

Sanjeev J. Koppal

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EXPERIENCE AND EDUCATION

- | | |
|--|--------------|
| Assistant Professor
<i>University of Florida, Electrical and Computer Engineering</i>
Director of the Florida Optics and Computational Sensor (FOCUS) Lab | 2014-present |
| Member of Technical Staff
<i>Texas Instruments</i>
Imaging R&D Group | 2012-2014 |
| Post-doctoral Research Associate
<i>Harvard University</i>
Mentor: Prof. Todd Zickler | 2009-2012 |
| Graduate Research Assistant
<i>Robotics Institute, Carnegie Mellon University</i>
<i>Ph.D. Robotics Aug 2009</i>
Advisor: Prof. Srinivasa Narasimhan | 2003-2009 |
| Undergraduate Research Assistant
<i>University of Southern California</i>
<i>B.S. Computer Science May 2003</i>
Advisor: Prof. Gaurav Sukhatme | 1999-2003 |

JOURNALS

- J12** Data Fusion for a Vision-Aided Radiological Detection System: Calibration Algorithm Performance
Nuclear Instruments and Methods in Physics A, 2018
K. Stadnikia, K. Henderson, A. Martin, P. Riley, **S. J. Koppal** and Andreas Enqvist
- J11** Focal Flow: Velocity and Depth from Differential Defocus through Motion
International Journal on Computer Vision (IJCV), 2017
E. Alexander, Q. Guo, **S. J. Koppal**, S.J. Gortler, and T. Zickler
- J10** Leveraging gaze data for segmentation and effects on comics
Transactions on Multimedia Computing (TOMM), 2017
I. Thirunarayanan, K. Khetarpal, **S. J. Koppal**, O. LeMeur, J. Shea and E. Jain
- J09** Pre-capture privacy for small vision sensors
Transactions on Pattern Analysis and Machine Intelligence (PAMI) 2016
F. Pittaluga and **S. J. Koppal**
- J08** A survey on computational photography in the small
IEEE Signal Processing Magazine, 2016
S. J. Koppal

J07 Wide-angle structured light with a scanning MEMS mirror in liquid
Optics Express, 2016

X. Zhang, **S. J. Koppal**, R. Zhang, L. Zhou, E. Butler and H. Xie

J06 Beyond perspective dual photography with illumination masks
Transactions on Image Processing (TIP), 2015

S. J. Koppal and S. G. Narasimhan

J05 Generalized assorted camera arrays: robust cross-channel registration and applic.
Transactions on Image Processing (TIP), 2015

J. Holloway and K. Mitra and **S. J. Koppal** and A. Veeraraghavan

J04 Towards wide-angle micro vision sensors

Transactions on Pattern Analysis and Machine Intelligence (PAMI), 2013

S. J. Koppal, I. Gkioulekas, T. Young, H. Park, K. Crozier, G. Barrows and T. Zickler

J03 Exploiting DLP illumination dithering for reconstruction and
photography of high-speed scenes

International Journal on Computer Vision (IJCV), 2011.

S. J. Koppal, S. Yamazaki and S. G. Narasimhan

J02 A viewer-centric editor for stereoscopic cinema

IEEE Computer Graphics and Applications (CG&A), 2011.

S. J. Koppal, L. Zitnick, M. Cohen, S. Kang, B. Ressler and A. Colburn

J01 Appearance derivatives for iso-normal clustering of scenes

Transactions on Pattern Analysis and Machine Intelligence (PAMI), 2008.

S. J. Koppal and S. G. Narasimhan

CONFERENCES

C26 Revealing Scenes by Inverting Structure from Motion Reconstructions

CVPR 2019 *Best Paper Finalist*

F. Pittaluga, **S. J. Koppal**, S. Kang and S. Sinha

C25 A Large Aperture 2-Axis Electrothermal MEMS Mirror for Compact 3-D LiDAR

2019 International Conference on Optical MEMS and Nanophotonics

D. Wang, C. Watkins, M. Aradhya, **S. J. Koppal** and H. Xie

C24 A Compact Omnidirectional Laser Scanner Based on an Electrothermal Tripod
MEMS Mirror for LiDAR

