Boris **Ivanovic**

PhD Candidate in Aeronautics and Astronautics · Deep Learning and Robotics

Stanford, California, USA

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Education

Stanford University — *September 2018 - Present*

Doctor of Philosophy (PhD) - Aeronautics and Astronautics — *Stanford, CA - USA*

- Conducting research at the intersection of robotics and deep learning under Prof. Marco Pavone.
- Head Course Assistant for *AA 274A: Principles of Robot Autonomy I*.

Stanford University — *September 2016 - June 2018*

Master of Science (MS) - Computer Science — *Stanford, CA - USA*

- Conducted research in machine learning, computer vision, robotics, and data science.
- Course Assistant for *CS231A: Computer Vision From 3D Reconstruction to Recognition*.

University of Toronto — *September 2012 - June 2016*

Bachelor of Applied Science (BASc) with High Honours - Engineering Science - GPA: 3.93 — *Toronto, ON - Canada*

- Undergraduate thesis with Professors Raquel Urtasun and Sanja Fidler in Visual SLAM and 3D Scene Segmentation.
- Award-winning TA for *CSC411: Introduction to Machine Learning*.
- Won the final *AER201: Engineering Design* competition.
- Ranked in the top 10% of Engineering Science students.

Publications

Preprints

MATS: An Interpretable Trajectory Forecasting Representation for Planning and Control
B. Ivanovic, A. Elhafsi, G. Rosman, A. Gaidon, M. Pavone
arXiv, 2020

Multimodal Deep Generative Models for Trajectory Prediction: A Conditional Variational Autoencoder Approach
B. Ivanovic*, K. Leung*, E. Schmerling, M. Pavone (* denotes equal contribution)
arXiv, 2020

Evidential Disambiguation of Latent Multimodality in Conditional Variational Autoencoders
M. Itkina, **B. Ivanovic**, R. Senanayake, M. J. Kochenderfer, M. Pavone
Workshop on Bayesian Deep Learning, Advances in Neural Information Processing Systems (NeurIPS), 2019, Vancouver, Canada

International Peer-Reviewed Conference Proceedings

Risk-Sensitive Sequential Action Control with Multi-Modal Human Trajectory Forecasting for Safe Crowd-Robot Interaction
H. Nishimura, **B. Ivanovic**, A. Gaidon, M. Pavone, M. Schwager
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020

Trajectron++: Dynamically-Feasible Trajectory Forecasting With Heterogeneous Data
T. Salzmann*, **B. Ivanovic***, P. Chakravarty, M. Pavone (* denotes equal contribution)
3rd place in the ICRA 2020 nuScenes Prediction Challenge
European Conference on Computer Vision (ECCV), 2020

Map-Predictive Motion Planning in Unknown Environments
A. Elhafsi, **B. Ivanovic**, L. Janson, M. Pavone
IEEE International Conference on Robotics and Automation (ICRA), 2020

The Trajectron: Probabilistic Multi-Agent Trajectory Modeling with Dynamic Spatiotemporal Graphs
B. Ivanovic, M. Pavone
IEEE/CVF International Conference on Computer Vision (ICCV), 2019, Seoul, South Korea

BaRC: Backward Reachability Curriculum for Robotic Reinforcement Learning
B. Ivanovic, J. Harrison, A. Sharma, M. Chen, M. Pavone
IEEE International Conference on Robotics and Automation (ICRA), 2019, Montreal, Canada

Generative Modeling of Multimodal Multi-Human Behavior

B. Ivanovic, E. Schmerling, K. Leung, M. Pavone

IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2018, Madrid, Spain

ADAPT: Zero-Shot Adaptive Policy Transfer for Stochastic Dynamical Systems

J. Harrison, A. Garg, **B. Ivanovic**, Y. Zhu, S. Savarese, L. Fei-Fei, M. Pavone

International Symposium on Robotics Research (ISRR), 2017, Puerto Varas, Chile

Blog Posts

Back to the Future: Planning-Aware Trajectory Forecasting for Autonomous Driving

B. Ivanovic

Stanford Artificial Intelligence Lab (SAIL) Blog, 2020

How to Deploy Deep Learning Models with AWS Lambda and TensorFlow

B. Ivanovic, Z. Ivanovic

5th most viewed blog post in all of AWS in 2018

Amazon Web Services (AWS) AI Blog, 2017

Experience

Toyota Research Institute *June 2020 - September 2020*

Research Scientist Intern *Los Altos, CA - USA*

- Worked with Adrien Gaidon on novel trajectory forecasting methods in the Machine Learning Research team.

