Kuya Takami, Ph.D.

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EDUCATION

Virginia Polytechnic Institute and State University Blacksburg, VA
Ph.D., Mechanical Engineering, 2015
Thesis: "Non-Field-of-View Acoustic Target Estimation"
Advisor: Professor Tomonari Furukawa

University of Wisconsin-Madison Madison, WI
M.S., Mechanical Engineering, 2011
Advisor: Professor Scott Sanders

University of Wisconsin-Madison Madison, WI
B.S., Biomedical Engineering (Biomechanics), 2008

RESEARCH INTERESTS

Robotics, Perception, Localization and Mapping, Mobile robots

APPOINTMENTS

GEORGE WASHINGTON UNIVERSITY Washington DC
Postdoctoral Research Fellow (08/2016-Present)
Flight Dynamics and Control Lab with Professor Taeyoung Lee

- Conducting research on probabilistic multi-UAV (Unmanned Aerial Vehicle) autonomous exploration and Simultaneous Localization and Mapping.
- Developed deep learning based sensor upstream enhancement on mobile robot depth perception.
- Creating probabilistic framework based on time dependent sensor fusion.

VIRGINIA TECH Blacksburg, VA
Postdoctoral Research Fellow (10/2015 07/2016)
Computational Multiphysics and Systems Lab with Professor Tomonari Furuakwa

- Primary researcher on National Science Foundation EAGER project, non-line-of-sight (NLOS) target localization in an unknown environment.
  - Developed probabilistic approach to NLOS visual/ acoustical target estimation based on recursive Bayesian estimation framework, and conducting test on human/ mobile sensor platform for human-robot-interaction.
  - Collaboration with Daniel Kish, president of World Access for the Blind, for perception of acoustic diffraction and reflection signal processing for human echolocation experts.
  - Grant proposal writing for National Robotics Initiative (NRI) NSF16-517 with Dr. Furukawa.
- Leader of Mohamed Bin Zayed International Robotics Challenge 2017 mobile manipulator team for the Challenge 2. The project consists of perception, navigation, and manipulation based on actual mobile robots to operate the valve with tools.

- Developed and implemented an FPGA based high-resolution imaging system with the integration to tire testing machine at Toyo Rubber.
- Developing an autonomous car and associative technologies including new sensors for a project sponsored by General Motors and Murata Manufacturing.
- Advising one MS student for the NSF EAGER project and mentoring a senior design project, Self-Driving Vehicle Team, consisting of nine senior students.

Graduate Research Assistant/ *Graduate Teaching Assistant (08/2011-09/2015)

- Developed NLOS hybrid optical/acoustical target localization scheme to model and predict the state of sound source in a complex environment (2011-2015).
- Modeled sound reflection/diffraction based NLOS target estimation for mobile robot localization (2011-2015).
- Assisted underwater autonomous navigation project on sonar localization simulation using simultaneous localization and mapping (SLAM) funded by Office of Naval Research (2011-2012).
- Worked on real-time autonomous driving using Grid-based SLAM in collaboration with ZMP and University of Technology, Sydney (2012-2014).
- Worked on tire noise prediction model entailing mathematical formulations, and fluid-solid interaction modeling funded by NSF Center for Tire Research (2012-2015).

BRIDGESTONE AMERICAS, INC Akron, OH (05 - 08/2014)
Advanced Tire Technology - Research intern

- Developed tire noise analysis procedure and designed and implemented tire noise experimental device based on an FPGA controller.

ZMP, INC Tokyo, Japan (01 - 07/2013)
Research Engineer in Autonomous Vehicles

- Assisted programming and hardware development for an autonomous driving vehicle, including data acquisition, implementation of SLAM, and vehicle modeling/control.
- Designed and constructed a quadrupedal machine learning-based evolving robot by calculating kinematics and specifying components.

UNIVERSITY OF WISCONSIN-MADISON Madison, WI (03/2009 - 08/2011)
Graduate Research Assistant for Engine Research Center

- Conducted laser and fiber optics centered research optimizing optical element design in harsh environments.
- Developed a noninvasive laser grid tomography temperature measurement system for jet and IC engines.

UNIVERSITY OF WISCONSIN HOSPITAL Madison, WI (08/2007 - 12/2008)
MRI Research Assistant for Radiology Department

- Studied MRI-based knee analysis, quantified quality of the image, and determined change of cartilage volumes.

