Salazar

Project Manager

Electrical Engineering



Dominic Ochoa

Mechanical Designer

Mechanical Engineering



Julio Banda

Electrical Designer

Electrical Engineering



Eben Pfeil

Lead Programmer

Mechanical Engineering



Cesar Ventura

Programmer

Mechanical Engineering

### UUV Team - Goals and Objectives

Goal: Design a prototype remote unmanned underwater vehicle (UUV) for safe exploration and navigation in turbid water.

- Obj. 1: Develop a small-scale, remote-controlled UUV with an imaging system that can be used to detect objects in confined, sub-aquatic spaces such as shallow water and flooded or submerged structures in clear and turbid water
- Obj. 2: Build knowledge in mechanical and electrical design of underwater robotics and remotely controlled systems
- Obj. 3: Promote STEM to potential engineers and scientists

# Mechanical Preliminary Design

- . Design Matrix led the "sandwich" design
- MaterialsMatrix determined ABS plastic was best for the chassis
- The Humminbird ONIX CI SI drove how the sonar was mounted to UUV
- Designed a 30° angle thruster configuration
- . Designed on SolidWorks then laser cut on ABS
- . Electronics stored in acrylic container





## **Final Mechanical Design**





## Hays County, SMART, Amphib Collaboration

- Tested with San Marcos Area Recovery Team (SMART) divers
- Acquired a sonar from Amphib
- Deep-water testing with rescue divers
- <u>Video</u>



### Future Goals and Objectives for the Project

- UUV improvements:Neutrally buoyant body, lights, arm and improve camera
- Collaboration w/ Hays County, SMART, Amphib, Texas State University and Sound Metrics
- Additional testing in different water environments needed to determine best operational design
- Testing in Fall 2017 with higher resolution sonar (Aris 1200)
- Possible additional features: compass, accelerometer, laser, lights and mechanical arm
- Goal: Fully operational UUV that significantly improves performance and safety of emergency search operations













### Questions?







