Alessandro Nocentini

Research Fellow

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Work Experience

- **Research fellow at Politecnico di Milano** 2024 – present

The research focuses on developing health monitoring and prognostic methods for avionic systems by analyzing data packet retransmissions in hard environments. The project, in collaboration with **Leonardo S.p.A.**, involves configuring the laboratory environment, designing software modules to be deployed on electronic boards, conducting experiments to stress the system, and laying the groundwork for implementing algorithms to detect abnormal conditions and predict potential faults.

Projects

- **Reinforcement Learning with MuJoCo** 2024

Developed a reinforcement learning framework in Simulink to train a Proximal Policy Optimization (PPO) agent for multi-directional walking control of a MuJoCo Ant model. Designed a custom environment and reward function within Simulink and trained through interaction with a control variable simulating a physical controller joystick. The trained PPO agent learned to interpret joystick signals and adjust the ant's walking direction accordingly.

- **Automation and Control Laboratory** 2022

Performed experiments on a Quanser Multi-dof Torsion System to acquire data and model the plant, estimating the uncertain parameters. Designed, simulated and tested different control techniques (with model-based and data-driven approaches). Prepared detailed documentation of the design, simulation and testing processes.

- **Additive Manufacturing** 2021

Led a multidisciplinary team in designing a boat model with CAD software, optimizing the printing file parameters, utilizing cutting-edge 3D printing technology for prototyping, and evaluating the design and modifying the model based on trial results. Competed in a speed race against other teams.

- **Software Engineering** 2021

Developed an Android application using the MIT App Inventor environment, through agile methodology to ensure a flexible and iterative development process. Made use of Google Sheets and AppScript as respectively database and database manager. Provided complete and detailed documentation of the process.

- **3D Printer Construction** 2016

Built a functional 3D printer autonomously, following an open-source project, assembling the components and setting up the software. Modified the machine to improve its performance.

Education

- **Master of science degree in Automation and Control Engineering at Politecnico di Milano** 2020 – 2024

Thesis: A User-Friendly Tool for the Verification of Protection Systems in LV Distribution Grids

In partnership with **ABB**, developed a user-friendly tool for the formal verification of protection systems in LV distribution grids. Created a notation for graphical grid modeling and implemented an intuitive application to control the process. Designed and implemented supplementary features to enhance the user experience, validated through summative usability testing.

Relevant courses:

Control of Industrial Robots, Data Driven Control System Design, Advanced and Multivariable Control, Software Engineering, Machine Learning, Reinforcement Learning, Dynamics of Electrical Machines and Drives, Computer Aided Manufacturing

- **Bachelor of science degree in Automation Engineering at Politecnico di Milano** 2017 – 2020

Relevant courses:

Process Control, Industrial Plants and Production Management, Fundamentals of Robotics, Mechanical Systems Modeling

Other Courses

- **Reinforcement Learning Onramp**
  by MathWorks (matlabacademy, credential)
- **Understanding and Visualizing Data with Python**
  by University of Michigan (coursera, credential)
- **Neural Networks and Deep Learning**
  by DeepLearning.AI (coursera, credential)
- **Introduction to Structured Query Language (SQL)**
  by University of Michigan (coursera, credential)
- **Programming Foundations with JavaScript, HTML and CSS**
  by Duke University (coursera, credential)
- **Java Programming: Solving Problems with Software**
  By Duke University (coursera, credential)

Other Information

- **Languages:**

Italian (mother tongue), English (proficient, Cambridge B2 level, TOEIC 945/990), French (beginner).

- **Technical Skills:**

MATLAB, Simulink, Python, Linux, C++, C#, CSS, HTML, Java, JavaScript, XML, MS Office, Fusion 360, MIT App Inventor, PLC, Ladder Diagram, Machine Learning, Reinforcement Learning, Control Design, SQL, LaTeX, Data Acquisition, Data Analysis, XML, MuJoCo, UI/UX Design.

- **Soft Skills:**

Self-improvement, Multidisciplinarity, Critical thinking, Problem solving, Adaptability, Time management, Fast learner, Detail oriented, Result oriented, Teamworking, Independence, Creativity.