



COS 495 - Lab 1

Autonomous Robot Navigation

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Semester: Fall 2011



The Iver2 AUV

- Overview of Vehicle Hardware
 - Vehicle Specs
 - Actuators
 - Sensors
 - Internals
 - Modifications
- System Control

Vehicle Specifications

- Length: 127-150 cm
- Diameter: 14.7 cm
- Weight: 21 kg
- Max Depth: 100m
- Max Speed: 4 knots
- Min Speed: 1 knot
- Max Endurance: up to 24 hrs at 2.5 knots

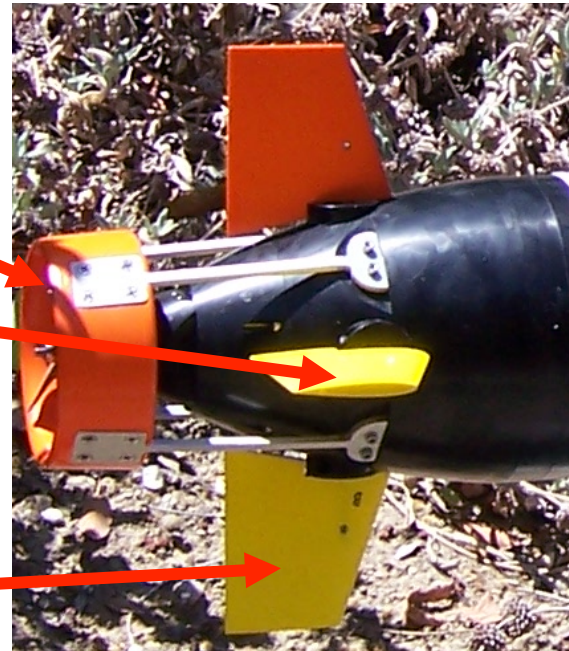


Vehicle Actuators

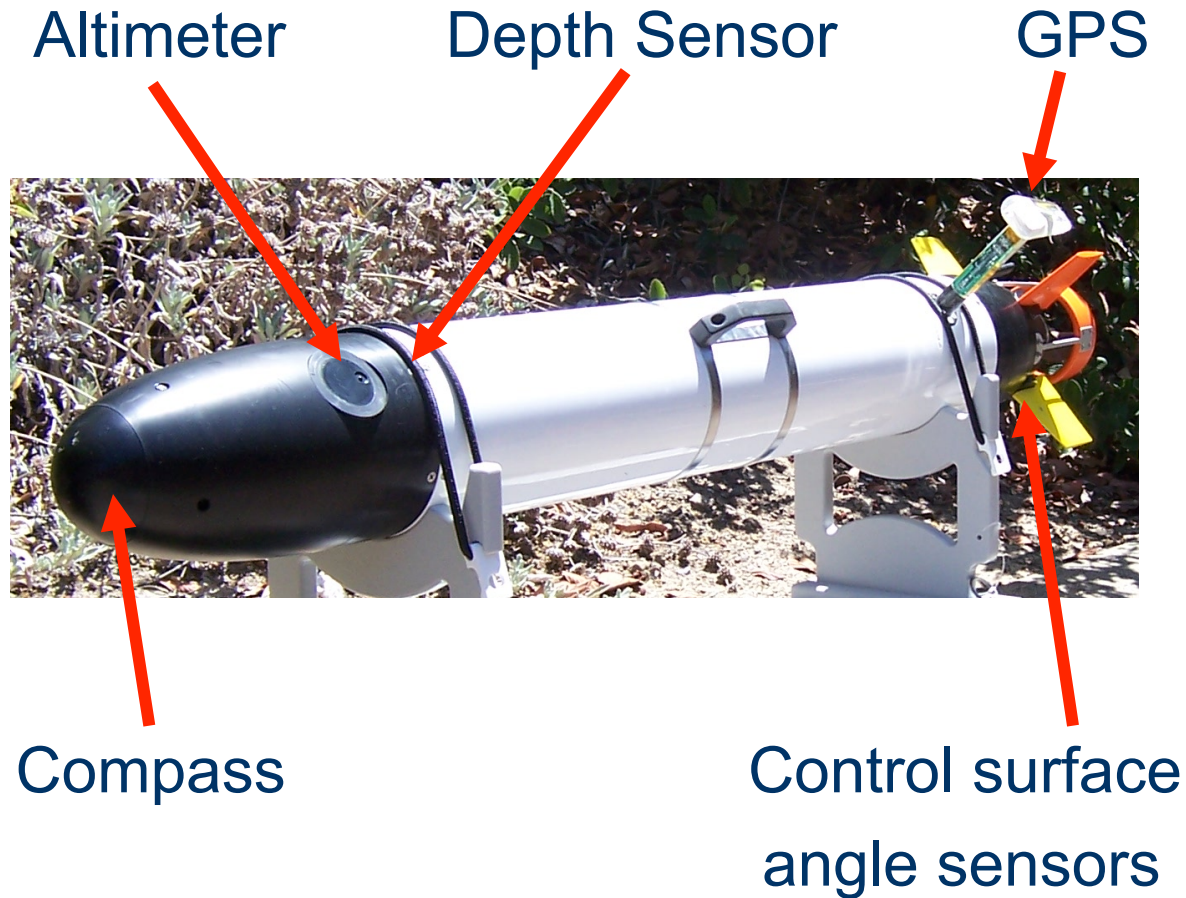
