

# John C. Kegelman

PH.D. CANDIDATE AT STANFORD UNIVERSITY

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## Education

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### Stanford University

PH.D. IN MECHANICAL ENGINEERING

Stanford, CA

Apr. 2012–PRESENT

- Thesis topic: Learning from Highly-Skilled Drivers to make Automated Vehicles Safer

### Stanford University

M.S. IN MECHANICAL ENGINEERING

Stanford, CA

Sep. 2009–Apr. 2012

- Coursework focused on controls, advanced dynamics and simulation, and electromechanical design.

### Johns Hopkins University

B.S. IN MECHANICAL ENGINEERING

Baltimore, MD

Sep. 2005–May 2009

- 4.0 GPA. Minored in Entrepreneurship and Management.

## Research Interests

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I investigate how we can learn from highly-skilled race car drivers to make automated vehicles safer. I explore how human control techniques at the limits of handling can be adapted into algorithms for autonomous vehicles. I can contribute a deep understanding of vehicle dynamics and controls with practical experience and a great appreciation that all models are wrong, but some are useful.

## Experience

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### Dynamic Design Lab

GRADUATE RESEARCH ASSISTANT, PI: PROF. J. CHRISTIAN GERDES

Stanford, CA

Sep. 2009–PRESENT

- Collected, compiled, analyzed, and openly published vehicle dynamics data from highly-skilled professional race car drivers during live racing events to gain insights into vehicle control at the limits of handling.
- Compared human performance with autonomous vehicles to improve operating capabilities of active vehicle safety systems.
- Implemented autonomous vehicle control using drive-by-wire hardware and convex optimization software to operate at the handling limits while following a desired trajectory.
- Implemented and tested control algorithms on experimental vehicles using C and MATLAB.
- Pioneered a comprehensive, noninvasive vehicle instrumentation suite for vintage race cars with significant historical value.
- Developed a graphical user interface in MATLAB for vehicle data visualization and exploratory data analysis.
- Assembled and maintained an end-to-end solution from surveyed GNSS base stations to on-board integrated navigation systems enabling research vehicles to operate reliably with centimeter-level position measurement accuracy.
- Installed and operated a Linux-based NTRIP caster to broadcast Differential GNSS corrections from multiple servers to multiple clients.

### Stanford Department of Mechanical Engineering

SENIOR TEACHING ASSISTANT — MECHANICAL SYSTEMS DESIGN, PROFS. MARK CUTKOSKY AND PAUL MITIGUY

Stanford, CA

Jan.–Mar. 2016

- Developed curriculum and coordinated team of five other teaching assistants.
- Led hands-on laboratory and tutorial sessions for course with 150 undergraduates exploring characteristics of machine elements.
- Advised design-project teams emphasizing the balance of physical and virtual prototyping based on engineering analysis.

TEACHING ASSISTANT — MECHANICAL SYSTEMS DESIGN, PROF. J. CHRISTIAN GERDES

Jan.–Mar. 2012

- Aided hands-on laboratory and tutorial sessions for course with 150 undergraduates exploring characteristics of machine elements.
- Advised design-project teams emphasizing the balance of physical and virtual prototyping based on engineering analysis.

### Johns Hopkins Department of Mechanical Engineering

TEACHING ASSISTANT — MECHANICAL ENGINEERING FRESHMAN LABORATORY, PROF. ALLISON OKAMURA

Baltimore, MD

Sep.–Dec. 2008

- Helped plan, organize, and conduct weekly hands-on laboratory sessions.
- Provided assistance during weekly laboratory sessions for approximately 20 students per session exploring basic physical science and engineering principles pertaining to mechanical engineering.

UNDERGRADUATE RESEARCH ASSISTANT, PI: PROFS. CHARLES MENEVEAU AND JOSEPH KATZ

Jan.–May 2007

- Designed and documented new test section, including a fractal canopy, for the project titled *Measuring and Modeling Interactions of the Turbulent Atmospheric Boundary Layer with Multiscale Ground Topology* to be conducted in the laboratory's axial turbomachinery water tunnel.

### Johns Hopkins University Applied Physics Laboratory

Laurel, MD

BIOMEDICINE GROUP INTERN, PI: DR. JAMES BEATY

May–Aug. 2008

- Developed method for capturing primate hand motion using Vicon cameras for the Revolutionizing Prosthetics Program.
- Designed and installed two on-site camera systems, prepared internal manual documentation, and trained multiple staff members to use the system proficiently.

### NASA Langley Research Center

Hampton, VA

LANGLEY AEROSPACE RESEARCH SUMMER SCHOLAR, PI: STEVEN BAUER

Jun.–Aug. 2007

- Collected and compiled experimental data from wind tunnel testing of the separation event of Ares I-X, the experimental flight test vehicle for NASA's next crew launch vehicle.
- Collected, compiled, and analyzed computational data using NASA-developed computational fluid dynamics (CFD) software for the descent database of the Upper Stage Simulator.

### New Horizons Governor's School for Science and Technology

Hampton, VA

CHIEF INVESTIGATOR, PI: DICK DELOACH

Sep. 2004–May 2005

- Research and mentorship program with NASA Langley Research Center.
- Investigated various swimming techniques by applying the Modern Design of Experiments to the biomechanics of swimming.

## Publications

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### JOURNAL ARTICLES

Insights into vehicle trajectories at the handling limits: analysing open data from race car drivers

John C. Kegelman, Lene K. Harbott, J. Christian Gerdes

*Vehicle System Dynamics* November (2016). 2016

### CONFERENCE PROCEEDINGS

Analysis of Measured Racing Lines : A Path Primitive Based Curve Fitting Approach

Guido Koch, John C. Kegelman, J. Christian Gerdes

*The 11th International Symposium on Advanced Vehicle Control*, 2012

Repeatability of arm pull patterns in front crawl swimming

Lester K. Su, John C. Kegelman

*American Physical Society, 62nd Annual Meeting of the APS Division of Fluid Dynamics*, 2009

## Honors & Awards

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2009–2012 Stanford Graduate Fellowship in Science and Engineering

2009 NCAA Postgraduate Scholarship

2009 ESPN The Magazine Academic All-American of the Year

2008 Barry M. Goldwater Scholarship

2008 Johns Hopkins University Provost's Undergraduate Research Award

2008 Robert George Gerstmyer Award, Johns Hopkins Department of Mechanical Engineering

2007–2009 Hodson Trust Scholarship

2005–2007 Michael Bloomberg Scholarship

2007 American Society of Heating, Refrigeration and Air Conditioning Engineers Scholarship,  
Baltimore Chapter

2006, 2008 Honorable Mention All-American, NCAA Division III Swimming

2005 Balanced Man Scholarship, Sigma Phi Epsilon, Johns Hopkins Chapter

2005 Armed Forces Communication and Electronics Association Scholarship, Tidewater Chapter

## Extracurricular Activity

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2012–2014	Club Cycling Team	<i>Stanford University</i>
2009–2013	<b>President</b> , 2010–2012, Club Triathlon Team	<i>Stanford University</i>
2005–2009	<b>Captain</b> , 2007–2009, Varsity Men’s Swim Team	<i>Johns Hopkins University</i>
2007	<b>President</b> , 2008–2009, Pi Tau Sigma, Mechanical Engineering Honor Society	<i>Tau Alpha Chapter</i>
2007	Tau Beta Pi, Engineering Honor Society	<i>Maryland Alpha Chapter</i>

## Personal

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- Born May 6, 1987, St. Louis, Missouri, USA.