Georgios Georgakis

October 21st 2025

NASA-Jet Propulsion Laboratory, Caltech
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Research Interests: Computer Vision, Machine Learning, (Space) Robotics

Education

Postdoctoral Researcher 2020-2023
GRASP Lab. Advised by Dr. Kostas Daniilidis
CIS Department, University of Pennsylvania

PhD in Computer Science 2013-2020
George Mason University
Thesis: 3D Model-Assisted Learning for Object Detection and Pose Estimation [pdf]
Advisor: Prof. Jana Kosecka

MSc in Computer Science 2013-2015
George Mason University

Diploma in Electronic and Computer Engineering 2006-2012
Technical University of Crete
Thesis: Field Landmark Recognition and Localization for the RobotStadium Online Soccer Competition [pdf]
Advisor: Associate Prof. Michail G. Lagoudakis

Positions

Robotics Technologist Jan 2023-
NASA-Jet Propulsion Laboratory
California Institute of Technology

Part-time Lecturer Spring 2022
ESE Department, University of Pennsylvania

Graduate Research Assistant Aug 2013-Dec 2019
Computer Vision and Robotics Lab
CS Department, George Mason University

Research Intern Summer 2019
United Imaging Intelligence, Cambridge MA

Ph.D Research Intern - Vision and Deep Learning Summer 2017, 2018
Siemens Corporate Technology, Princeton NJ

Awards

- Co-I, *"Jupiter's Radiant Energy Budget: Full-Disk Temporal Variations and Polar Region Analysis"*
  NASA Research Opportunities in Space and Earth Science (ROSES), 2025, $693K
  PI: University of Houston
- Team Award, *"For successful completion of Lunar Navigation Maps (LuNaMaps) project to address key gaps in mapping for Lunar TRN"*
  Robotic Systems Section, Jet Propulsion Lab, September 2025
- Team Award, *"For technical contributions and leadership in advancing robotic autonomy"*
  Robotic Systems Section, Jet Propulsion Lab, September 2025

- Technology Spotlight Award, *"Map-based Localization for Ingenuity flights"*
  Autonomous Systems Division, Jet Propulsion Lab, August 2025
- Technology Spotlight Award, *"Photometric Calibration of JunoCam with a Data-driven Method"*
  Autonomous Systems Division, Jet Propulsion Lab, May 2024
- PI, *"Disentangling Jupiter's Complex Atmospheric Processes Through the Application of Machine Learning Methods to JunoCam Data"*
  NASA Research Opportunities in Space and Earth Science (ROSES), 2024, $711K
  Co-Is: University of Michigan, University of California Berkeley, Caltech
- Doctoral Consortium at ICCV 2019
- Outstanding Graduate Teaching Assistant Award by the Department of Computer Science, George Mason University, for the academic year 2015-16

