

Ph.D. in Information Technology: Thesis Defense

October 8th, 2021

**Sala Conferenze “Emilio Gatti” and online by Teams
at 10.00**

Davide SCAZZOLI – XXXIII Cycle

Design of a UAV based localization system for public safety networks

Supervisor: Prof. Maurizio Magarini

Abstract:

The high mobility of Unmanned Aerial Vehicles (UAVs) has afforded them uncontested superiority in several civil and military applications. One of which is the rapid, on-demand deployment of communication infrastructure, which is an invaluable assets for handling emergencies or military actions among many other applications. With increasing usage of UAVs for such purposes, the need for adding even more features to their repertoire is ever more present. One such feature is the ability to localize RF transmitters, either for the purpose of finding people in search and rescue operations or identifying the presence of enemies on the battlefield. The main objective of this thesis is the design of a localization system that can be fitted to UAVs and is designed for the scope of supplementing the features of Public Safety Networks (PSN). While most UAV based systems in the literature are based on measures of signal strength, this thesis takes a novel approach and attempts to implement an angle of arrival based one. The main problematics of this approach, concerning the impairments of related to transmission in non Line-of-Sight (LoS) conditions are discussed, and a machine learning approach that achieves state-of-the-art accuracy on an antenna array small enough to be fitted to a UAV is provided. Taking advantage of UAVs' mobility, an analytical evaluation of typical aerial survey movement patterns, for the purpose of maximizing the number of transmissions that happen in LoS, is provided. Finally, experimental set-ups based on commercial-off-the-shelf products are provided.

PhD Committee

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