

CEEMBA IDR



Product Description

The goal of this project is extremely broad: Develop a mobile underwater system to facilitate the study of bioluminescent plankton.

The system will record stereo video using low light cameras from multiple angles.

In addition, various telemetry, such as depth and salinity will also be recorded.

Product Development Team

Bobby Heyer: Software architecture and file system

Caio: Project lead, system architecture, and camera integration

Eddie Franco : GPS and INS integration

Jovan Hernandez: Media processing

Molly Smith: environmental sensors

Initial Specification

- Computer Vision
 - 2 low light cameras to provide stereo vision
- Sensors
 - Pressure, salinity, temperature and pH sensors
 - compass, GPS, gyro, and accelerometers for position estimation
- Interface
 - contextual button menu
- Storage
 - SPIFI interface for fast SD card writes

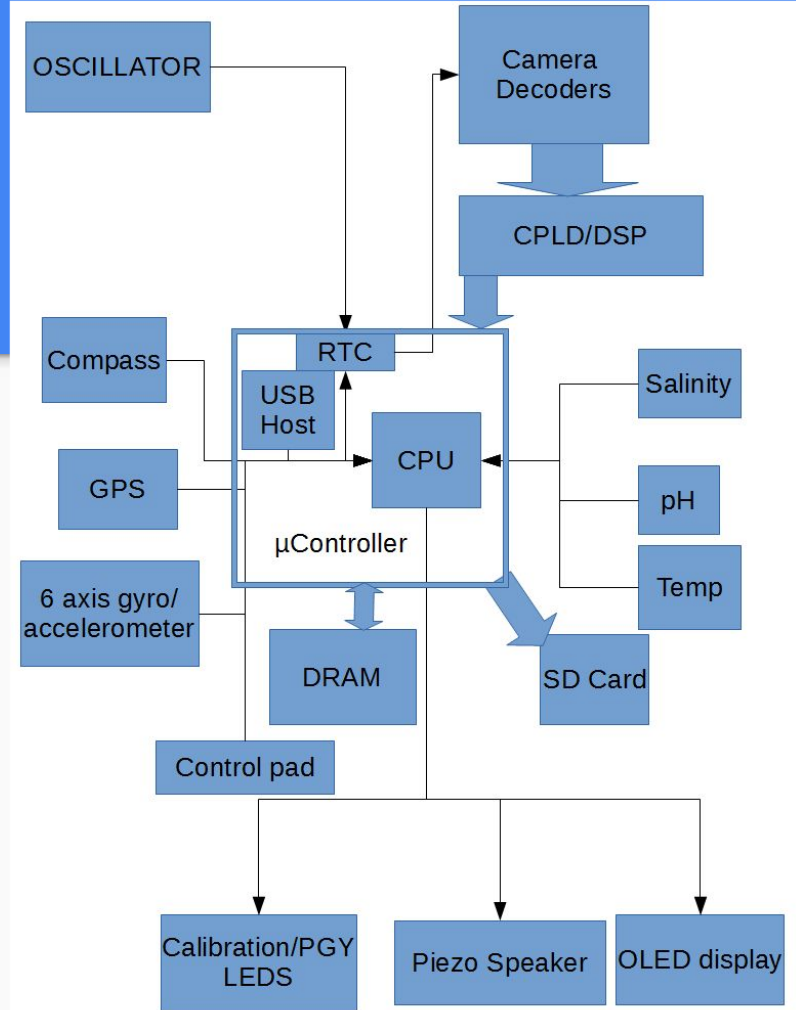
Interface

- 6 buttons total
- 3 options, menu and next
- Play/pause



Block Diagram

May still need CPLD or DSP for decoder



Parts

Gyroscope

ADIS16300AMLZ - SPI interface

Rather expensive (\$117), but quite accurate

May go for something cheaper since can't be used
for inertial navigation



Parts

GPS

TI CC4000GPSEM

\$40

UART interface

Only works on surface



Parts

Pressure sensor

