Ricardo Dominguez-Olmedo

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Education

MSc Machine Learning *Oct. 2019 - Present*

Department of Computer Science, University of Tübingen, Germany

- **Grade average**: 1.00/1.00 (GPA 4.0)
- **Thesis**: On the Adversarial Robustness of Causal Algorithmic Recourse
- **Supervisors**: Bernhard Schölkopf, Amir-Hossein Karimi
- **Selection of courses**: Deep Learning, Mathematics for Machine Learning, Probabilistic Inference and Learning, Statistical Learning, Convex Optimization, Machine Learning in Graphics and Vision, Reinforcement Learning.

BEng Mechatronic and Robotic Engineering *Sept. 2016 - Jul. 2019*

Department of Automatic Control and Systems Engineering, The University of Sheffield, UK

- **Classification**: First Class Honours (GPA 4.0), Top of Class
- **Thesis**: Sample-Efficient Deep Reinforcement Learning for Control in Additive Manufacturing

Work Experience

Max Planck Institute for Intelligent Systems *June 2021 - Present*

Research Intern, supervised by Prof. Bernhard Schölkopf, Empirical Inference Department

- Research on the adversarial robustness of causal algorithmic recourse (i.e. counterfactual explanations). Showed that minimally costly recourse is provably fragile, and proposed efficient methods to generate robust recourse.
- Additionally researching applications of Riemannian geometry for structural causal models in order to define notions of i) counterfactual similarity between individuals ii) similarity between structural causal models.

Bosch Center for Artificial Intelligence *Mar. 2020 - Sept. 2020*

Research Intern with Prof. Gerhard Neumann, Tübingen Research Unit

- Implemented a variety of deep-learning-based robotic grasping methods. Curated large-scale object datasets and designed an experimental protocol to compare the performance of the different methods in realistic settings.
- Wrote scalable benchmark scripts for tractable run times in a high-performance computing cluster. Analyzed and periodically presented results verbally and in writing to an audience of research scientists.

The University of Sheffield *Jan. 2019 - Jul. 2019*

Research Intern, Advanced Manufacturing Research Center

- Bachelor's thesis on end-to-end control of a complex thermomechanical manufacturing process.
- Modeled the process dynamics with an ensemble of probabilistic neural networks and leveraged model predictive control to achieve state-of-the-art control performance.

Dyson Technology Ltd. *June 2018 - Sept. 2018*

Software Intern, Robotics Research, Design and Development Team, UK

- Applied stochastic search to efficiently train vehicle control policies for Dyson's autonomous robotic vacuum.
- Devised and implemented software changes to reduce the reaction time of the robot by an order of magnitude.

Publications

On the Adversarial Robustness of Causal Algorithmic Recourse *2021*

NeurIPS 2021 WHY-21 Workshop (*Contributed Talk*, 3% of submissions). In submission to ICML 2022.

Additional research experience

Karlsruhe Institute of Technology *Nov. 2020 - May 2021*

Research Assistant for Prof. Gerhard Neumann, Autonomous Learning Robots Lab

- Independent research project *A Temporally Coherent Policy for Reinforcement Learning*. Proposed a recurrent policy that ensures high temporal coherence of the agent's actions, resulting in more effective exploration.

The University of Sheffield *Jan. 2018 - June 2018*

Research Assistant for Prof. Mahnaz Arvaneh, Physiological Signals and Systems Laboratory *Part-time*

- Research on inferring cognitive workload from EEG brain signals for patients with lower-limb exoskeletons.
- Collected EEG data from volunteers, wrote scripts to automatically remove noise and artifacts from the signals.

The University of Sheffield *Jan. 2017 - June 2017*

Research Assistant for Dr. Chelsea Sabo, Sheffield Robotics, Department of Computer Science *Part-time*

- Research on the real-time classification of EMG muscle signals for robotic control.
- Designed, assembled and demonstrated an inexpensive Arduino-based controller which has since been used in other research projects from Sheffield Robotics on human-robot interaction.

Other Activities

Sheffield Eco Motorsports *Oct. 2016 - Jul. 2019*

Team Leader, Sheffield, UK

- Lead a team of 24 undergraduates building a hyper-efficient electric go-kart. Responsible for overall organization and strategy, project planning, recruiting, liaising with academic staff and management of a budget of £20,000.
- Led the software and control team and oversaw the implementation our data acquisition, logging and wireless communication systems, as well as the programming and testing of the motor controller.
- Successfully competed in the 2019 Shell Eco Marathon, an international competition on vehicle energy efficiency.

Awards

- Mappin Medal, Graduated with Greatest Distinction, ACSE Department, The University of Sheffield (2019)
- Award for Best Academic Performance in Year 1&3, ACSE Department, The University of Sheffield (2017/19)
- Ravenscroft Prize for Outstanding Academic Performance, Faculty of Engineering, The University of Sheffield (2018)
- Undergraduate Scholarship for Academic Achievement, Faculty of Engineering, The University of Sheffield (2016)

Skills

- **Programming:** Python, C, C++, MATLAB
- **Frameworks:** PyTorch, JAX, TensorFlow, scikit-learn, Pandas, PyBullet, ROS.
- **Languages:** English (*proficient*), Spanish (*native*), French (*beginner*), German (*beginner*).