Propeller

2 Horizontal control surfaces

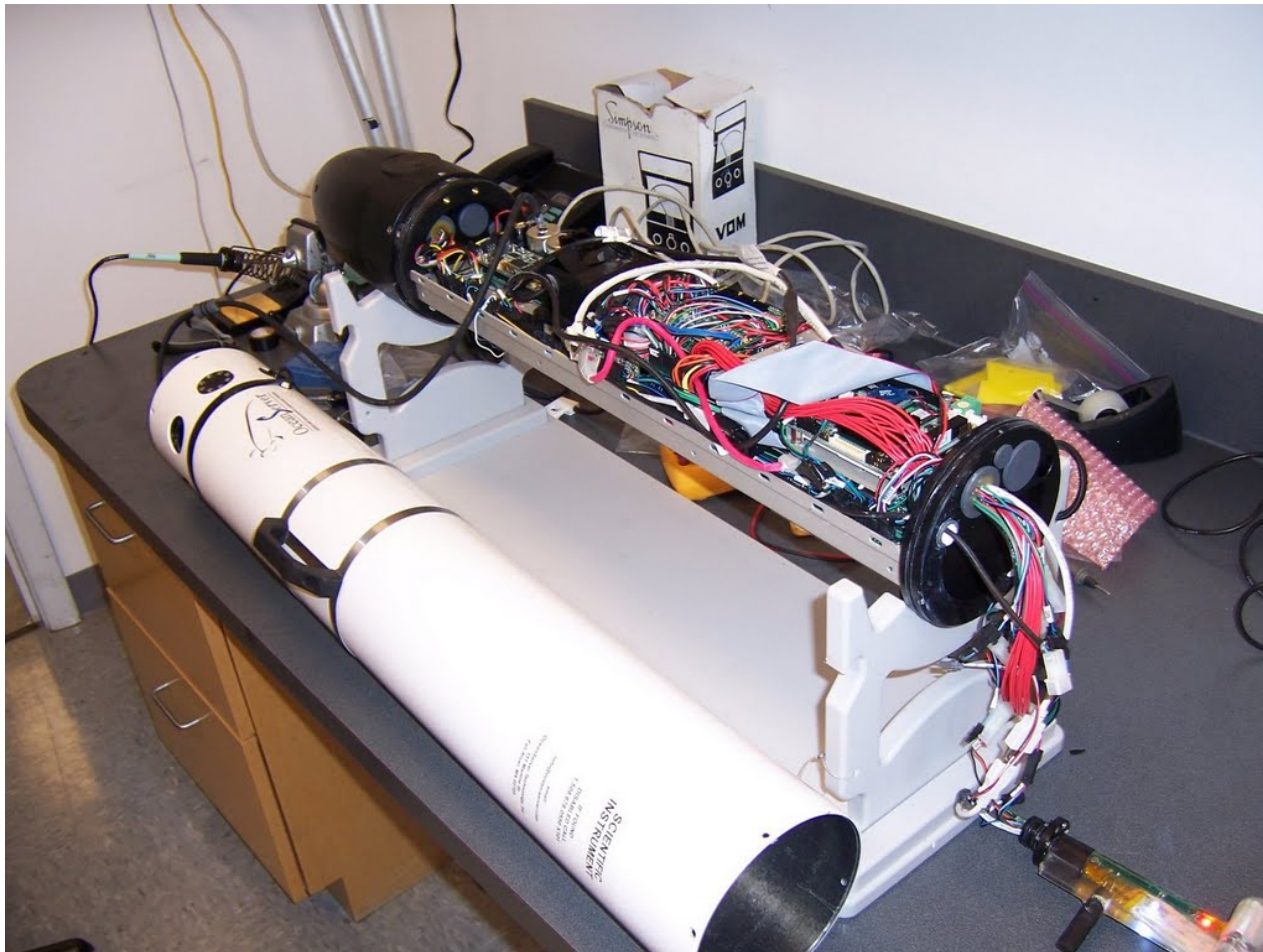
2 Vertical Control surfaces



Vehicle Sensors



Vehicle Internals





Vehicle Modifications

- Secondary Processor
- Altimeter
- Temperature Sensor
- Acoustic Modem
- Oxygen sensor
- Doppler Velocity Log (DVL)
- Video Cameras
- Acoustic Tag Receiver

Vehicle Modifications

Secondary Processor

Iver2 Computer Section

- Main computer, 500Mhz, 512MB mem, 80-160GB disk, 7 Watts power
- (optional) User Computer, same specs, < 5 Watts of power

