

Coordinated Distributed Mobile Sensors and How to Measure Their Performance

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Abstract: At present dramatic advances are seen in sensor and multi-sensor fusion techniques, in networking and multi-agent system design, and in capabilities of robotic platforms in terms of robustness and endurance. Applications for autonomous surveillance appear on the horizon, especially wanted for hazardous or dangerous environments. However, whilst for each subsystem measurements of performance exist (e.g. Receiver Operating Characteristics for sensors, data rate for networks, energy efficiency for a robotic platform), we have to find also a systematic approach on how to construct measures of performance for an entire system of distributed sensing robots. Having such a methodology available would allow the comparison of complete systems which are designed with different emphasis on sensor quality, collaboration tactics and platform capabilities, finally resulting in profound investment decisions. In this paper, we discuss two example applications, in underwater surveillance and in logistics, respectively. Furthermore, we describe the recent effort of the “Distributed Mobile Sensors Interest Group” (DMSIG) for which a roadmap towards collaborative work has been proposed. A first aim of this collaboration is to comprehensively understand how better coordination between platforms can compensate lower sensor quality.