Konstantinos Zampogiannis

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Research Interests

I am interested in various aspects of 3D perception.
Computer Vision — Robotics — Artificial Intelligence — Machine Learning

Experience

Magic Leap, Inc.
Lead Computer Vision Researcher/Engineer *April 2021-Present*
Senior Computer Vision Researcher/Engineer *September 2019-March 2021*

University of Maryland *Fall 2014-Spring 2019*
Graduate Research Assistant
- Developed a method for non-rigid, topology-aware raw point cloud registration
- Created `cilantro`, a general-purpose, feature-rich point cloud processing library
- Developed model-based 6DoF stochastic object tracking algorithms in RGB-D videos
- Developed a method for grounding pairwise spatial relations between objects observed in 3D and proposed an action representation based on their temporal evolution

Robot Training Academy *June 2016-August 2016*
Perception Intern
- Implemented a small-scale RGB-D SLAM pipeline
- Developed algorithms for cuboid detection and fitting in incomplete 3D geometries
- Developed a method for automatic part decomposition and fitting for box-like containers and appliances from partial interior and exterior 3D scans

University of Maryland *Fall 2011-Spring 2014*
Graduate Teaching Assistant
- [CMSC425] *Game Programming* (Spring 2013)
- [CMSC122] *Programming via the Web* (Fall 2012, Fall 2013, Spring 2014)
- [CMSC351] *Algorithms* (Spring 2012)
- [CMSC427] *Computer Graphics* (Fall 2011)

National Technical University of Athens *Fall 2004-Spring 2011*
- Designed and implemented Kalman and Particle Filtering 2D tracking algorithms based on color and optical flow cues (diploma thesis)
- Lab assistant in ECE course *Introduction to Programming* (Stathis Zachos), Fall 2005

Education

University of Maryland at College Park
PhD in Computer Science
Dissertation: *Reasoning about Geometric Object Interactions in 3D for Manipulation Action Understanding*
Advisor: Prof. Yiannis Aloimonos, co-advisor: Dr. Cornelia Fermüller

University of Maryland at College Park
MSc in Computer Science

National Technical University of Athens
5-year diploma (MEng equivalent) in Electrical and Computer Engineering
Thesis: *Stochastic Object Tracking*
Advisor: Prof. Petros Maragos

Service & Memberships

Reviewer
Conferences: ICRA, ICCV, AAAI
Journals: RA-L, RAS, CVIU, IMAVIS, TVCJ

Visiting Researcher
Telluride Neuromorphic Cognition Engineering Workshop (June-July 2015)

Student Member
IEEE, SIAM

Publications

[1] **Topology-Aware Non-Rigid Point Cloud Registration**, K. Zampogiannis, C. Fermüller, Y. Aloimonos, *PAMI 2019*

[2] **cilantro: A Lean, Versatile, and Efficient Library for Point Cloud Data Processing**, K. Zampogiannis, C. Fermüller, Y. Aloimonos, *ACM MM 2018 (OSSC)*

[3] **Prediction of Manipulation Actions**, C. Fermüller, F. Wang, Y. Yang, K. Zampogiannis, Y. Zhang, F. Barranco, M. Pfeiffer, *IJCV 2018*

[4] **Combining Visual Learning with a Generic Cognitive Model for Appliance Representation**, K. Ganguly, K. Zampogiannis, C. Fermüller, Y. Aloimonos, *EUCOG 2016*

[5] **Learning the Spatial Semantics of Manipulation Actions through Preposition Grounding**, K. Zampogiannis, Y. Yang, C. Fermüller, Y. Aloimonos, *ICRA 2015*

Selected Course Projects

The following advanced undergraduate and graduate course projects were either individual work or completed by a group of two students:

Computer Vision
- Development of a dense 3D point cloud reconstruction pipeline from multiple 2D views
- Development of an image mosaicking application using homographies
- Implementation of classical vision algorithms for edge and corner detection, optical flow estimation, nonlinear image diffusion and MRF/CRF inference based segmentation

Pattern Recognition
- Implementation of an SVM face image classifier
- Development of an unsupervised, realtime speaker indexing application
- Development of a small vocabulary speech recognition system using continuous HMMs
- Implementation of a simple LPC vocoder

Robotics and AI
- Development of an HTN planner for the solar panel operations on ISS (*ICKEPS* 2012 challenge track)
- Development of a robotic manipulator simulator with kinematic redundancies

Programming Languages
- Development of forward and backward symbolic execution interpreters in OCaml for a TAC language
- Development of a compiler in C for the procedural programming language Dana

Relevant Graduate Coursework

Processing of Pictorial Information	Computational Geometry
Image Segmentation	AI Planning
Subspaces and Manifolds in CV and ML	Scientific Computing
Statistical Pattern Recognition	Program Analysis and Understanding

Honors & Awards

- University of Maryland **Dean's Fellowship**, 2011-2013
- Member of the team that represented Greece in the final stage of Microsoft's **Imagine Cup 2009** competition in Cairo, in the category of Software Design: we built a semi-automatic malaria diagnosis system for remote, rural areas of the developing world
- **Award** by the bank *Eurobank EFG* for ranking 1st in class (panhellenic exams performance) in the last year of high school, 2003

Technical Skills

Languages: C++, C, MATLAB, Python, Java, OCaml, Haskell, Prolog, Pascal
APIs: OpenCV, PCL, Eigen, Ceres, g2o, ROS, OpenGL, OpenMP
Tools: GNU Make, CMake, Visual Studio, LaTeX
Operating Systems: GNU/Linux, Windows