

Evening Technical Meeting: The Future of Subsea Autonomy

Report on SUT Perth Branch Evening Technical Meeting
Wednesday 12th June 2019

By Allan Devlin, Perth Branch Phoenix Special Interest Group (SIG) Chair

The June 2019 SUT technical evening at the Parmelia Hilton was opened by SUT Perth Branch Vice-Chair, Mark Casey and chaired by SUT *Phoenix SIG Chair Allan Devlin*.



The event was kindly sponsored by Atteris, BlueZone Group and presenter Marine Advanced Robotics.

USV “sheep-dogging” AUV was presented by Lieutenant James Keane, Capability Realisation Engineer with the Royal Australian Navy (RAN). The presentation gave an overview of Autonomous Warrior 2018 (AW18), an international exercise in co-operative marine autonomy, which provided an opportunity for the RAN to develop and demonstrate experimental capability in conjunction with industry and academia. A 16’ Wave Adaptive Modular Vessel (WAM-V) was developed and deployed as an Unmanned Surface Vessel (USV) ‘sheepdog’ for an Autonomous Underwater Vehicle (AUV), whilst also acting as a test-platform for new control behaviours and autonomy software. LEUT Keane explained how he was first involved with automating WAM-V in 2014, conducting first-principles research into the manoeuvring coefficients that were then used to develop a mathematical model of the WAM-V for simulations and the control system. In 2018, a fresh WAM-V was automated in a matter of months by integrating a control system from Ocuis Technology Ltd, which was then able to integrate with a wider command and control system that aimed to demonstrate control of a multi-platform fleet. As a member of the AW18 fleet, the WAM-V also demonstrated enhanced capability, such as real-time object identification using machine-learning algorithms developed in-house.

Multi-domain (Air, Sea and Subsea) Unmanned Maritime System of Systems Approach to Expeditionary Mine Countermeasures was presented by Mark Gundersen, Chief Executive Officer of Marine Advanced Robotics. The presentation showcased how Marine Advanced Robotics, in cooperation with their technology partners, demonstrated to the US Navy an unmanned System of Systems approach to expeditionary mine countermeasures. The unmanned System of Systems presented included two types of unmanned subsea vehicles, two types of unmanned surface vehicles, and an unmanned aerial vehicle, all working in coordination to achieve a complex task. The intent was to expand the operational effectiveness beyond any of the individual vehicles by utilizing synergistic capabilities, while simultaneously decreasing overall cost with a network of affordable systems. The presentation provided an overview of the system integration required for the multiple systems approach, discussed the results and lessons learned, and explored future enhancements.

Evaluating Autonomous Systems was presented by Lieutenant James Keane, Capability Realisation Engineer with the RAN. The RAN was described as being in an experimental phase with Marine Autonomous Systems (MAS), and rapidly learning the core challenges with operating complex capability such as Autonomous Underwater Vehicles (AUV). Before new AUV systems can be deployed, they must be tested and proven ready for integration with the existing organization and fleet. The presentation showed how MAS will inevitably play an increasing role for future maritime operations and warfare, but that they must first become trusted assets that complement organizational culture and capability. This was highlighted as a global challenge for organizations using AUV, where robotics control systems are becoming smarter, yet the rest of the organization may not be prepared for their effective employment. Operational Test & Evaluation (OT&E) was described as the means to determine readiness of the overall system for operations. OT&E of probabilistic systems such as AUV is notoriously difficult. Yet it is increasingly critical to the achievement for effective and efficient operations that technical capability must be understood and characterized in the context of both the user organization, and the specific mission. The presentation explored the approach taken in designing a repeatable, comparable OT&E framework and experiments conducted to determine suitability and readiness of AUV for operations.

After each presentation, there were questions from the floor which allowed each presenter to provide some detailed insights into their presentations. The presentations and whole evening were well received by the 124 attendees.

Thank you to the SUT members, new members and guests for their attendance during the evening, especially to the two presenters that volunteered their time to speak at the event. I would like to conclude by again thanking our ETM sponsors, Atteris, BlueZone Group and Marine Advanced Robotics for their valuable financial support without which these evenings would not be possible.