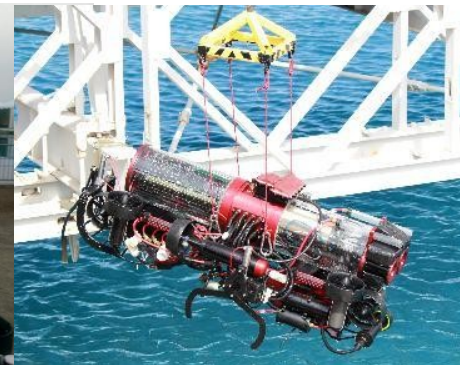
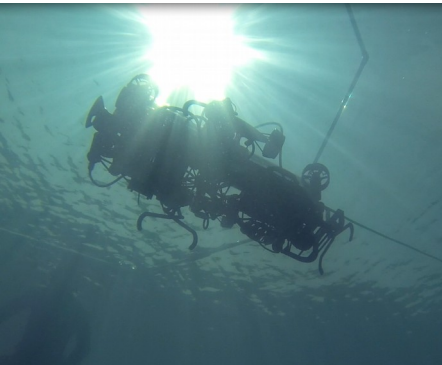




CORNELL UNIVERSITY AUTONOMOUS UNDERWATER VEHICLE

Mission Optimization & Testing

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Overview: Mission Optimization

“Utility Maximization” - utility \approx points

Note: Not exactly (placement \sim ranking)

But a reasonable approximation

Constraints

Time

Submarine capabilities

Ordering

Failure chance



Economic Maximization

Set of possible choices

What tasks can we do?

Associated outcomes

How many points will we get?

Considerations

What tasks have we done (repeating is useless)?

How likely are we to complete a task successfully?

Where are we (travel time)?

What do we need to do in a certain order (multi-stage tasks)?



Dynamic Selection

Situation changes as the mission proceeds

We probably can't predict our performance perfectly

Sub needs to continuously choose next “task”

Makes sense to split some tasks further – want “point unit”

This can lead to some interesting behavior!

(but correct)

Used by CUAUV this past summer



Overview: Testing 101

Most problems at TRANSDEC are not conceptual
(sadly)

One part of doing well is covering bug possibilities

Test goals: Error coverage

- Eliminate as many potential error cases as possible before TRANSDEC

- Ensure you can complete full missions in your testing area

- Simulate TRANSDEC to whatever extent possible



Goals

Preventing later failure

Bug testing – can we do it, as we have planned, successfully?

Error simulation – what happens if the IMU is off-axis (e.g.)?

Backup plans – what if we can't see the torpedoes target?

(ability to optimize mission useful here)

Adaptability to different fields / layouts

(TRANSDEC-specific, read the rules)

Other plans

Team logistics

TRANSDEC testing methodology



Particulars

Potentially invariant

- Sheer time (“in-water”)

- Environmental suitability

Less so

- Methodology (team-dependent)

 - Simulate errors

 - Don't just “test what works” - focus time on what doesn't

- Have backup plans



Questions?