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Davide Allegro

Ph.D. Student in Computer Vision

Profile Summary

I am a second-year PhD student in Computer Vision and Robotics with a strong background in multi-camera calibration, human pose estimation, and activity recognition. My current research focuses on applying Vision-Language Models for 6D object pose estimation to advance human-robot collaboration tasks. Additionally, I am exploring 3D Gaussian Splatting techniques to augment imitation learning demonstrations and empower robot interactions with the environment.

Work Experience

Oct. 2022 - Present **Teaching Assistant**, University of Padova.
Courses: Computer Vision and C++ Programming Laboratory.

Apr. 2022 - Sep. 2022 **Research scholarship**, IASLab, University of Padova.
Research topic: multi-camera hand-eye calibration for human-robot collaboration.

Feb. 2022 - Jun. 2022 **IoT Intern / Digital Academy**, Siemens, Milan, Italy.
Project work on IoT for Data Analytics, design of a data acquisition system to acquire energy data from a machine tool.

Jun. 2020 - Dec. 2020 **Digital Transformation Intern**, Azzurro Digitale, Padova, Italy.
Development of IoT software for data acquisition for a computer vision project.

Education

Oct. 2022 - Present **Ph.D. in Information Engineering**, IASLab, University of Padova.
Research topic: 6D object pose estimation, multi-view robot localization and human action recognition for human-robot collaboration tasks.

Oct. 2019 - April. 2022 **M.Sc. Automation Engineering**, University of Padova.
Grade: 106/110. Supervisor: Stefano Ghidoni.
Thesis: Automatic Multi-Camera Hand-Eye Calibration for Robotic Workcells.

Sept. 2016 - Oct. 2019 **B.Sc. in Information Engineering**, University of Padova.
Grade: 101/110. Supervisor: Augusto Ferrante.
Thesis: Neural Networks and Deep Learning.

Awards

- Klaus Fischer Degree Awards Edition 2023 on the theme "Innovations in processes, equipment and instrumental systems for the digitalization and automation of industrial production".
- 1^{st} prize of ADvanced Agile ProducTion (ADAPT) field campaign competition organized by Tampere University, Finland.

Skills

- Programming: C++, Python, Matlab
- Typesetting: LaTeX
- Scientific Computing: Numpy, Pandas, Matplotlib, Scikit-learn
- Open-source tools: OpenCV, ROS, PyTorch, TensorFlow, Keras, Ceres-Solver
- 3D Libraries: Open3D
- System: Linux, Git, Docker
- Languages: Italian (Native), English (Professional)

Reviewer

IEEE Robotics and Automation Letters, IEEE Transactions on Automation Science and Engineering, IEEE International Conference on Intelligent Robots and Systems, and IEEE International Conference on Robotics and Automation

References

Published Papers

[1] Daniele Evangelista, Davide Allegro, Matteo Terreran, Alberto Pretto, and Stefano Ghidoni. "An unified iterative hand-eye calibration method for eye-on-base and eye-in-hand setups". In: *2022 International Conference on Emerging Technologies and Factory Automation (ETFA)*. IEEE. 2022.

[2] Daniele Evangelista, Emilio Olivastri, Davide Allegro, Emanuele Menegatti, and Alberto Pretto. "A Graph-Based Optimization Framework for Hand-Eye Calibration for Multi-Camera Setups". In: *2023 IEEE International Conference on Robotics and Automation (ICRA)*. IEEE. 2023.

[3] Davide Allegro, Matteo Terreran, and Stefano Ghidoni. "METRIC—Multi-Eye to Robot Indoor Calibration Dataset". In: *Information* 14.6 (2023).

[4] Davide Allegro, Matteo Terreran, and Stefano Ghidoni. "Multi-Camera Hand-Eye Calibration for Human-Robot Collaboration in Industrial Robotic Workcells". In: *IEEE Robotics and Automation Letters*. IEEE. 2024.

Accepted Papers

[5] Davide Allegro, Matteo Terreran, and Stefano Ghidoni. "MEMROC: Multi-Eye to Mobile RObot Calibration". In: *2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE. 2024.

[6] Laura Bragagnolo, Matteo Terreran, Davide Allegro, and Stefano Ghidoni. "Multi-view Pose Fusion for Occlusion-Aware 3D Human Pose Estimation". In: *European Conference on Computer Vision*. Springer. 2024.

[7] Alberto Bacchin, Davide Allegro, Stefano Ghidoni, and Emanuele Menegatti. "SOOD-ImageNet: a Large-Scale Dataset for Semantic Out-Of-Distribution Image Classification and Semantic Segmentation". In: *European Conference on Computer Vision*. Springer. 2024.

Submitted Papers

[8] Niccolò Turcato, Giulio Giacomuzzo, Matteo Terreran, Davide Allegro, Ruggero Carli, and Alberto Dalla Libera. "Robotic Object Throwing with real Manipulator using Model-Based Reinforcement Learning". In: *IEEE Transactions on Robotics*. IEEE. 2024.

[9] Leonardo Barcellona, Andrii Zadaianchuk, Davide Allegro, Samuele Papa, Stefano Ghidoni, and Efstratios Gavves. "Dream to Manipulate: Compositional World Models Empowering Robot Imitation Learning with Imagination". In: *The Thirteenth International Conference on Learning Representations (ICLR 2025)*. OpenReview. 2025.

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