User Disk

Main Disk

USER CPU

MAIN CPU



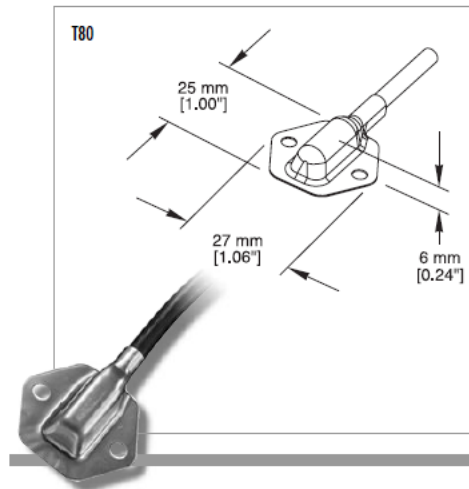
Vehicle Modifications

Altimeter Flip



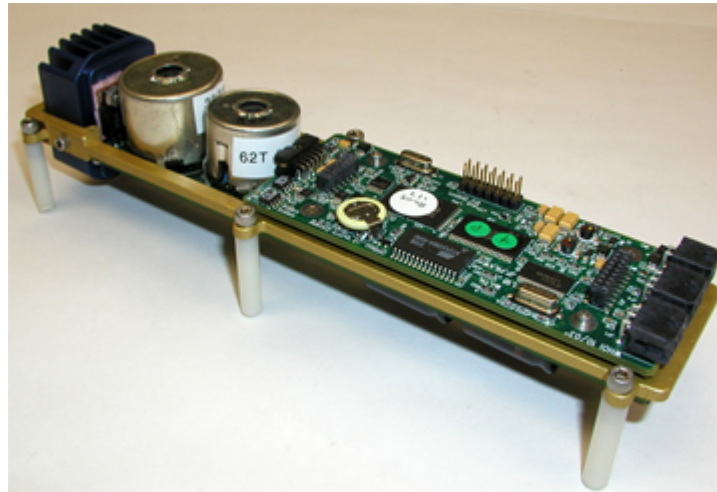
Vehicle Modifications

Temperature Sensor



Vehicle Modifications

Acoustic Modem

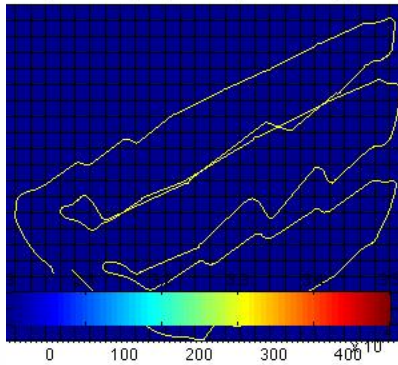


Vehicle Modifications

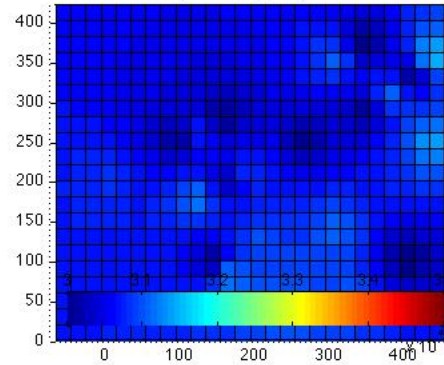
Oxygen Sensor



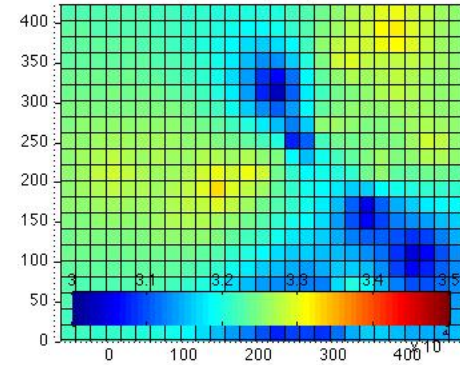
DO2 (microMol/L) - Depth = 0 m, AUV Path in yellow



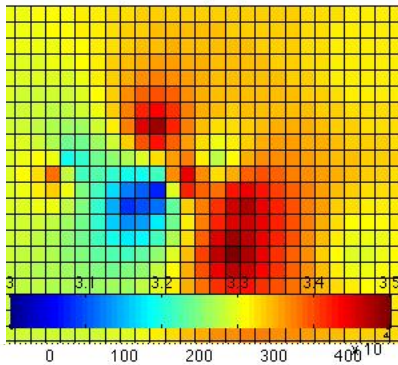
DO2 (microMol/L) - Depth = 2 m



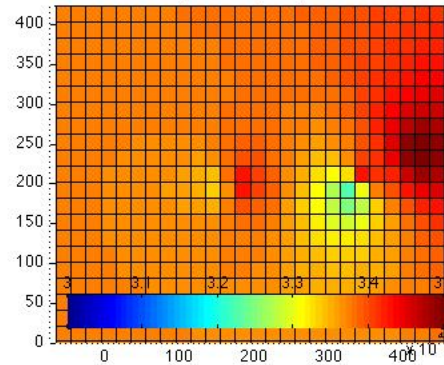
DO2 (microMol/L) - Depth = 4 m



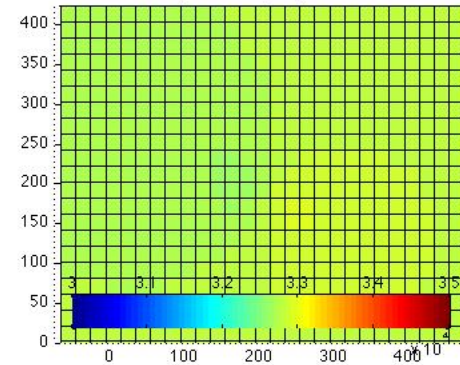
DO2 (microMol/L) - Depth = 6 m



DO2 (microMol/L) - Depth = 8 m

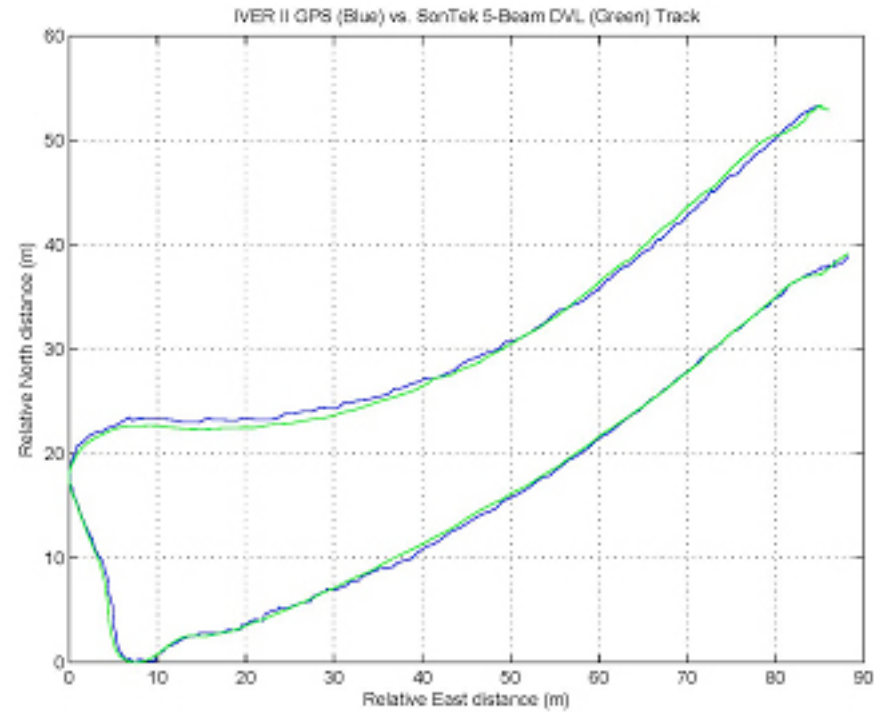
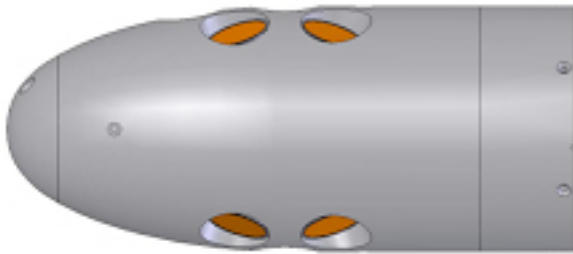


