

# Tommaso Belvedere

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## Education

- 2020– **PhD Program in Automatic Control, Bioengineering and Operations Research**, *Sapienza University of Rome*.
- 2018–2020 **MSc in Control Engineering**, *Sapienza University of Rome*, 110/110 cum laude.
- 2015–2018 **BSc in Electronics Engineering**, *Sapienza University of Rome*, 110/110 cum laude.
- 2010–2015 **High school degree**, *Liceo Scientifico Statale Giuseppe Peano*, 100/100.

## Master thesis

- Title *A Model Predictive Control approach to safe vehicle control using Control Barrier Functions*
- Supervisor Giuseppe Oriolo

## Publications

Paolo Di Giamberardino, Barbara Bazzana, Tommaso Belvedere, and Daniela Iacoviello. An optimal control approach to public investments for unemployment reduction. In *2019 23rd International Conference on System Theory, Control and Computing (ICSTCC)*, pages 744–749. IEEE, 2019. <https://doi.org/10.1109/ICSTCC.2019.8885645>.

## Computer skills

- Programming languages Python, MATLAB, C/C++
- Operating systems Linux, Windows
- Tools Git, Vim
- Other software acados, V-REP, L<sup>A</sup>T<sub>E</sub>X, MS Office, Keras, OrCAD PSpice

## Languages

- Italian Native
- English Fluent (written and spoken)

## Personal skills

Team working, independent learning, critical mindset.

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## Relevant Projects

### **Acrobot swing-up using Iterative LQR Model Predictive Control.**

Study and implementation of a nonlinear trajectory optimizer based on iLQR for nonlinear unconstrained model predictive control. Application: Acrobot swing-up manoeuvre. (MATLAB)

### **Graceful Posture Regulation for Unicycle Robots.**

Study of a feedback posture regulator targeted towards autonomous wheelchairs. Extension to reorientation with backward motion and motion planning with primitive-based RRT. (Simulink)

### **Range-only SLAM using Gauss-Newton optimization.**

Implementation of a sparse least squares solver for landmark-based SLAM with range measurements and odometry, defining the state and measurement spaces on the respective manifolds for a singularity-free solution. (Octave)

### **Minimum-time motion along Cartesian paths for redundant robots.**

Study of the time optimal path parametrization problem based on Reachability Analysis for the KUKA LWR manipulator. Implementation of inverse dynamics and optimal path generation with emphasis on the computation time. (Python)

### **Optimal Control Analysis of Unemployment using Pontryagin's Minimum Principle.**

Study and proposal of different policies for unemployment reduction and performance indexes based on the iterative solving of Pontryagin's Minimum Principle. (MATLAB)

### **Digital satellite attitude control.**

Simulation and comparison of different discrete-time equivalent controllers and state observers, as well as state space control in the discrete-time domain via output feedback for the single-axis attitude dynamics. (MATLAB)

### **5G Load Balancing.**

Proposal of Reinforcement Learning strategies for load balancing in heterogeneous 5G networks with focus on Quality of Experience.

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## Extra

- 2018 Student representative for the degree in Electronics Engineering at Sapienza.
- 2015– Tutoring of several high school students in mathematics and physics.
- 2015 Participation to the XVI National Team Finals of the Italian Mathematical Olympiad in Cesenatico, 8-9 May 2015.