Transducers 2019

D. Wang, C. Watkins, **S. J. Koppal**, M. Li, Y. Ding and H. Xie

C23 EyeVEIL: Degrading Iris Authentication in Eye-Tracking Headsets

ETRA 2019

B. John, **S. J. Koppal** and E. Jain

C22 Learning Privacy Preserving Encodings through Adversarial Training

IEEE Winter Conference on Applications in Vision (WACV), 2019

F. Pittaluga, **S. J. Koppal** and A. Chakrabarti

- C21** Directionally Controlled Time-of-Flight Ranging for Mobile Sensing Platforms
Robotics Science and Systems (RSS), 2018
Z. Tasneem, D. Wang, H. Xie and **S. J. Koppal**
- C20** An Integrated Forward-View 2-Axis MEMS Scanner for Compact 3D LIDAR
NEMS 2018 *Best Student Paper Award*
D. Wang, S. Rojas, A. Shuping, Z. Tasneem, **S. J. Koppal** and H. Xie
- C19** A Compact 3D LIDAR Based on an Electrothermal Two-Axis MEMS Scanner for Small UAV
SPIE 2018
D. Wang, S. Strassle, A. Stainsby, Y. Bai, **S. J. Koppal** and H. Xie
- C18** Designing Light Filters to Detect Skin Using a Low-powered Sensor
SoutheastCon 2018
M. Tariq, A. Ghosh, K. Badillo-Urquiola, A. Jha, **S. J. Koppal**, and P. J. Wisniewski
- C17** Tracking Radioactive Sources through Sensor Fusion of Omnidirectional LIDAR and Isotropic Rad-detectors
3DV 2017
K. Henderson, K. Stadnikia, A. Enqvist and **S. J. Koppal**
- C16** A Compact MEMS-Based Wide-Angle Optical Scanner
International Conference on Optical MEMS and Nanophotonics (OMN), 2017
B. Yang, L. Zhou, X. Zhang, D. Wang, **S. J. Koppal** and H. Xie
- C15** Situational Information Guidance for Revised Detection Limits
Nuclear Science Symposium / Medical Imaging Conference 2017
K. Stadnikia, K. Henderson, **S. J. Koppal** and A. Enqvist
- C14** A Wide-angle Immersed MEMS Mirror and Its Application in OCT
International Conference on Optical MEMS and Nanophotonics, 2016
X. Zhang, L. Zhou, C. Duan, D. Zheng, **S. J. Koppal**, and H. Xie
- C13** Data Fusion for a Vision-Radiological System: Calibration Algorithm Response to Sensor Location
INMM 2016
K. Stadnikia, A. Martin, P. Riley, K. Henderson, **S. J. Koppal** and A. Enqvist
- C12** Focal flow: Measuring distance and velocity with defocus and differential motion
ECCV 2016 Best Student Paper
E. Alexander, Q. Guo, **S.J. Koppal**, S.J. Gortler, and T. Zickler
- C11** Sensor-level privacy for thermal cameras
International Conference on Computational Photography (ICCP), 2016
F. Pittaluga, A. Zivkovic and **S. J. Koppal**
- C10** Low-cost depth and radiological sensor fusion to detect moving sources
3DV, 2015
P. Riley, A. Enqvist and **S. J. Koppal**

C09 Privacy preserving optics for miniature vision sensors
Conference on Computer Vision and Pattern Recognition (CVPR), 2015
F. Pittaluga and **S. J. Koppal**

C08 Data Fusion for a Vision-Radiological System for Source Tracking and Discovery
Advancements in Nuclear Instrumentation Measurement Methods and their Applic., 2015
A. Enqvist and **S. J. Koppal**

C07 MEMS mirrors submerged in liquid for wide-angle scanning
International Conference on Solid-State Sensors, Actuators and Microsystems, 2015
X. Zhang, R. Zhang, **S. J. Koppal**, E. Butler, X. Cheng and H. Xie

C06 Wide-angle micro sensors for vision on a tight budget
Conference on Computer Vision and Pattern Recognition (CVPR), 2011.
S. J. Koppal, I. Gkioulekas, T. Zickler and G. Barrows

C05 Shadow cameras: Reciprocal views from illumination masks
International Conference on Computer Vision (ICCV), 2009.
S. J. Koppal and S. G. Narasimhan

C04 Temporal dithering of illumination for fast active vision
European Conference on Computer Vision (ECCV), 2008.
S. G. Narasimhan, **S. J. Koppal** and S. Yamazaki

C03 Novel depth cues from uncalibrated near-field lighting
International Conference on Computer Vision (ICCV), 2007.
S. J. Koppal and S. G. Narasimhan