DO2 (microMol/L) - Depth = 10 m



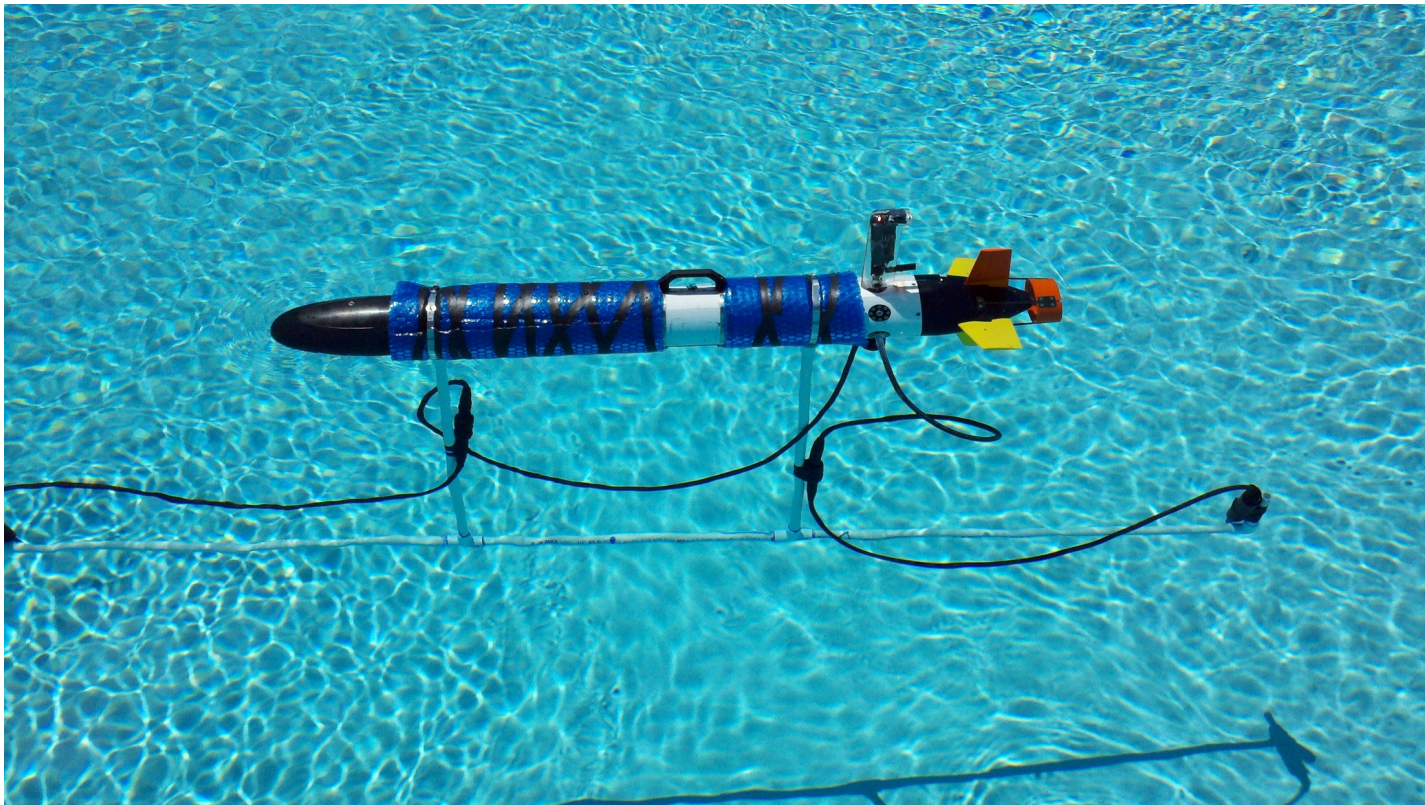
Vehicle Modifications

Doppler Velocity Log



Vehicle Modifications

Acoustic Tag Receiver

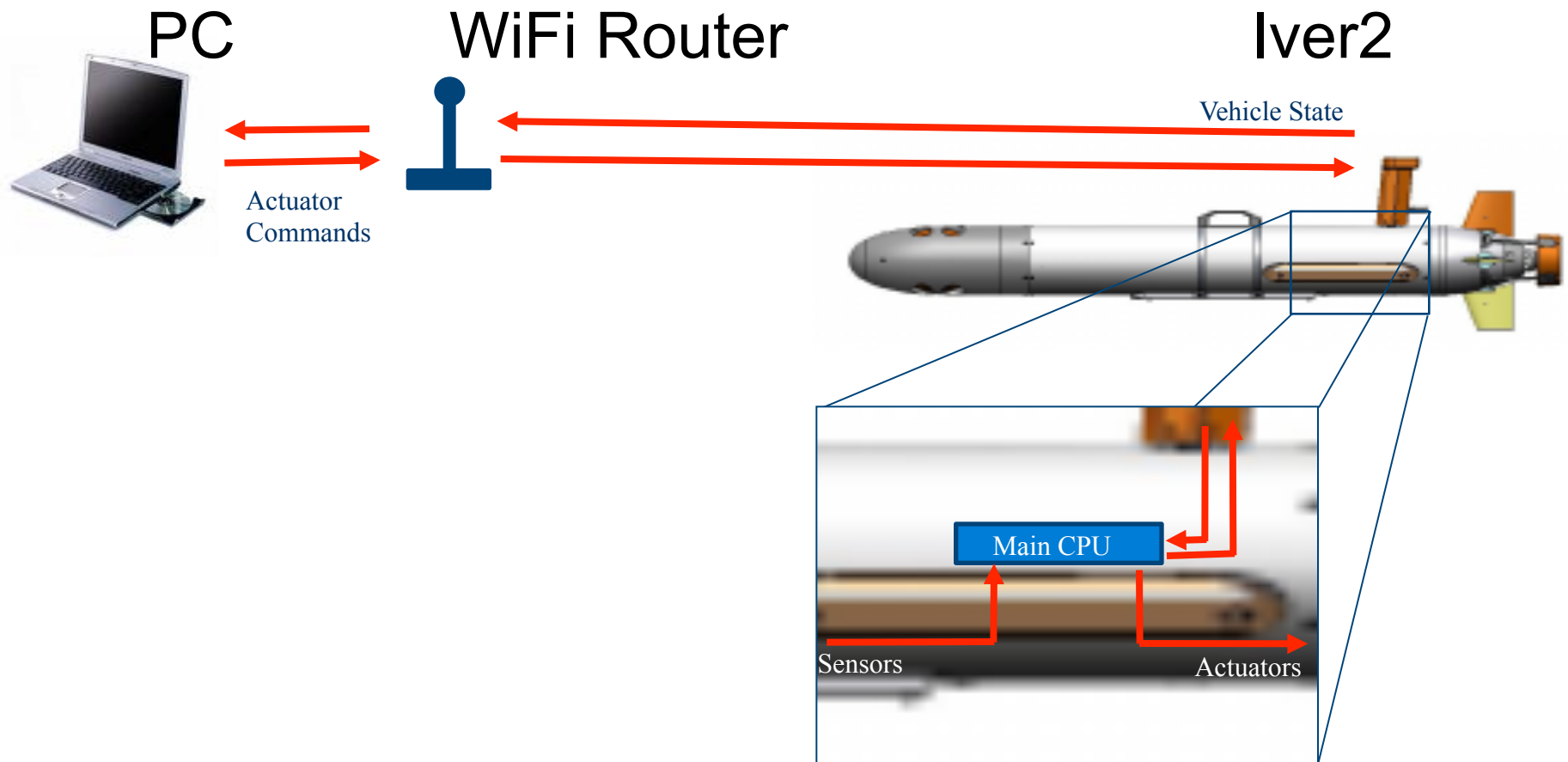




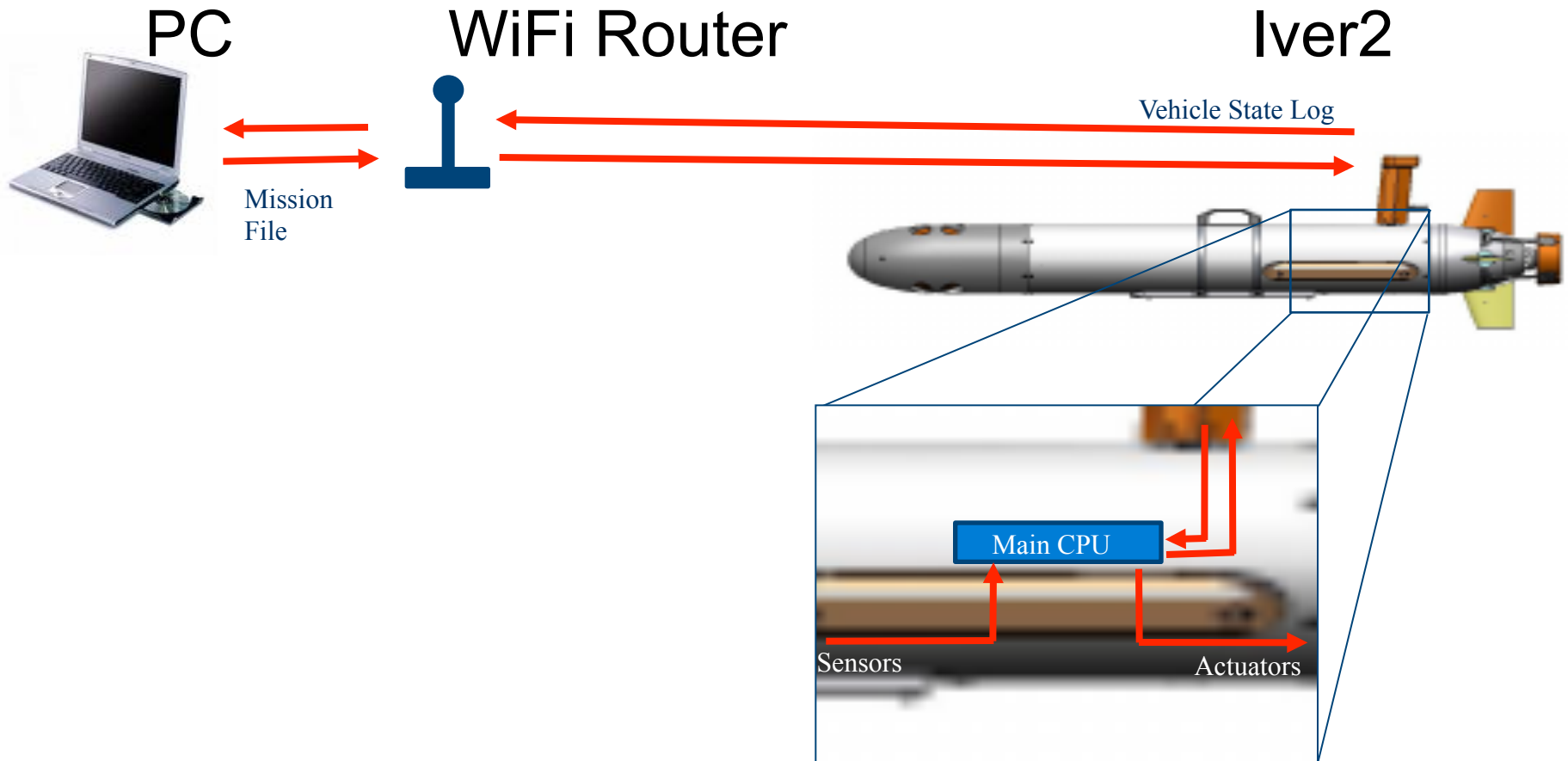