Papers

- *A Map-based Localization System for Ingenuity using Deep Image Matching*
  G. Georgakis, D. Pisanti, N. Williams, C. Mauceri, G. Kubiak, A. Ansar, R. Brockers
  IEEE Transactions on Field Robotics (T-FR) Special Issue on Space Robotics, 2025
- *Visual Perception Engine: Fast and Flexible Multi-Head Inference for Robotic Vision Tasks*
  J. Łucki, J. Becktor, **G. Georgakis**, R. Royce, S. Khattak
  arXiv:2508.11584 (under submission)
- *Robust Visual Localization in Compute-Constrained Environments by Salient Edge Rendering and Weighted Hamming Similarity*
  T.H. Pham, P. Bailey, D. Posada, **G. Georgakis**, J. Enriquez, S. Suresh, M. Dolci, P. Twu
  IEEE Robotics and Automation Letters (RA-L) 2025
- *Risk-Guided Diffusion: Toward Deploying Robot Foundation Models In Space, Where Failure Is Not An Option*
  R. Thakker, A. Patnaik, V. Kurtz, J. Frey, J. Becktor, S. Moon, R. Royce, M. Kaufmann, **G. Georgakis**, P. Roth, J. Burdick, M. Hutter, S. Khattak
  RSS 2025 Workshop on Reliable Robotics: Safety and Security in the Face of Generative AI
- *General-Purpose Robotic Navigation via LVLM-Orchestrated Perception, Reasoning, and Acting*
  B. Lange, A. Yildiz, M. Arief, S. Khattak, M. Kochenderfer, **G. Georgakis**
  arXiv:2506.17462 (under submission)
- *Vision-based Geo-Localization of Future Mars Rotorcraft in Challenging Illumination Conditions*
  D. Pisanti, R. Hewitt, R. Brockers, **G. Georgakis**
  arXiv:2502.09795 (under submission)
- *Enhancing the Quality of 3D Lunar Maps Using JAXA's Kaguya Imagery*
  Y. Iwashita, H. Moe, Y. Cheng, A. Ansar, **G. Georgakis**, A. Stoica, K. Nakashima, R. Kurazume, J. Torresen
  IEEE International Conference on Systems, Man, and Cybernetics (SMC) 2025
- *Illumination Invariant Image Matching for Lunar TRN*
  N. Rothenberger, **G. Georgakis**, Y. Chen, A. Ansar
  AIAA SciTech 2025
- *NAVCON: A Cognitively Inspired and Linguistically Grounded Corpus for Vision and Language Navigation*
  K. Wanchoo, X. Zuo, H. Gonzalez, S. Dan, **G. Georgakis**, D. Roth, K. Daniilidis, E. Miltsakaki
  arXiv:2412.13026
- *Learning Illumination Invariant Features for Lunar South Pole with Deep Learning*
  G. Georgakis, A. Ansar
  Space Imaging Workshop (SIW) 2024

- *Pixel to Elevation: Learning to Predict Elevation Maps at Long Range using Images for Autonomous Offroad Navigation*
  C. Chung, **G. Georgakis**, P. Spieler, C. Padgett, A. Agha, S. Khattak
  IEEE Robotics and Automation Letters (RA-L) 2024
- *Icy Moon Surface Simulation and Stereo Depth Estimation for Sampling Autonomy*
  R. Bhaskara, **G. Georgakis**, J. Nash, M. Cameron, J. Bowkett, A. Ansar, M. Majji, P. Backes
  IEEE Aerospace Conference (AeroConf) 2024
- *Unordered Navigation to Multiple Semantic Targets in Novel Environments*
  B. Bucher, K. Ashton, B. Wu, K. chmeckpeper, S. Goel, N. Matni, **G. Georgakis**, K. Daniilidis
  Embodied AI Workshop at CVPR 2023
- *Bridge Data: Boosting Generalization of Robotic Skills with Cross-Domain Datasets*
  F. Ebert*, Y. Yang*, K. Schmeckpeper, B. Bucher, **G. Georgakis**,
  K. Daniilidis, C. Finn, S. Levine
  Robotics: Science and Systems (RSS) 2022
- *Cross-modal Map Learning for Vision and Language Navigation*
  G. Georgakis, K. Schmeckpeper, K. Wanchoo, S. Dan, E. Miltsakaki, D. Roth, K. Daniilidis
  IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2022
- *Learning to Map for Active Semantic Goal Navigation*
  G. Georgakis*, B. Bucher*, K. Schmeckpeper, S. Singh, K. Daniilidis
  International Conference on Learning Representations (ICLR) 2022
- *Uncertainty-driven Planner for Exploration and Navigation*
  G. Georgakis, B. Bucher, A. Arapin, K. Schmeckpeper, N. Matni, K. Daniilidis
  International Conference on Robotics and Automation (ICRA) 2022
- *Object-centric Video Prediction without Annotation*
  K. Schmeckpeper*, **G. Georgakis***, K. Daniilidis
  International Conference on Robotics and Automation (ICRA) 2021
- *Hierarchical Kinematic Human Mesh Recovery*
  G. Georgakis*, R. Li*, S. Karanam, T. Chen, J. Kosecka, Z. Wu
  European Conference on Computer Vision (ECCV) 2020
- *Robust Multi-modal 3D Patient Body Modeling*
  F. Yang, R. Li, **G. Georgakis**, S. Karanam, T. Chen, H. Ling, Z. Wu
  Medical Image Computing and Computer Assisted Interventions (MICCAI) 2020
- *Towards Robust RGB-D Human Mesh Recovery*
  R. Li, C. Cai, **G. Georgakis**, S. Karanam, T. Chen, Z. Wu
  arXiv:1911.07383
- *Simultaneous Mapping and Target Driven Navigation*
  G. Georgakis, Y. Li, J. Kosecka
  arXiv:1911.07980
- *Learning Local RGB-to-CAD Correspondences for Object Pose Estimation*
  G. Georgakis, S. Karanam, Z. Wu, J. Kosecka
  IEEE International Conference on Computer Vision (ICCV) 2019
- *End-to-end Learning for Keypoint Detection and Descriptor for Pose Invariant 3D Matching*
  G. Georgakis, S. Karanam, Z. Wu, J. Ernst, J. Kosecka
  IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2018
- *Label Propagation in RGB-D Video*
  Md. A. Reza, H. Zheng, **G. Georgakis**, J. Kosecka
  IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2017
- *Synthesizing Training Data for Object Detection in Indoor Scenes*
  G. Georgakis, A. Mousavian, A. C. Berg, J. Kosecka
  Robotics: Science and Systems (RSS) 2017

