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ABSTRACT

Four research groups, the Autosub group at Southampton Oceanography Centre, The Center for Ocean Technology in the Marine Science Dept. at USF, the Advanced Marine Systems Group in Ocean Engineering Dept. at FAU, and the AUV group in the Mechanical Engineering Dept. at NPS, have all adopted the LONTalk protocol as a control and sensor bus for connecting sensor and actuator systems in their respective autonomous underwater vehicle and oceanographic sensor systems.

Ongoing collaborative efforts between the groups have benefited from the adoption of a common communications interface between sensors and other subsystems. In particular, the LONTalk protocol running on a network of Neuron chips has proven to be a reliable, flexible, cost effective system for developing, integrating, and testing relatively complex automated systems such as AUVs. Recent meetings between the groups have reinforced the commitment of the researchers to continue and expand use of the technology and work toward increased cooperation. One primary benefit of this common approach has been more effective use of scarce R&D resources through more easily sharing technology between groups. Examples include plug and play integration of common subsystems such as DVL, PH, and other sensors. In addition we are defining standard network variable types for increased interoperability between dedicated and mission configurable subsystems to reduce integration and reconfiguration time. The commonality of the low level architecture engendered by the LONTalk network has also resulted in us adopting compatible systems for data logging and mission specification.

In addition to the advantages of sharing technology, practical experience has shown that an intelligent distributed control architecture reduces the development time and effort required to design, build, test, and field an AUV compared to more traditional approaches. For example, testing time for the SOC Autosub-1 to go from tethered operation to full autonomy was under 6 months. The other groups have had similar experiences.

The success of this collaborative effort has inspired the questions of whether or not the AUV and Oceanographic community in general would benefit from a more wide spread adoption of a common control and sensor bus standard? Should LONTalk be that standard? This paper will describe some of the experiences of the 4 groups in using LONTalk in their R&D efforts and how this has facilitated cooperation and technology sharing. We will discuss some of the issues associated with common standards such as migration, cost and performance, interoperability, and resource leveraging. We will consider as well system design benefits of using a distributed control network vs. conventional centralized control systems, and compare also other potential candidates, such as CAN, for a standard control and sensor bus.

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