

# Filippos E. Sotiropoulos

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## SUMMARY

I am a robotics and AI researcher and 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 methodologies. I take pride in reliably delivering complex projects in restrictive time-frames and in my ability to communicate conceptual ideas and technical details in industrial and academic environments across disciplines.

## SELECTED EXPERIENCE

2021 – now	<b>Xihelm Ltd.</b> (London, UK & Remote) - <i>robotic harvesting &amp; packaging AgTech startup</i> AI & Research Team Lead <ul style="list-style-type: none"><li>Lead team of 3 research engineers developing models for robot perception and manipulation in harvesting and packing of vine tomatoes.</li><li>Deployed new deep-learning model (PyTorch) for safety supervision of harvesting robot grasps, minimizing crop damage and eliminating human supervision.</li><li>Developed (in Python) perception and robotics AI for tomato truss manipulation and packing system, including grasp generation.</li><li>Decrease damage rates caused by vision extracted grasps, using DL and heuristic approaches, in a prototype tomato manipulator.</li></ul>
2016 – 2021	<b>Massachusetts Institute of Technology</b> (Cambridge, USA) Graduate Research Assistant - D'Arbeloff Laboratory <ul style="list-style-type: none"><li>Tackled multiple outstanding problems in the area of autonomous excavation introducing and leveraging methods in machine learning, control, estimation, and optimization.</li><li>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.</li><li>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.</li><li>First authored multiple publications in high impact robotics journals and presented at flagship robotics and control conferences.</li></ul> Undergraduate Student Supervisor and Mentor <ul style="list-style-type: none"><li>Projects were on state estimation from vision, gaze tracking, and reinforcement learning.</li></ul> Teaching Assistant & Guest Lecturer - Identification, Estimation and Learning (MIT 2.160) <ul style="list-style-type: none"><li>Graded assignments and exams, hosted office hours, and guest lectured for a graduate level class. 7/7 median rating from students.</li></ul>
2015 May-Sep.	<b>Dyson Ltd.</b> (Malmesbury, UK) Research Intern <ul style="list-style-type: none"><li>Designed, simulated, and experimentally tested acoustic transducers for an experimental vacuum cleaner product and presented this to senior management and company owner.</li></ul>

## EDUCATION

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

## JOURNAL PUBLICATIONS AND CONFERENCE PROCEEDINGS

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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

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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

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- 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*

## RELEVANT SKILLS

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

**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 }

**Miscellaneous:** Public Speaking, Teaching, Scrum

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