- *A Contact Exploitative Approach to the Amazon Robotics Challenge*
  E. Dessalene, **G. Georgakis**, Md. A. Reza, Y. Li, Y. Ovcharik, A. Shapiro, J. Kosecka, D. Lofaro
  Warehouse Picking Automation Workshop (ICRA) 2017
- *Multiview RGB-D Dataset for Object Instance Detection*
  G. Georgakis, Md. A. Reza, A. Mousavian, P. H. Le, J. Kosecka
  International Conference on 3D Vision (3DV), 2016
- *RGB-D Multiview Object Detection with Object Proposals and Shape Context*
  G. Georgakis, Md. A. Reza, J. Kosecka
  IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2016

* Denotes equal contribution

Patents Awarded/Pending

- *Method and System for On-board Localization*
  R. Brockers, F. Dietsche, J. Delaune, P. Proença, R. Hewitt, **G. Georgakis**
  US18/312,444 filed May 2023, Application no. US20230360547A1
- *Systems and Methods for Human Pose and Mesh Recovery*
  Z. Wu, S. Karanam, C. Cai, **G. Georgakis**
  US16/995,446, filed August 2020, Application no. US20210158028A1
- *Systems and Methods for Human Mesh Recovery*
  S. Karanam, Z. Wu, **G. Georgakis**
  US16/863,382, filed April 2020, Application no. US20210158107A1
- *Learning Keypoints and Matching RGB Images to CAD Models*
  G. Georgakis, S. Karanam, Z. Wu, J. Ernst
  PCT/US2019/053827, filed September 2019, Application no. WO2020086217
- *Matching RGB Images to CAD Models*
  G. Georgakis, S. Karanam, Z. Wu, J. Ernst
  PCT/US2019/040913, filed July 2019, Application no. WO2020014170A1
- *Spare Part Identification Using a Locally Learned 3D Landmark Database*
  G. Georgakis, S. Karanam, Z. Wu, J. Ernst
  PCT/US2018/049100, filed September 2018, Application no. WO2019094094A1
- *Learning View-invariant Local Patch Representations for Pose Estimation*
  G. Georgakis, S. Karanam, V. Manjunatha, K-C. Peng, Z. Wu, J. Ernst
  PCT/US2018/013271, filed January 2018, Application no. WO2019139587A1
- *Training a Convolutional Neural Network using Task-irrelevant Data*
  V. Manjunatha, **G. Georgakis**, K-C. Peng, Z. Wu, J. Ernst
  PCT/US2017/067766, filed December 2017, Application no. WO2019125453A1

