John C. **Kegelman**

Ph.D. Candidate at Stanford University

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Education

Stanford University — *Stanford, CA*

Ph.D. in Mechanical Engineering — *Apr. 2012–PRESENT*

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

Stanford University — *Stanford, CA*

M.S. in Mechanical Engineering — *Sep. 2009–Apr. 2012*

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

Johns Hopkins University — *Baltimore, MD*

B.S. in Mechanical Engineering — *Sep. 2005–May 2009*

- 4.0 GPA. Minored in Entrepreneurship and Management.

Research Interests

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

Dynamic Design Lab — *Stanford, CA*

Graduate Research Assistant, PI: Prof. J. Christian Gerdes — *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 — *Stanford, CA*

Senior Teaching Assistant — Mechanical Systems Design, Profs. Mark Cutkosky and Paul Mitiguy — *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 — *Baltimore, MD*

Teaching Assistant — Mechanical Engineering Freshman Laboratory, Prof. Allison Okamura — *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 porgram with NASA Langley Research Center.
- Investigated various swimming techniques by applying the Modern Design of Experiments to the biomechanics of swimming.

Publications

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

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

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

Personal

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