Enabling Future Autonomous UUV Operational Networks

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Introduction

Who are OPT? - The world leader in “scalable” wave energy conversion technology (WEC)

What do we do? – OPT delivers innovative WEC energy solutions that cross industry boundaries

What is our strategy and vision? - to redefine how power is generated and used offshore in the Marine environment over the next 25 years.

Why are markets sectors with marine operations interested? – The delivery of energy for marine based operations is time consuming and expensive. Operational solutions and innovation are constrained by the cost of energy delivery and its availability.
The Littoral Expeditionary PowerBuoy (LEAP) System is established to enhance the Navy’s Anti-Terrorism /Force Protection (ATFP) by providing persistent afloat and port maritime surveillance in the near coast, harbours, piers and littorals worldwide.

Case Study: US Navy Offshore Data Platform

New York Harbour
Case Study Result: Improved performance

Integration of sensors to a stable reliable platform delivered an enhanced system with more accurate, high definition data to enable effective operational decisions.

Before

After

Amalthea Detections out to 20 km

Amalthea Detections out to 40 km

Doubled the detection range with use of LEAP

Track of Hurricane Irene
APB350 Commercial Development Path

Development Focus
- Safety
- Reliability
- Minimal Operational Cost
- Plug & Play functionality

Higher Power & 2/3 size & weight
TAP – Technical Advisory Panel

• Seven members:
  • Gardline Marine Sciences,
  • DNV GL,
  • University of Western Australia (UWA) Centre for Offshore Foundation Systems (COFS),
  • Two major O&G operators,
  • International O&G equipment manufacturer
  • Leading meteorological and oceanographic sensor manufacturer.

• Formed to intensify efforts to accelerate PowerBuoy™ commercialisation and market adoption

• Consists of selected potential customers, end-users, technical stakeholders, and scientific consultants from various markets to achieve a wide spectrum of opinion.

• Purpose: To review and provide valuable industry feedback on market and application requirements and test protocols in order to increase speed to market. This long term collaboration is initially focused on the APB350.
## Deployment Data August 2015 – Present (still deployed)

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Highest Hourly Day (kW)</th>
<th>Highest Day Total (kW h)</th>
<th>Deployment Avg. (W)</th>
<th>Deployment Total (kW h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generator Power</td>
<td>1.349 (10 Jan)</td>
<td>32.3 (10 Jan)</td>
<td>475</td>
<td>1300</td>
</tr>
</tbody>
</table>
Current AUV Operational Challenges

• Deployment/Recovery
  • Normally from a host ship using a special mechanism that often has limitations above sea state 3 or 4
  • Long transit times for ship to get on station and potential weather delays

• Power
  • Operation is normally via re-chargeable Lithium batteries that have an operational life of 8-12 hours

• Communications
  • Achieved via the AUV resurfacing to transmit information, or downloaded once recovered onboard host ship
  • Pre-mission programming is conducted onboard host ship prior to deployment

• Size
  • Using man portable AUV’s limits use and operational capability (batteries, types of sensor etc..)
Future - Prepositioned AUV Networks
OPT Enables....

- **Power**
  - The APB-350 provides constant reliable power generated from waves to the AUV via the garage for recharging for long term deployments.
  - The power can be constant or in “bursts” or both

- **Communications**
  - The APB-350 offers a real time communications path from the remote operator in his office for mission programming and data retrieval
  - The APB-350 provides real time health check updates to enable proactive maintenance and servicing.

- **Simple Cost Effective Operations**
  - Currently, garages are connected to offshore infrastructure such as FPSO’s or rigs limiting their areas of operation. The APB -350 enables operation in remote areas with no infrastructure e.g. for pre-development site surveys
  - AUV missions can be conducted and concluded in hours rather than days with valuable data delivered to the operator quickly
AUV Garage

[Diagram of AUV Garage and dock interface section]
AUV Garage configuration
Future AUV Networks– Enhanced operations

“Better, quicker data leads to more effective operational decisions and use of assets”

• **Increased operational readiness**
  - Dial up access enables deployment of AUV in matter of minutes rather than days

• **Power**
  - Continuous charging of the AUV enables increased operation
  - Quicker charging as no need to recover AUV or change out batteries

• **Communications**
  - Real-time mission programming and data upload to desk to anywhere in the world
Thank You & Questions

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