

**Ph.D. in Information Technology  
Thesis Defenses**

**February 24, 2023  
at 14:00**

**Room Seminari "Nicola Schiavoni"**

**Michele BOLOGNINI – XXXV Cycle**

**CONDITION MONITORING OF THE BUILT ENVIRONMENT WITH MULTICOPTER NETWORKS**

Supervisor: Prof. **Lorenzo Fagiano**

**Abstract:**

Unmanned Aerial Vehicles have been among the hottest technology trends of the last two decades. Their versatility is testified by their widespread adoption in several different fields.

Within a rich research field, we present novel theoretical results and experimental applications of such technology in the inspection of the built environment.

First we focus on high-level control and mission planning for tethered and non-tethered UAV networks, then we introduce novel techniques for vision-based energy efficiency estimation and modal analysis.

**Danilo SACCANI – XXXV Cycle**

**MODEL PREDICTIVE CONTROL FOR CONSTRAINED NAVIGATION OF AUTONOMOUS VEHICLES**

Supervisor: Prof. **Lorenzo Fagiano**

**Abstract:**

This dissertation investigates safe navigation for autonomous vehicles by designing a regulator that balances the trade-off between safety and exploitation and considers the exploration problem of an unknown environment. The design of motion planning algorithms for safety-critical applications must consider this trade-off, and among the different approaches for dynamic path planning, discrete optimization approaches, such as Model Predictive Control (MPC) schemes, have received broad attention thanks to their ability to manage state and input constraints (safety) while minimizing a user-defined cost function (exploitation). The thesis's contribution is twofold: provide a theoretical framework for constrained navigation of autonomous vehicles and show potential applications of this framework in practical scenarios where different kinds of constraints are considered.

**PhD Committee**

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Prof. **Daniel Limon**, Universidad de Sevilla