The Iver2 AUV

- Overview of Vehicle Hardware
- System Control
 - Control Flow – Single Processor
 - Control Flow – Secondary Processor
 - Control Flow - Additional Intelligence
- Software Modules

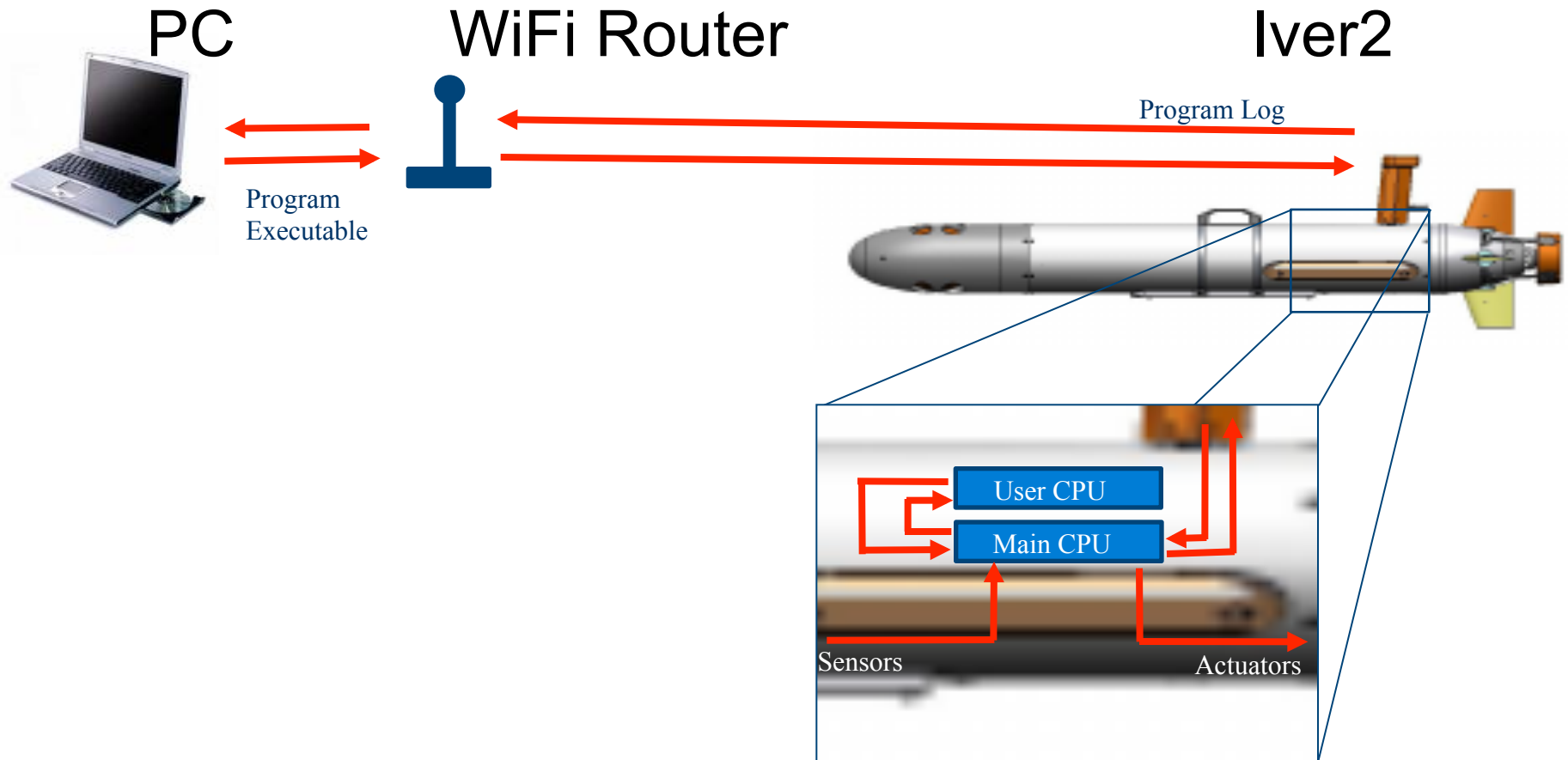
Control Flow: Manual



