

Filippos E. Sotiropoulos

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SUMMARY

I am a robotics and AI engineer with both academic and industrial experience, passionate about creating new technologies. I have a proven track record of delivering systems to tackle novel problems leveraging machine learning, control theory and other robotics principles. my ability to communicate technical and conceptual ideas in industrial and academic environments across disciplines.

SELECTED EXPERIENCE

2021 – now	Xihelm Ltd. (London, UK & Munich, Germany) <i>AI & Research Team Lead</i> <ul style="list-style-type: none">Lead team of 3 research engineers developing models for robot perception and manipulation in harvesting and packing of vine tomatoes.Development perception and robotics AI of on-the-vine tomato truss manipulation and packing system, including tomato characterisation and grasp generation.Leveraged DL and heuristic approaches to decrease damage rates (from > 10% to < 1%) in prototype tomato truss manipulator.Deployed new model for safety supervision of harvesting robot grasps, minimizing crop damage and eliminating human supervision.
2016 – 2021	Massachusetts Institute of Technology (Cambridge, USA) <i>Graduate Research Assistant - D'Arbeloff Laboratory</i> <ul style="list-style-type: none">Tackled multiple outstanding problems in the area of autonomous excavation introducing and leveraging methods in control, machine learning, estimation, and optimization.Independently designed, built and programmed an entire robotic excavation system, including hardware and low-level control. This robot was used to test novel low-level control algorithms.I created a research platform, used by multiple researchers, based on an industrial collaborative robot (Universal Robots). I used this to collect data, train ML models and test control algorithms.Coordinated research efforts with a commercial sponsor (Komatsu Ltd.) to collect real world data-sets used in my research.First authored multiple publications in high impact robotics journals and presented at flagship robotics and control conferences. <i>Undergraduate Student Supervisor and Mentor</i> <ul style="list-style-type: none">Supervised two undergraduate students undertaking research projects over multiple years.Projects were on state estimation from vision, gaze tracking, and reinforcement learning. <i>Teaching Assistant & Guest Lecturer - Identification, Estimation and Learning (MIT 2.160)</i> <ul style="list-style-type: none">Graded assignments and exams, hosted office hours, and guest lectured for a graduate level class. 7/7 median rating from students.
2015 May-Sep.	Dyson Ltd. (Malmesbury, UK) <i>Research Intern</i> <ul style="list-style-type: none">Designed, simulated, manufactured and experimentally tested acoustic transducers for an unconventional vacuum cleaner product.Presented concept and findings to senior researchers, management and company owner.

EDUCATION

2018 – 2021	Massachusetts Institute of Technology	PhD in Mechanical Engineering (Robotics) Minor: Artificial Intelligence, GPA: 4.9/5 Thesis: "Methods for Control in Robotic Excavation" Advisor: Prof. H. Harry Asada
2016 – 2018	Massachusetts Institute of Technology	MS in Mechanical Engineering
2012 – 2016	University of Bristol	MEng in Mechanical Engineering 1st Class Honours, Cohort Rank: 1st

RELEVANT SKILLS

Software: Python (incl. PyTorch), C++ (incl. OpenCV, GTSAM), MATLAB (incl. Simulink), ROS, Git, Linux, AWS, Docker, \LaTeX , SolidWorks, AGX Dynamics, AWS

Technical: Deep learning (CNNs, Segmentation etc.), Control, Estimation, Machine learning, Sensor fusion, Image processing, Computer vision, SLAM

Hardware & Prototyping: Machine design, Machining (mill, lathe, etc.), 3D Printing, Soldering, Motion Capture

Languages: English (Native), Greek (Fluent), Italian (Fluent), Spanish (Basic)

Miscellaneous: Public Speaking, Teaching, Scrum

Hobbies: Chess, Football, Squash, Tennis, Guitar, Cooking

JOURNAL PUBLICATIONS AND CONFERENCE PROCEEDINGS

1. **Sotiropoulos, F. E.** and Asada, H. H., "Dynamic Modeling of Bucket-Soil Interactions Using Koopman-DFL Lifting Linearization for Model Predictive Contouring Control of Autonomous Excavators", *IEEE Robotics and Automation Letters (RA-L)*, 2021
2. **Sotiropoulos, F. E.** and Asada, H. H., "Autonomous Excavation of Rocks Using a Gaussian Process Model and Unscented Kalman Filter", *IEEE Robotics and Automation Letters (RA-L & ICRA)*, 2020
3. **Sotiropoulos, F. E.** and Asada, H. H., "A Model-Free Extremum-Seeking Approach to Autonomous Excavator Control Based on Output Power Maximization", *IEEE Robotics and Automation Letters (RA-L & ICRA)*, 2019
4. Asada, H. H. and **Sotiropoulos, F. E.**, "Dual Faceted Linearization of Nonlinear Dynamical Systems Based on Physical Modeling Theory", *Journal of Dynamic Systems, Measurement, and Control*, 2019
5. **Sotiropoulos, F. E.** and Asada, H. H., "Causality in Dual Faceted Linearization of Nonlinear Dynamical Systems", *Proceedings of the American Control Conference (ACC)*, June 2018

PATENTS

1. Asada, H. H. and **Sotiropoulos, F. E.**, "Determining Soil State and Controlling Equipment Based on Captured Images", US Patent 10,867,377, (2020)
2. Asada, H. H. and **Sotiropoulos, F. E.**, "Automated control for Excavators", US Patent 11,248,365, (2022)

AWARDS

- Frederic Barnes Waldron Prize, Inst. of Mechanical Engineers, (2016); *best mechanical engineering student*
- Univ. of Bristol Best Project Award, Inst. of Mechanical Engineers, (2016) ; *best individual project*
- Bechtel Industrial Individual Prize, University of Bristol, (2016); *greatest contribution to group research project*
- Panhellenic Forensics Debate Competition, (2012); *winning national debate competition*