C02 Clustering appearance for scene analysis
Conference on Computer Vision and Pattern Recognition (CVPR), 2006.
S. J. Koppal and S. G. Narasimhan

C01 Structured light from scattering media
International Conference on Computer Vision (ICCV), 2005.
S. G. Narasimhan, S. K. Nayar, B. Sun and **S. J. Koppal**

Book chapters

BC02 Koppal S.J. (2014/2019) Lambertian Reflectance. In: Ikeuchi K. (eds) Computer Vision. Springer, Boston, MA

BC01 Koppal S.J. (2014/2019) Diffuse Reflectance. In: Ikeuchi K. (eds) Computer Vision. Springer, Boston, MA

Workshops and other publications

W04 A low-power structured light sensor for outdoor scene reconstruction and dominant material identification
International Workshop on Projector-Camera Systems, 2012

C. Mertz, **S. J. Koppal**, S. Sia and S. G. Narasimhan

W03 Illustrating motion through DLP Photography
PROCAMS, 2008

S. J. Koppal and S. G. Narasimhan

W02 Leveraging Gaze Data for Segmentation and Effects on Comics
ACM Symposium on Applied Perception Poster, 2016

I. Thirunarayanan, **S. J. Koppal**, J. Shea and E. Jain

W01 Taylor Series of Appearance Functions

CMU-Robotics Institute Technical report, 2006

S. J. Koppal, A. Datta, S. G. Narasimhan and K. Nishino

PATENTS

P07 S. J. Koppal, S.B. Kang, C.L. Zitnick, M.F. Cohen, and B.K. Ressler
Stereo movie editing, US Patent 8,330,802

P06 T. Zickler, **S. J. Koppal**, G. L. Barrows and I. Gkioulekas
Optical micro-sensor, US Patent 9,176,263

P05 S. J. Koppal

Depth sensor data with real-time processing of scene sensor data , US Patent 9,767, 545

P04 S. J. Koppal

Time-of-Flight (TOF) Assisted Structured Light Imaging , US Patent Application
US20150062558A1 (Pending)

P03 S. J. Koppal

Controlling Image Focus in Real-Time Using Gestures and Depth Sensor Data, US Patent
Application US20150022649A1 (Pending)

P02 S. J. Koppal and F. Pittaluga

Optical privatizing device US Patent Application US20180063509A1 (Pending)

P01 Huikai Xie, **S. J. Koppal**, X. Zhang, L. Zhou and C. Duan

Endoscopic oct probes with immersed mems mirrors, WO2018023010A1 (Pending)

FUNDING AWARDS (TOTAL ~ \$2.5M, PI SHARE ~ \$1.25M)

F06 Dynamic Light Transport Acquisition and Applications to Computational Illumination (2019-2022)

National Science Foundation (NSF) 1909729

Total ~ \$500,000 PI share ~ \$250,000

F05 Directionally Controlled Time-of-Flight Sensors: Algorithms, Optical and Imaging (2018-2021)

Office of Naval Research (ONR) N00014-18-1-2663

Total ~ \$780,000 PI share ~ \$390,000

F04 Novel Micro-LIDAR design and sensing algorithms for flapping-wing Micro-aerial Vehicle (2015-2019)

National Science Foundation (NSF) 1514154

Total ~ \$400,000 PI share ~ \$200,000

F03 Radiological Source Detection and Tracking Based on Multi-Sensor Data Fusion (2014-18)

Department of Homeland Security (DHS) 2014-DN-077-ARL083-03

Total ~ \$890,000, co-PI share ~ \$460,000

F02 Wide-angle optics for micro-LIDAR sensor (2018-2020)

MIST Center Award, Total ~ \$100000, PI share ~ \$50000

F01 Texas Instruments Embedded Processing University Funding Award (2013)

TEACHING

T02 Computational Photography, Fall 2014-present

Latest rating 4.3 for undergraduates and 4.5 for graduate students

I developed this Computational Photography course from scratch at UF, and which received its official course numbers recently (EEL 4403/5406). This course contains hands-on lab activity, where simple but powerful computational photography techniques were implemented in-lab, using just cellphone cameras and a few support structures (such as optical masks or a tripod). To inspire students further, the support structures were also designed and built by the students using 3D printers.

T01 Signals and Systems, Spring 2015-present

Latest rating 3.8 for undergraduates

EEL 3135 (Signals and Systems) is a core course for an undergraduate degree in Electrical and Computer Engineering at UF. The goal of the course is to garner a practice-based understanding of time-varying information (signals) and the software/circuits needed to process these (systems). I exploit the flipped nature of the class to help students develop abstract complex number processing skills, so that future courses that delve into the theory of signals and systems are accessible.