Control Flow: Mission Download



Control Flow: Intelligence

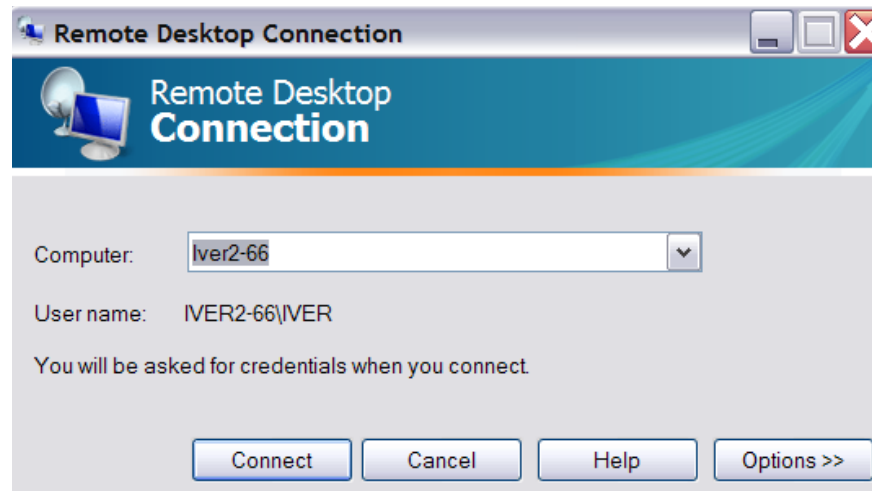


Iver2 AUV

- Overview of Vehicle Hardware
- System Control
- Software Modules
 - Manual Control Software
 - Intelligent Control
 - Mission Control Software

