Ph.D. in Information Technology: Thesis Defense

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online by Teams – at 14.30

Mattia BRAMBILLA – XXXIII Cycle

"Sensor-assisted cooperative localization and communication in multi-agent networks"

Advisor: Prof. **Monica Nicoli**

Abstract:

This doctoral thesis presents research advances on cooperative localization and communication. These two macro trends are investigated in multi-agent networks, where time-varying agents of unknown absolute location are asked to fulfill positioning and information sharing tasks.

The research on localization aims to develop an integrated solution where cooperative self-localization of agents is combined with multitarget detection, localization and tracking, where targets represent valuable information to be used to refine the agents' positioning. Cooperative localization is addressed in maritime and vehicular scenarios.

The research on communication is focused on vehicular applications, and it concerns explorative studies on sensor-assisted beam alignment techniques for beam-based communications at both Millimeter-Wave (mmWave) and Free-Space Optics (FSO),. Inter-vehicle cooperation and intra-vehicle sensor data fusion are combined in a unified system targeted to guarantee reliable communication links in mobility scenarios.

Both macro-researches deal with a tight integration of heterogeneous sensors with communication in dynamic multi-agent systems. The volatility of interconnections among agents due to mobility and instability of links mandatorily calls for flexible and adaptive techniques, capable of profitably fuse diverse types of information. The outcomes of this thesis demonstrate how a statistical approach is capable of handling realistic problems and developing versatile solutions to be applied in real systems.

PhD Committee

Prof. **Umberto Spagnolini**, DEIB
Prof. **Davide Dardari,** Universita' degli Studi di Bologna
Prof. **Giovanni Del Galdo,** Ilmenau University