# Nicola **Franco**

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## Experience

**Toposens-GmbH**                                                                     *Munich, Germany*
Robotics Engineer (Internship)                                          *Sep. 2019 - Feb. 2020 (6 months)*

A 3D ultrasound sensor is able to extract a point cloud from a near-field environment for slowly moving robots. With well-known machine learning techniques, I have created a surface classifier in a three steps procedure: segmentation, fitting and classification.

https://toposens.com/

- Creation of a surface classifier with cutting-edge machine learning techniques.
- Design and development of a constrained least-squares algorithm in python, applied after segmentation.
- Built a plugin in Gazebo (C++) to simulate the model and classify several different surfaces.
- Wrote a scientific paper to explain the model and show the result associated.

**National Institute for Nuclear Physics, Legnaro national laboratories, INFN - LNL**        *Padova, Italy*
Mechatronics Engineer (Internship)                                     *Feb. 2017 - Sep. 2017 (8 months)*

An automatic storage facility of exhausted targets used to allow a drop in radioactivity. The movement was fully autonomous, from target extraction until the storage phase. A prototype of the deposit system has been designed and implemented.

https://www.youtube.com/watch?v=lCyCAb-AQD0

- Logic design for the control of brushless motors with the PLC and sensors implementation for axis position detection.
- Development of a supervision system with Scada as HMI. Documentation the storage usages and procedures.

## Projects

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|---|---|
| **Distributed controls** | • Implementation in **Gazebo** (C++) of the distributed version of the well-known simplex algorithm, for a tasks assignment problem with multiple **TurtleBots**.<br>• Design of a **distributed observer** for estimating the state of a continuous-time, linear system, for research activities of a swarm of **quadcopters** (Matlab and Simulink). |
| **Computer vision** | • Barcodes detection in a dataset of images and extraction of quality parameters for the evaluation of print execution, with **OpenCV** in C++. |
| **Machine learning** | • Developed an algorithm to extract all basic road elements from **apolloscape** dataset of RGB image frames, by training a CNN with **Pytorch** (Python). |
| **Industrial Robotics** | • A line-following and **obstacle avoidance** LEGO robot provided with an ultrasonic sensor and a light intensity camera, programmed in **Java** to participate in a university competition. |
| **Mechatronics** | • Design and implementation of a **sliding mode control** for a shape memory alloy connected to a spring-mass-damper system, with **Arduino** programmed in Matlab and Simulink. |

## Education

**University of Bologna**                                                                  *Bologna, Italy*
M.S. in Automation Engineering, 101/110                                             *Sep. 2017 - Dic. 2019*

**Thesis Title**: "Distributed Observer Analysis and Design."
https://amslaurea.unibo.it/19642/1/Nicola%20Franco.pdf

**University of Padova**                                                                   *Padova, Italy*
B.S. in Mechatronics Engineering, 90/110                                            *Sep. 2013 - Jul. 2017*

**Thesis Title**: "Definition of use procedures for a storage prototype of radioactive targets in the SPES system".
http://tesi.cab.unipd.it/56397/

## Skills

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| **Progr. Languages** | | *Medium knowledge:* C++, Python, PLC, Matlab, C,<br>*Basic knowledge:* JAVA, VHDL |
| **Libraries** | | Pytorch, Pandas, scikit-image, PCL, OpenCV, Eigen |
| **OS** | | Linux, ROS, Mac, VxWorks |
| **IDE** | | CLion, Jupyter Notebook, PyCharm, Visual Studio, Vivado, Unity Pro, Simulink, TIA portal, Eclipse, Arduino IDE |
| **Languages** | | *High knowledge:* Italian, English,<br>*Basic knowledge:* German |
| **Sports** | | Swimming and Climbing |