Amazon.com *June 2017 - September 2017*

Prime Air SDE Intern *Seattle, WA - USA*

- Worked with Principal Research Scientist Ishay Kamon in the Autonomy team.
- Designed and implemented a novel state-of-the-art deep learning approach for a specific computer vision task within the team, outperforming existing models by 10x. The project was completed successfully and a full-time Research Scientist return offer was extended.

Stanford University *January 2017 - June 2017*

Independent Research Project *Stanford, CA - USA*

- Worked in the Computer Vision and Geometry Lab (CVGL) and Autonomous Systems Lab (ASL) with Professors Silvio Savarese and Marco Pavone on making reinforcement learning more robust with control theory.
- Tackled the problem of policy transfer in reinforcement learning, applying model-predictive control to provide safety guarantees when transferring a learned policy from one environment to another with different dynamics.

Stanford University *September 2016 - June 2017*

Research Assistant *Stanford, CA - USA*

- Worked in the Stanford Network Analysis Project (SNAP) Lab with Professor Jure Leskovec on analyzing large-scale physical activity data with modern data science methods.
- Efficiently cleaned, preprocessed, and distilled 3 TB of user physical activity data from over 2 million users of a mobile fitness app. Obtained scientific results with data visualization, statistical analyses , and computational methods (e.g., hierarchical bootstrapping).

Amazon.com *May 2016 - August 2016*

Prime Air SDE Intern *Seattle, WA - USA*

- Worked with former NASA Astronaut Neil Woodward in the Flight Test team.
- Designed and built fault-tolerant, scalable software and hardware to autonomously collect and process relevant flight test data from numerous locations for internal consumption.

ETH Zurich *May 2015 - August 2015*

Summer Research Intern *Zurich - Switzerland*

- Worked with Professor Raffaello D'Andrea in the Institute for Dynamic Systems and Control, specifically the Flying Machine Arena.
- Removed superfluous code from an open source motor controller and implemented new features such as motor calibration, emergency safety states, and a better motor startup routine in C. Simulated dynamic motor and propeller system responses in Python.

Amazon.com *May 2014 - July 2014*

SDE Intern *Seattle, WA - USA*

- Worked in the Demand Forecasting team creating a real-time demand forecasting simulation tool. Used the Hadoop MapReduce framework to process large amounts of simulation data generated by a machine learning module. The project was completed successfully and a return offer was extended.

Awards

NSERC Doctoral Canada Graduate Scholarship (CGS-D) *May 2020*
National Sciences and Engineering Research Council (NSERC) *Canada*
The CGS-D Program promotes continued excellence in Canadian research by rewarding high-calibre Canadian doctoral students pursuing studies at home or abroad.

Engineering Science Award of Excellence *May 2016*
University of Toronto *Toronto, ON - Canada*
Received for maintaining a CGPA greater than 3.90.

Computer Science TA Award *May 2016*
University of Toronto *Toronto, ON - Canada*
Received for being the best Computer Science TA in the Winter 2016 semester.

NSERC Master's Postgraduate Scholarship (CGS-M) (Declined) *April 2016*
National Sciences and Engineering Research Council (NSERC) *Canada*
The CGS-M Program provides financial support to high-calibre scholars who are engaged in eligible master's programs in Canada.

Dean's Honour List *September 2012 - June 2016*
University of Toronto *Toronto, ON - Canada*
Placed on the Dean's Honour List for all undergraduate semesters.

University of Toronto Scholarship *September 2012*
University of Toronto *Toronto, ON - Canada*
Received for being one of the top 300 entrants to the University of Toronto in 2012.

Skills

Programming	Python, Java, C/C++, MATLAB, R, Scala, Verilog, Assembly, Web (HTML5/CSS3/JavaScript)
Learning & Robotics	PyTorch, TensorFlow, MXNet, Theano, MuJoCo, Box2D, MazeBase, ROS
Data Science	NumPy, Pandas, Seaborn, Matplotlib, StatsModels
Libraries/SDKs	Amazon Web Services SDK, Hadoop, Spark, Node.js, Google Web Tools, Android SDK