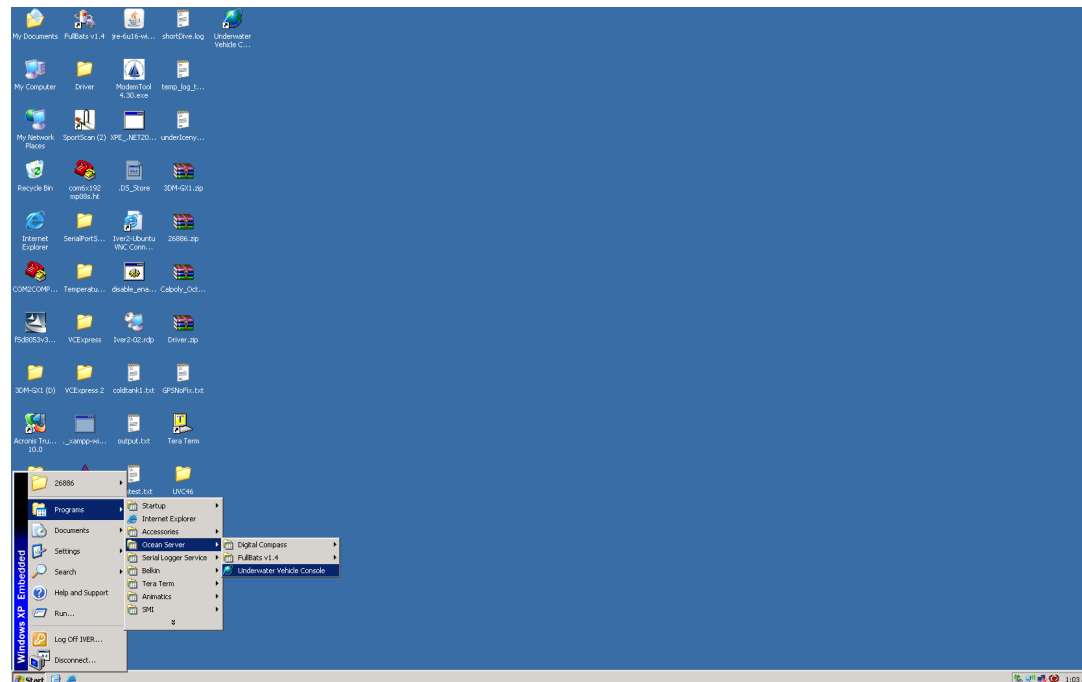
The Iver2 AUV

- Windows Remote Desktop
 - From: Start->Programs->Accessories
 - User: iver
 - Password: i