STUDENTS

Ph.D. Students

D06 Xiaoyang Zhang, graduated 2016 (co-advised)

Thesis: Robust Electrothermally Actuated Scanner for Fiberoptic Endoscopic Imaging and Wide-angle Optics

Magic Leap (first appointment)

D05 Francesco Pittaluga, graduated May 2019

Thesis proposed: Privacy Preserving Computational Cameras

2018 Microsoft Research Dissertation Awardee

NEC Labs (first appointment)

D04 Kristofer Henderson, expected May 2020

Thesis proposed: Lightweight Sensor Fusion using Radial Trajectories

D03 Xiaomeng Liu, expected May 2021

D02 Justin Folden, expected May 2023

D01 Brevin Tilmon, expected May 2024

Thesis committees

Richard Al-Bayaty Electrical and Computer Engineering

Manu Chandran Electrical and Computer Engineering

Pratik Brahma Electrical and Computer Engineering

Chiranjib Sur Computer Engineering

Kelsey Stadniki Nuclear Engineering Sciences

Xiaohui Huang Computer Science

Inchul Choi Computer Science

Xianjin Dai Biomedical Engineering

Paul Johns Nuclear Engineering Science

AWARDS

Best Paper Award Finalist (CVPR 2019)

Best Student Paper Award (NEMS 2018)

Best Student Paper Award (ECCV 2016)

Outstanding Reviewer Award (ECCV 2016)

USC Computer Science Award for Outstanding Achievement (2003)

USC Trustee Scholarship (full tuition) (1999-2003)

USC Undergraduate Engineering Research Award (1999-2003)

SERVICE

S04 Area chair for Computer Vision and Pattern Recognition (CVPR) 2019/2020

S03 Co-chair for Cameras and Computational Displays (CCD) 2018 workshop held in conjunction with CVPR 2018/2019

S02 Posters/Demos co-chair for International Conference on Computational Photography (ICCP) 2018 and 2020

S01 Reviewer for Scholarly Journals/Conferences

IEEE Pattern Analysis and Machine Intelligence (PAMI), IEEE Transactions on Image Processing (TIP), International Journal on Computer Vision (IJCV), Computer Vision and Pattern Recognition (CVPR), European Conference on Computer Vision (ECCV), International Conference on Computer Vision (ICCV), International Conference on Computational Photography (ICCP)

INVITED TALKS

IT 11 Optics and Sensing for Small Vision Platforms
FAU I-SENSE

Boca Raton, FL (Oct 2019)

IT 10 Toward Miniature Computer Vision Sensors
OSA Imaging Systems and Applications
Orlando, FL (June 2018)

IT 09 Small Vision Sensors for Phenomics
Phenome
Tucson, AZ (February 2018)

IT 08 Towards Privacy Preserving Cameras
ASU SENSIP
Phoenix, AZ (2018)

IT 07 Wide-FOV Sensing & Optical Processing for Small Vision Applications
OSA Incubator on Small Eyes and Smart Minds
Washington, DC (October 2017)

IT 06 Towards Privacy Preserving Cameras
IRISA-Rennes
Rennes, France (2017)

IT 05 Towards Privacy Preserving Cameras
Technicolor R&D Labs
Rennes, France (2017)

IT 04 Towards Privacy Preserving Cameras
INRIA-Bordeaux/LPN2
Bordeaux, France (2017)

IT 03 Towards Privacy Preserving Cameras
UCF CRCV
Orlando, FL (2017)

IT 02 Towards Micro Vision Sensors
UCF CREOL
Orlando, FL (2017)

IT 01 Privacy Preserving Sensors
University of Miami CSD
Miami, FL (2015)

MEDIA COVERAGE

MC 04 "RoboBees Can Fly and Swim. What's Next? Laser Vision"
Smithsonian Magazine

MC 03 "RoboBee Lidar Useful for Robocars?"
IEEE Spectrum

MC 02 "RoboBees' with Laser Eyes Could Locate Disaster Victims"
NBC News

MC 01 "Scientists Are Using Lasers to Teach RoboBees to See"
Smithsonian Magazine

OTHER INFORMATION

Languages: English, Hindi, Kannada

Citizenship: U.S.A

Lab Website: focus.ece.ufl.edu