Daniele **De Martini**, PhD, MIEEE

Postdoctoral Research Assistant @ Oxford Robotics Institute

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Research Interests

Main Areas Robotics, perception and state estimation, machine learning and deep learning, weather-proof operations, navigation, cyber-physical systems
Applications autonomous vehicles, agriculture robotics, service robotics

Job Positions

University of Oxford - Kellogg College — **Oxford, UK**
Junior Research Fellow — **10/2019 – Ongoing**

University of Oxford - Oxford Robotics Institute — **Oxford, UK**
PostDoctoral Research Assistant — **05/2018 – Ongoing**
Develop of algorithm for robust odometry and localisation using uncommon sensors for autonomy, especially radar · Develop of Machine Learning techniques for environment understanding with radar systems

Frontier Development Lab — **Virtual**
Researcher in the Digital Twin Earth Team — **06/2020 – 08/2020**
Development of algorithms for precipitation forecasts through Machine Learning techniques · Collaboration with Oxford University and ESA

FCA — **Torino, Italy**
Engineer specialist in the R&D chassis group — **04/2014 – 01/2015**
Multibody design and analysis of front and rear suspensions · Constrained optimization of suspension springs

Education

Università degli Studi di Pavia — **Pavia, Italy**
Ph.D. student — **02/2015 – 01/2018**
Thesis: *Actuator Management of a Quadcopter with Double-Axis Tilting Rotors*

Politecnico di Torino — **Torino, Italy**
M.Sc. in Mechatronics Engineering — **09/2011 – 12/2013**
Thesis: *Design of a VTOL UAV*, under the supervision of Prof. Giancarlo Genta, in collaboration with the company *Mediamotive* – final mark: 110/110

Università degli Studi di Pavia — **Pavia, Italy**
B.Sc. in Mechanical Engineering — **09/2008 – 09/2011**
Thesis: *200 m K1 kayak race simulation: cinematic and dynamic analysis and physiological aspects*, under the supervision of Prof. Carlo Rottenbacher – final mark: 110/110

Grants, Funding and Awards

Sense-Assess-eXplain — **2019 – 2021**
Researcher Co-Investigator in the project Sense-Assess-eXplain — **314k £**

Visiting Student — **2016 – 2017**
to visit University of New Brunswick (Fredericton, Canada) during my PhD at University of Pavia — **3k €**

Best Short Paper Award — **2017**
for the paper *Peak load optimization through 2-dimensional packing and multi-processor real-time scheduling*

PhD Italian Scholarship — **2015 – 2018**
to attend the PhD school of Engineering at University of Pavia, Pavia, Italy — **36k €**

Visiting Periods

University of New Brunswick — **Fredericton, Canada**
Visiting Ph.D. student — **10/2016 – 03/2017**
Implementation of a multirobot distributed coordination algorithm and test in HIL simulations (ROS on ODROID XU4 platform) · Gaining expertise on PixHawk flight controller on both ground and quadcopter platforms · Helping during field tests with quadcopters and fixed wing aircrafts, getting expertise on practical aspects like LiPo battery management

Teaching Experience

University of Oxford **2018 – Ongoing**

- Co-supervision of 4YP, CDT and PhD students 2018 – Ongoing
- B16 – software engineering laboratory demonstrations 2018 – 2019
- B16 – software engineering small-groups tutorials 2020
- Robotics Laboratory demonstrations 2018 – 2019
- P5 – computing laboratory demonstrations 2018 – Ongoing
- PAT (Physics Aptitude Test) marker 2020

Università degli Studi di Pavia **2015 – 2017**

- Co-supervision of B.Sc. and M.Sc. students thesis
- Supervision of the practical projects of the *Robotics* course held by Prof. Tullio Facchinetti
- Tutorship of C programming bases

Research Projects

Researcher co-investigator for Oxford Robotics Institute: *Sense-Assess-Explain (SAX): Building Trust in Autonomous Vehicles in Challenging Real-World Driving Scenarios* 2019 – 2021

Industrial Projects

- Implementation of a fuzzy logic based infrastucture for risk index assessment Alisea S.r.l., 2018
- Design of a mechanical system for stress tests on athletic surface materials Mondo S.p.A., 2018
- Design of a mobile robot for air duct exploration Alisea S.r.l., 2015

Patents and Intellectual Properties

IP co-inventor : *Precise Ego-Motion Estimation and Localisation for Automotive Scanning Radars* 2018

Organisation of Scientific Meetings and Commission of Trust

Chair: *International Conference on Intelligent Transportation Systems* (ITSC) (2019)