Honeywell 40PC100G1A

Analog out, will require a voltage divider

\$46



Parts

pH sensor

EZO pH sensor

i2c, UART interface

\$100 with standard probe



Parts

Midas MCOC2002AWMRE

Parallel interface

Red to prevent night vision loss

Currently out of stock

Price N/A



Parts

NXP LPC4088

Current uController

May not be able to handle bitrate of 2 cameras

Alternative: Blackfin ADSP-BF542



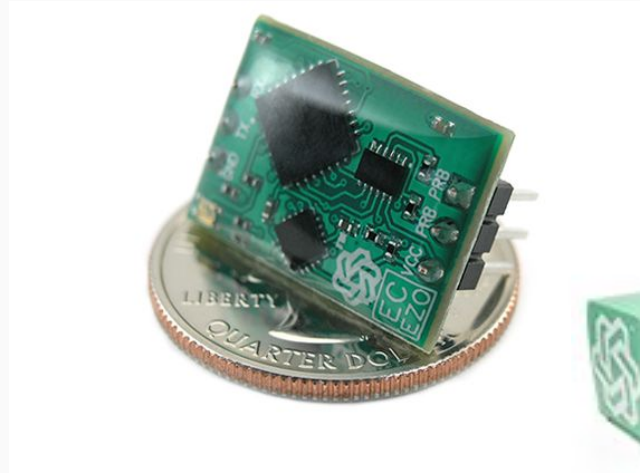
Parts

Salinity

EZO Conductivity Circuit

i2c, UART

\$250



Parts

Compass

Parallax 29133

i2c interface

\$30



Parts

Analog Decoder

Analog Devices ADV7180BSTZ

Need 2

Both have an i2c bus and 8 bit parallel

i2c registers can be shifted with pins so multiple can be on the same bus



Parts

Temp sensor

Ti TMP100

Waterproof board designed by Connor Wolf

free



Critical Elements

- Need to maintain a temporal relation between the two videos being captured
- Must be waterproof
- must be able to be calibrated
- Must have high bandwidth to support video
- Must have high sensitivity cameras

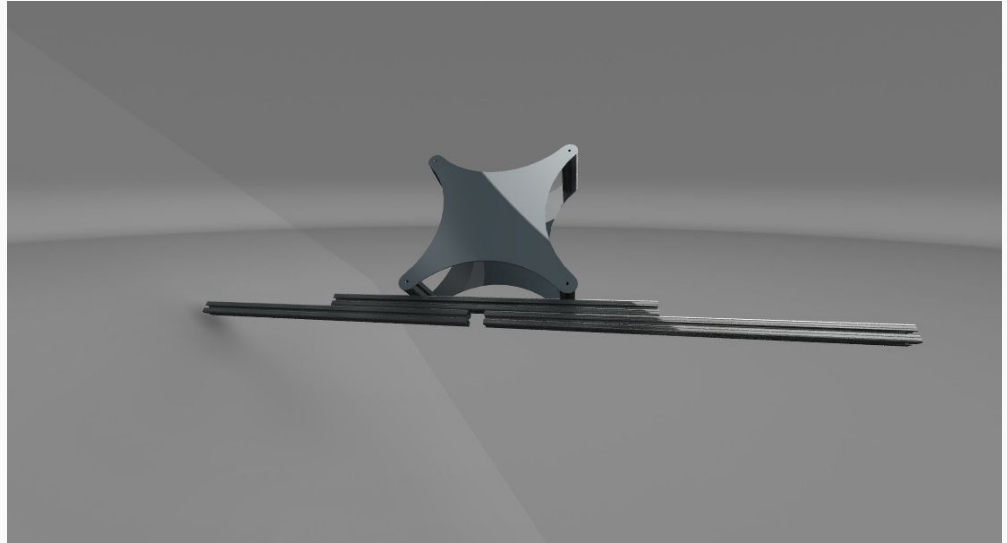
Hardware

Sexton Co for waterproof cases.

Approximate budget: \$1000

Insource design to save on money

Collapsible and modular



Hardware

Camera

Water WAT-910HX

Effective ISO: > 2000000

Still need to find NVD device for M12 lens

\$700