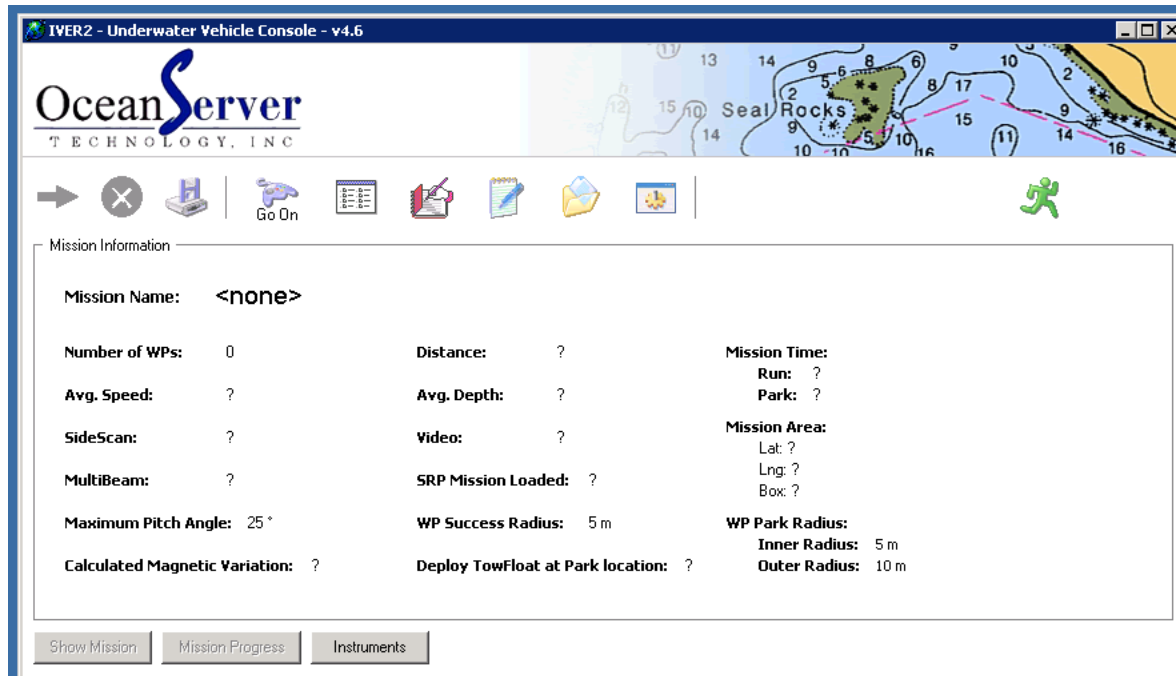


Start Software

- Start->Programs->OceanServer->Underwater Vehicle Console



Underwater Vehicle Console



OceanServer
TECHNOLOGY, INC

IVER2 - Underwater Vehicle Console - v4.6

Seal Rocks

Go On

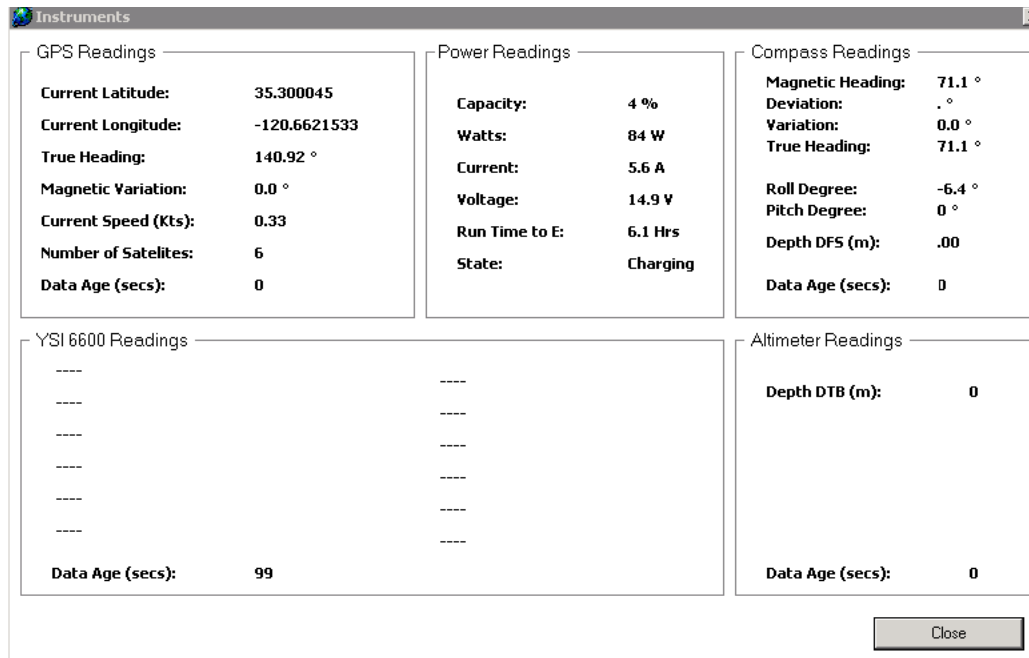
Mission Information

Mission Name: <none>

Number of WPs:	0	Distance:	?	Mission Time:	Run: ?
Avg. Speed:	?	Avg. Depth:	?		Park: ?
SideScan:	?	Video:	?	Mission Area:	Lat: ?
MultiBeam:	?	SRP Mission Loaded:	?		Lng: ?
Maximum Pitch Angle:	25°	WP Success Radius:	5 m		Box: ?
Calculated Magnetic Variation:	?	Deploy TowFloat at Park location:	?	WP Park Radius:	Inner Radius: 5 m
					Outer Radius: 10 m

Show Mission Mission Progress Instruments

Real time Sensor Updates!



The screenshot displays a software window titled "Instruments" with a close button in the top right corner. The window is divided into several panels, each showing real-time sensor data:

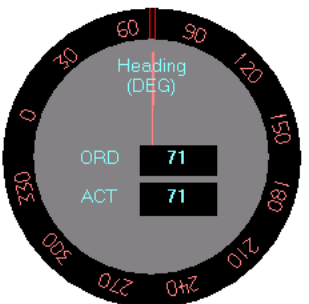
- GPS Readings:**
 - Current Latitude: 35.300045
 - Current Longitude: -120.6621533
 - True Heading: 140.92 °
 - Magnetic Variation: 0.0 °
 - Current Speed (Kts): 0.33
 - Number of Satellites: 6
 - Data Age (secs): 0
- Power Readings:**
 - Capacity: 4 %
 - Watts: 84 W
 - Current: 5.6 A
 - Voltage: 14.9 V
 - Run Time to E: 6.1 Hrs
 - State: Charging
- Compass Readings:**
 - Magnetic Heading: 71.1 °
 - Deviation: . °
 - Variation: 0.0 °
 - True Heading: 71.1 °
 - Roll Degree: -6.4 °
 - Pitch Degree: 0 °
 - Depth DFS (m): .00
 - Data Age (secs): 0
- YSI 6600 Readings:**
 - Five rows of data are shown as "----".
 - Data Age (secs): 99
- Altimeter Readings:**
 - Depth DTB (m): 0
 - Data Age (secs): 0

A "Close" button is located at the bottom right of the window.

Drive By Wire!

Manual Mode

Current Position and Heading

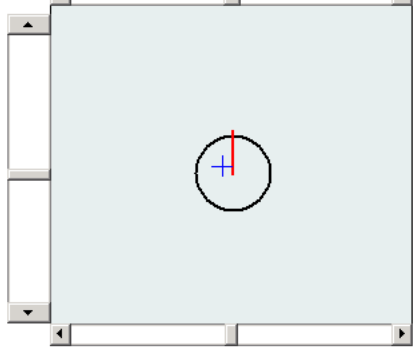


Latitude: 35.300045
Longitude: -120.662153333333

Manual Control

Speed:

Yaw (Left - Right):



Roll:

Pitch Control:

Stop and Close Manual Mode

Drive to Location

Enter Coordinates (decimal degrees only)

Latitude:

Longitude:

Status:

Distance to Target Location (m):

Debug Information Fins and Motor

Pitch Fin Left:	90	Yaw Fin Top:	128
Pitch Fin Right:	90	Yaw Fin Bottom:	128
		Motor Speed Value:	128

Manual Control Software





Manual Control Software

Manual Control Demo!