Organising committee: Special session on *Beyond Traditional Sensing for Intelligent Transportation* @ *International Conference on Intelligent Transportation Systems* (ITSC) (2019 – 2020)

Associate editor *International Conference on Robotics and Automation* (ICRA) (2021) · *International Conference on Intelligent Transportation Systems* (ITSC) (2019 – 2020)

Reviewer Board Member: *MDPI Sensors* (2020)

Program committee: *International Conference on Emerging Technologies and Factory Automation* (ETFA) (2019 – 2020) · *International Conference on Agents and Artificial Intelligence* (ICAART) (2019 – 2020) · *International Joint Conference on Artificial Intelligence – Pacific Rim International Conference on Artificial Intelligence* (IJCAI-PRICAI) (2020) · *European Conference on Artificial Intelligence* (ECAI) (2020)

Other reviewing activity: *IEEE Transactions on Mechatronics* (2020) · *Nature Machine Intelligence* (2020) · *MDPI Actuators* (2020) · *Manning Publications* (2019 – 2020) · *International Symposium on Experimental Robotics* (ISER) (2020) · *International Conference on Intelligent Robots and Systems* (IROS) (2018 – 2020) · *International Conference on Intelligent Transportation Systems* (ITSC) (2019 – 2020) · *International Conference on Industrial Cyber-Physical Systems* (ICPS) (2020) · *Intelligent Vehicles Symposium* (IV) (2020) · *International Conference on Industrial Electronics for Sustainable Energy Systems* (IESES) (2020) · *International Conference on Cyber-Physical Systems* (ICCPS) (2018) · *World Scientific* (2017)

Invited Talks

[1] *Condition-independent perception and navigation of complex urban environments with vision and radar*, *Robust and Generalisable Vehicle Automation* workshop @ *International Conference on Intelligent Transportation Systems* (ITSC) (2019)

[2] *Overview of Deep Learning based Perception and Navigation at Oxford Robotics Institute*, *Deep learning for Automated Driving: Beyond Perception* workshop @ *International Conference on Intelligent Transportation Systems* (ITSC) (2019)

Publication List

Peer-reviewed journal articles:

[1] **D. De Martini**, M. Gadd and P. Newman. kRadar++: Coarse-to-fine FMCW Scanning Radar Localisation *Sensors, MDPI*, 2020.

[2] M. Musci, **D. De Martini**, N. Blago, T. Facchinetti and M. Piastra. Online Fall Detection using Recurrent Neural Networks on Smart Wearable Devices. *IEEE Trans. Emerging Topics in Computing*, 2020.

[3] **D. De Martini** and T. Facchinetti. Fault Detection of Electromechanical Actuators via Automatic Generation of Fuzzy Systems. *IEEE/ASME Trans. Mechatronics*, 2020.
[4] T. Y. Tang, **D. De Martini**, D. Barnes and P. Newman. RSL-Net: Localising in Satellite Images From a Radar on the Ground. *IEEE Robotics and Automation Letters, IEEE*, 2020.
[5] **D. De Martini**, G. Benetti, M. L. Della Vedova and T. Facchinetti. Adaptive Real-Time Scheduling of Cyber-Physical Energy Systems. *ACM Transactions on Cyber-Physical Systems, ACM*, 2017.
[6] **D. De Martini**, G. V. Gramazio, A. Bertini, C. E. Rottenbacher and T. Facchinetti. Design and Modeling of a Quadcopter with Double Axis Tilting Rotors. *Unmanned Systems, World Scientific*, 2017.
[7] M. A. Koledoye, **D. De Martini**, M. Carvani and T. Facchinetti. Design of a Mobile Robot for Air Ducts Exploration. *Robotics, MDPI*, 2017.

Peer-reviewed conference papers:

[1] T. Facchinetti, A. Bonandin, G. Benetti and **D. De Martini**. Distributed architecture for a smart LEDs display system based on MQTT. *IEEE International Conference on Emerging Technologies and Factory Automation (ETFA)*, 2020.
[2] T. Y. Tang, **Daniele De Martini**, S. Wu and P. Newman. Self-Supervised Localisation between Range Sensors and Overhead Imagery. *Robotics: Science and Systems (RSS)*, 2020.
[3] D. Williams, **D. De Martini**, M Gadd., L. Marchegiani and P. Newman. Keep off the Grass: Permissible Driving Routes from Radar with Weak Audio Supervision. *IEEE Intelligent Transportation Systems Conference (ITSC)*, 2020.
[4] P. Kaul, **D. De Martini**, M. Gadd and P Newman. RSS-Net: weakly-supervised multi-class semantic segmentation with FMCW radar. *IEEE Intelligent Vehicles Symposium (IV)*, 2020.
[5] M. Gadd, **D. De Martini** and P. Newman. Look Around You: Sequence-based Radar Place Recognition with Learned Rotational Invariance. *IEEE/ION Position, Location and Navigation Symposium (PLANS)*, 2020.
[6] Ș. Săftescu, M. Gadd, **D. De Martini**, D. Barnes and P. Newman. Kidnapped Radar: Topological Radar Localisation using Rotationally-Invariant Metric Learning. *International Conference on Robotics and Automation*, 2020.
[7] T. Tse, **D. De Martini** and L. Marchegiani. No Need to Scream: Robust Sound-based Speaker Localisation in Challenging Scenarios *International Conference on Social Robotics*, 2019.
[8] D. Giuffrida, G. Benetti, **D. De Martini** and T. Facchinetti. Fall Detection with Supervised Machine Learning using Wearable Sensors *International Conference on Industrial Informatics*, 2019.
[9] S. Kyberd, J. Attias, P. Murcutt, C. Prahacs, M. Towlson, S. Venn, A. Vasconcelos, M. Gadd, **D. De Martini** and P. Newman. What Could Go Wrong? Introspective Radar Odometry in Challenging Environments. *IEEE Intelligent Transportation Systems Conference*, 2019.
[10] R. Aldera, **D. De Martini***, M. Gadd* and P. Newman. Fast radar motion estimation with a learnt focus of attention using weak supervision. *IEEE International Conference on Robotics and Automation*, 2019.
[11] M. Koledoye, **D. De Martini**, S. Rigoni and T. Facchinetti. A Comparison of RSSI Filtering Techniques for Range-based Localization. *IEEE International Conference on Emerging Technologies and Factory Automation*, 2018.
[12] **D. De Martini**, G. Benetti and T. Facchinetti. Cyber/physical interplay in the real-time scheduling for peak load optimization of electric loads. *IEEE International Conference on Industrial Cyber-Physical Systems*, 2018.
[13] **D. De Martini**, A. Bonandin and T. Facchinetti. eduMorse: An Open-Source Framework for Mobile Robotics Education. *Robotics in Education: Latest Results and Developments*, 2017.
[14] **D. De Martini**, G. Benetti, F. Cipolla, D. Caprino, M. L. Della Vedova and T. Facchinetti. Peak load optimization through 2-dimensional packing and multi-processor real-time scheduling. *Proceedings of ACM International Conference on Computing Frontiers*, 2017.
Winner of the *Best short paper* award.
[15] **D. De Martini**, G. Roveda, A. Bertini, A. Marchini and T. Facchinetti. A Framework for Automatic Generation of Fuzzy Evaluation Systems for Embedded Applications. *International Joint Conference on Computational Intelligence*, 2017.

Peer-reviewed workshop papers:

[1] C. Tong, C. Schroeder de Witt, V. Zantedeschi, **D. De Martini**, F. Kalaitzis, M. Chantry, P. Bilinski and D. Watson-Parris. RainBench: Enabling Data-Driven Precipitation Forecasting on a Global Scale. Tackling Climate Change with Machine Learning and AI for Earth Sciences workshops at the *Conference on Neural Information Processing Systems (NeurIPS)*, 2020.
[2] V. Zantedeschi, **D. De Martini**, C. Tong, C. Schroeder de Witt, F. Kalaitzis, P. Biliński, M. Chantry and D. Watson-Parris. Towards Data-Driven Physics-Informed Global Precipitation Forecasting from Satellite Imagery. Tackling Climate Change with Machine Learning and AI for Earth Sciences workshops at the *Conference on Neural Information Processing Systems (NeurIPS)*, 2020.
[3] M. Gadd*, **D. De Martini***, L. Marchegiani, P. Newman and L. Kunze. Sense-Assess-eXplain (SAX): building trust in autonomous vehicles in challenging real-world driving scenarios. *IEEE Intelligent Vehicles Symposium (IV)*, 2020.
[4] D. Williams, **D. De Martini**, L. Marchegiani and P. Newman. Listening closely to see far away: Radar-based Terrain Classification from Auditory Signals. Abstract submission at the *International Conference on Digital Image & Signal Processing*, 2019.

Books:

[1] C. Cusano, T. Facchinetti, C. Larizza, E. Losiouk, A. Tramonte and **D. De Martini**. Programmazione In Linguaggio C. Problemi e Temi Svolti. (eng: Exercises in the C Programming Language) *Medea Editore*, 2015.