Sudeep Pillai

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About

Research scientist with strong machine learning, computer vision, SLAM and probabilistic robot perception expertise, interested in developing robust autonomous systems that can learn persistently in an environment from visual experience/data.

Interests: High-impact ventures leveraging computer vision, machine learning and perception technologies in autonomous systems (including self-driving cars, house-hold robotics, and UAVs).

Professional Experience

Toyota Research Institute, Cambridge, MA
Research Scientist - Machine Learning Oct 2017 - Present
Responsible for the design and development of machine learning algorithms/infrastructure for the perception stack in next-generation autonomous vehicles.

Key Technologies: Self-supervised and active learning related technologies for autonomous vehicles;

Mitsubishi Electric Research Laboratories, Cambridge, MA
Research Intern - Spatial Analysis May-Aug 2014
Developed next-generation computer vision technologies for autonomous vehicles

Key Technologies: Real-time applications for autonomous vehicles; Stereo Mapping and Reconstruction; Software stack for rapid-prototyping and evaluation of computer vision applications.

PhaseSpace Motion Capture, San Leandro, CA
Computer Vision & Software Developer 2009 – 2011
Assist with the development of a state-of-the-art computer vision stack to support motion-capture technologies with real-time performance considerations

Segway Inc., Manchester, NH
R & D Engineer Intern - Product Development and Future Technologies May-Aug 2008
Conceptualized upcoming prototypes amongst a highly skilled product design team

Education

Massachusetts Institute of Technology, Cambridge, MA 2014 – 2017
Doctor of Philosophy (Ph.D), Electrical Engineering and Computer Science
Thesis: SLAM-aware, Self-Supervised Perception in Mobile Robots
Advisor: John J. Leonard

Massachusetts Institute of Technology, Cambridge, MA 2011 – 2014
Master of Science (S.M), Electrical Engineering and Computer Science
Thesis: Learning Articulated Motions from Visual Demonstration

University of Michigan, Ann Arbor, MI 2005 – 2008
Bachelor of Science in Engineering (B.S.E), Mechanical Engineering

Patents (Pending)

High-Speed and Tunable Scene Reconstruction Method Using Stereo Imagery 2016

Selected Publications

Pillai et al. "Self-Supervised Visual Place Recognition Learning in Mobile Robots", *IROS '17 (Wkshp)*.

Pillai et al. "Towards Visual Ego-motion Learning in Robots", *IROS '17*.

Moll et al. "Exploring big volume sensor data with Vroom", *VLDB '17 (Demo Track)*.

Fourie et al. "Centralized Graph Databases for Mobile Robotics", *ICRA '17*.

Pillai et al. "High-Performance and Tunable Stereo Reconstruction", *ICRA '16*.

Pillai et al. "Monocular SLAM Supported Object Recognition", *RSS '15*.

Ramalingam et al. "Line-Sweep: Cross-Ratio for Wide-Baseline Matching & Recons.", *CVPR '15*.

Pillai et al. "Learning Articulated Motions from Visual Demonstration", *RSS '14*.

Fleder et al. "Bitcoin Transaction Graph Analysis", *arXiv '13*.

Invited Talks

RE·WORK Deep Learning Summit 2018, Boston, MA	May 2018
NVIDIA Research, Santa Clara, CA	Mar 2017
Microsoft Analog Research and Development, Seattle, WA	Feb 2017
MIT CSAIL Advisory Board Meeting, Cambridge, MA	Apr 2016
Boston Imaging and Vision Meetup, Cambridge, MA	Jan 2016
Association for the Advancement of Artificial Intelligence (AAAI '15), Austin, TX	Jan 2015

Academic Duties

Tutorial / Workshop Co-organizer:

- Workshop on Deep Learning for Visual SLAM, CVPR 2018 — 2018
- Learning for Mapping Workshop, IEEE IROS 2017 — 2017

Program Committee and Reviewer:

- Robotics Science and Systems (RSS) — 2016

Conference and Journal Reviewer:

- IEEE International Conference on Robotics and Automation (ICRA) — 2014 - Present
- IEEE International Conference on Intelligent Robots and Systems (IROS) — 2015 - Present
- IEEE Robotics and Automation Letters (RA-L) — 2016 - Present
- Autonomous Robots (AURO) — 2016 - Present
- IEEE Conference on Computer Vision and Pattern Recognition (CVPR) — 2017 - Present
- International Conference on Computer Vision (ICCV) — 2017
- Asian Conference on Computer Vision (ACCV) — 2018

Media

"Terminator-like vision could help robots do our dishes", *Popular Science*	2015
"Object recognition for robots", *MIT News*	2015
"Robots that can recognize objects? A SLAM dunk", *MIT CSAIL News*	2015
"Soon, robots to get better at identifying objects", *The Hindu*	2015
"Attacking Bitcoin's anonymity with graph analytics", *Linkurious Blog*	2014

Past Projects

MIT DARPA Robotics Challenge Team, *Member, Perception Sub-Team*	2012 – 2013
UM::Autonomy, *Perception Lead / Co-founder*	2007 – 2008

References

John J. Leonard, Professor, Massachusetts Institute of Technology
32-232, 32 Vassar St, Cambridge, MA, USA
Email: jleonard@mit.edu

Nicholas Roy, Professor, Massachusetts Institute of Technology
32-330, 32 Vassar St, Cambridge, MA, USA
Email: nickroy@csail.mit.edu

Srikumar Ramalingam, Associate Professor, The University of Utah
50 Central Campus Drive, Salt Lake City, UT, USA
Email: srikumar@cs.utah.edu

Programming

Programming Languages: C, C++, C++17, Python, Javascript, WebGL/Three.js, CUDA, SIMD/SSE, MATLAB, Bash, Emacs Lisp, SQL.
Software / Libraries: PyTorch, TensorFlow, Caffe, Ceres Solver, OpenCV, Eigen, PCL, LCM/ROS/Gazebo, ISAM/GTSAM, Apache Spark, CGAL, OpenGL, Boost, OpenMP, GDB, Valgrind, Linux
Python: Keras, Scikit-Learn, NumPy, Boost-Python, Cython, Pandas, SciPy, PyTables, NetworkX, graph-tool, Numba, Anaconda

Keywords: Machine Learning, Deep Learning, Semantic Scene Understanding, Computer Vision, Simultaneous Localization and Mapping (SLAM), Structure-from-Motion (SfM), Self-driving cars, Autonomous Robots, Robot Perception, Object Recognition, Localization, Mapping, Probabilistic Graphical Models, Self-supervised Learning, Semi-Supervised Learning, Learning from Demonstration, Sensor Fusion.