Selected Talks

- **Approximate Photometric Calibrations of JunoCam with a Deep Learning System**
  Invited talk at Juno Science Team Meeting, September 2025
- **Learning Illumination Invariant Features for Lunar South Pole with Deep Learning**
  Space Imaging Workshop, Atlanta GA, October 2024
- ***Vision-based Navigation in Novel Environments***
  Jet Propulsion Lab Section 347 Talks, Virtual, July 2022
- ***Cross-modal Map Learning for Vision and Language Navigation***
  GRASP SFI Seminar Series, Philadelphia PA, April 2022
- ***Uncertainty-based Mapping and Navigation***
  MURI Review Meeting, Virtual, October 2021
- ***Object-centric Video Prediction without Annotation***
  Honda Curious Minded Machines Seminar Series, Virtual, January 2021

- ***3D Model-Assisted Learning for Object Detection and Pose Estimation***
  GRASP Seminar Series, Philadelphia PA, December 2019
- ***Keypoint Learning for Pose Estimation***
  Siemens CT Intern Talk Series, Princeton NJ, August 2018
- ***Synthesizing Training Data for Object Detection in Indoor Scenes***
  RSS Conference Talk, Cambridge MA, July 2017
- ***RGB-D Multiview Object Detection with Object Proposals and Shape Context***
  IROS Conference Talk, Daejeon, South Korea, October 2016

Teaching

Instructor **at University of Pennsylvania**

ESE650: Learning in Robotics with Oleh Rybkin	Spring 2022

Guest Lecturer **at George Mason University**

CS112: Introduction to Programming - Python	Fall 2015
CS685: Autonomous Robotics	Fall 2018
CS687: Advanced Artificial Intelligence	Spring 2019
CS747: Deep Learning	Spring 2020

Graduate Teaching Assistant **at George Mason University**

CS112: Introduction to Programming - Python (Head TA)	Fall 2014 - Spring 2017
CS310: Data Structures - Java	Fall 2018
CS480: Introduction to Artificial Intelligence	Spring 2019

Mentoring

PhD Thesis Committee

- Tiberiu-Ioan Szatmari, *"Personalizing Audiology With User-centered, Private AI"*, Technical University of Denmark, 2025

Thesis Supervision

- PhD, Dario Pisanti, *"Vision-based Geo-Localization of Future Mars Rotocraft in Challenging Illumination Conditions using Deep Learning"*, Scuola Superiore Meridionale / Jet Propulsion Lab, 2025
- MSc, Aditya Singh, *"Instruction-guided Path Generation on Allocentric Maps using Diffusion Models"*, University of Pennsylvania, 2023
- MSc, Bo Wu, *"The Role of Mapping in Modern Robot Navigation Tasks"*, University of Pennsylvania, 2023, (jointly advised with Bernadette Bucher)
- MSc, Shiyani Patel, *"Vector Graph Neural Network: Point Cloud Prediction into the Future"*, University of Pennsylvania, 2021, (jointly advised with Karl Schmeckpeper and Diego Patino)
- MSc, Siddharth Goel, *"Navigation to Multiple Semantic Targets in Novel Environments"*, University of Pennsylvania, 2021, (jointly advised with Bernadette Bucher)

Recent Project Supervision

Isaac Madhavaram (JPL Msc Intern, Summer 2025)
Agata Weglerska (JPL Msc Intern, Summer 2025)
Sofia Talleri (JPL Msc Intern, Summer 2025)
Dimitrios Chatziparaschis (JPL PhD Intern, Fall 2024)
Dario Pisanti (JPL PhD Intern, Spring 2023-Fall 2024)
Jakub Lucki (JPL Msc Intern, Fall 2024)
Haakon Moe (JPL Msc Intern, Fall 2024)
Ramchander Bhaskara (JPL PhD Intern, Summer 2023)

Reviewer

Conferences:	NeurIPS, ICLR, CVPR, CVPRW, ICCV, ECCV, WACV, ACCV, ICRA, IROS
Journals:	TPAMI, RA-L, Autonomous Robots, Transactions on Robotics, Transactions on Image Processing, Pattern Recognition Letters, Signal Processing: Image Communication, IEEE Access
Proposals:	NSTGRO, SBIR