

# KUYA TAKAMI, Ph.D.

## Postdoctoral Research Fellow

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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

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## APPOINTMENTS

### VIRGINIA TECH

#### Postdoctoral Research Fellow

Blacksburg, VA

(10/2015 - Present)

Computational Multiphysics and Systems Lab with Professor Tomonari Furukawa

- 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.

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## JOURNAL PAPERS

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1. **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).
2. **K. Takami**, T. Furukawa. "Development of a High-Resolution Measurement System for Rotating Deformable Body," Journal of Visualization (under review).
3. **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.
4. **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.
5. 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.
6. A. Xinliang, T. Kraetschmer, **K. Takami**, S. T. Sanders, L. Ma, et al. "Validation of temperature imaging by H<sub>2</sub>O absorption spectroscopy using hyperspectral tomography in controlled experiments," Journal of Applied Optics, 2011.

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## CONFERENCE PAPERS AND WORKSHOP

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1. **K. Takami**, H. Liu, T. Furukawa, M. Kumon, and G. Dissanayake, "Recursive Bayesian Estimation of NFOV Target Using Diffraction and Reflection Signals" IEEE FUSION, 2016 (accepted)
2. **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.
3. **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.
4. 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.
5. **K. Takami** and T. Furukawa, "High-Resolution Deformation Measurement System for Fast Rotating Tire," ASME IDETC/CIE, 2015.
6. **K. Takami** and T. Furukawa, "High-Resolution Deformation Measurement System for Fast Rotating Tires Towards Noise Prediction," Euronoise., 2015.
7. M. Kumon, D. Kimoto, **K. Takami** and T. Furukawa, "Acoustic recursive Bayesian estimation for non-field-of-view targets," In Image Analysis for Multimedia Interactive Services (WIAMIS), IEEE, 2013.
8. M. Kumon, D. Kimoto, **K. Takami** and T. Furukawa. "Bayesian non-field-of-view target estimation incorporating an acoustic sensor," In Intelligent Robots and Systems, IEEE/RSJ International Conference, 2013.

9. **K. Takami**, S. Taheri, M. Taheri and T. Furukawa, "Prediction of Railroad Track Foundation Defects Using Wavelets," Joint Rail Conference, ASME, 2013.

## HONORS AND AWARDS

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

†: 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

## INVITED TALKS AND GUEST LECTURES

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- "High-Resolution Deformation Measurement System for Fast Rotating Tires Towards Noise Prediction" speaker at Apollo Tyres Global RD, Netherland, Mar. 2015
- "High-Resolution Deformation Measurement System for Fast Rotating Tires Towards Noise Prediction" speaker at Applied Mechanics at Twente University, Netherland, Mar. 2015
- "Visualization system for Tire rolling rig", speaker at Bridgestone, Aug. 2014

## MISCELLANEOUS

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### Grant proposal:

- NSF National Robotics Initiative (Pending): Participated as a grant writer
- NSF 1554961 (Granted \$165k): Reflection and Diffraction Sound Signals for Non-Field-of-View Target Estimation, Participated as a grant writer
- MURATA (Granted \$265k): Contributed to technical development

### Service to the field:

Reviewer: ASME Journal of Vibration and Acoustics, IEEE IROS

### Mentoring:

Hangxin Liu: Virginia Tech Undergraduate - beginning MS at UCLA

Alex Giratd: Virginia Tech MS

Yung Wang: Virginia Tech Undergraduate

- **Instructor** (ME 2024-Engineering Design and Economics): Lectured mechanical engineering students on product development (Fall 2013).
- **Project Advisor** (ME4015/4016): Supervised senior design project on autonomous driving, and automotive alternator design and experimental validation (2011-2012).

## TECHNICAL STRENGTH

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Computer Languages:	C/C++, Java	System:	Windows, Linux, OS X
Software:	ROS, MATLAB, Visual Studio	Languages:	English, Japanese (native)
CAD & FEA:	SolidWorks, PTC Creo, Abaqus		

## EXTRACURRICULAR EXPERIENCE

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Organization	Mechanical Engineering Graduate Student Council (2013-2015) Mechanical Engineering Graduate Ambassador (2013-2015) President of VT Slackline Club (2011-2014) President of Japanese Conversation Group (2012-2015) President of Japanese Cultural Society in University of Wisconsin-EC (2005-2006)
Volunteer	Graduate student mentor (2014-Present)
Society	National Society of Leadership and Success, Biomedical Engineering Society

## REFERENCES

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- Dr. Tomonari Furukawa  
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- Dr. Robert Parker  
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- Dr. Scott Sanders  
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