SELECTED JOURNAL PAPERS

1. E. Kaufman, **K. Takami**, T. Lee, Z. Ai. “Autonomous Exploration with Exact Inverse Sensor Models,” Springer Journal of Intelligent & Robotic Systems, (March 2017 Accepted)
2. **K. Takami**, L. Hangxin, T. Furukawa, M. Kumon, G. Dissanayake. “Reflection and Diffraction Signals based Recursive Bayesian Estimation for Non-Field-of-View Target,” (in preparation).
3. **K. Takami**, T. Furukawa. “Development of a High-Resolution Measurement System for Rotating Deformable Body,” Journal of Visualization (under review).

4. **K. Takami**, T. Furukawa, M. Kumon, D. Kimoto, and G. Dissanayake. “Estimation of a Nonvisible Field-of-View Mobile Target Incorporating Optical and Acoustic Sensors,” Autonomous Robots, 2015.
5. **K. Takami**, T. Furukawa, M. Kumon, and G. Dissanayake. “Non-Field-of-View Acoustic Target Estimation in Complex Indoor Environment,” Springer Tracts in Advanced Robotics, 2015.
6. J. M. Whitney, **K. Takami**, S. T. Sanders, and Y. Okura. “Design of system for rugged, low-noise fiber-optic access to high-temperature, high-pressure environments,” Sensors Journal, IEEE, 2011.
7. A. Xinliang, T. Kraetschmer, **K. Takami**, S. T. Sanders, L. Ma, et al. “Validation of temperature imaging by H_2O absorption spectroscopy using hyperspectral tomography in controlled experiments,” Journal of Applied Optics, 2011.

SELECTED CONFERENCE PAPERS AND WORKSHOP

1. **K. Takami**, T. Lee, “Environment dependent depth enhancement with multi-modal sensor fusion learning,” IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2017 (Submitted)
2. **K. Takami**, H. Liu, T. Furukawa, M. Kumon, and G. Dissanayake, “Non-Field-of-View Sound Source Localization Using Diffraction and Reflection Signals,” IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2016
3. **K. Takami**, H. Liu, T. Furukawa, M. Kumon, and G. Dissanayake, “Recursive Bayesian Estimation of NFOV Target Using Diffraction and Reflection Signals,” ISIF International Conference on Information Fusion, 2016
4. **K. Takami**, T. Furukawa, M. Kumon, and L. Mak,“Non-Field-of-View Indoor Sound Source Localization based on Reflection and Diffraction,” Multi-sensor Integration and Fusion, IEEE, 2015.
5. **K. Takami**, T. Furukawa, M. Kumon, and G. Dissanayake. “Non-Field-of-View Acoustic Target Estimation in Complex Indoor Environment,” Field and Service Robotics, 2015.
6. T. Furukawa, **K. Takami**, X. Tong, D. Watman, A. Hamed, R. Ranasinghe and G. Dissayanake, “Map-based Navigation of an Autonomous Car Using Grid-based Scan-to-Map Matching,” ASME IDETC, 2015.
7. **K. Takami** and T. Furukawa,“High-Resolution Deformation Measurement System for Fast Rotating Tire ” ASME IDETC/CIE, 2015.
8. **K. Takami** and T. Furukawa,“High-Resolution Deformation Measurement System for Fast Rotating Tires Towards Noise Prediction,” Euronoise., 2015.
9. M. Kumon, D. Kimoto, **K. Takami** and T. Furukawa. “Bayesian non-field-of-view target estimation incorporating an acoustic sensor,” IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2013.

HONORS AND AWARDS

2007 Most Outstanding Physics Award†
2012 Pratt Graduate Fellowship‡
2015 ASME:IDETC/CIE Best Student Paper Award
2011 Pratt Graduate Fellowship‡
2014 Pratt Graduate Fellowship‡

†: Scholarship to the best student in two semester physics courses at University of Wisconsin-EC
‡: Awarded to students who are aggressively recruited by other top engineering colleges

TECHNICAL STRENGTH

Computer Languages: C/C++ (8/10), Python (7/10)
Software: ROS, MATLAB
CAD & FEA: SolidWorks, PTC Creo
System: Windows, Linux, OS X
Languages: English, Japanese (native)