



## Jonathan P. Fiene

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## Education

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### **Doctor of Philosophy, Mechanical Engineering, Stanford University, Stanford, CA**

Concentration: Haptics and Mechatronics, 3.76 GPA

Thesis Title: Toward Realistic Haptic Interactions with Virtual Rigid Objects, Advisor: Dr. Günter Niemeyer

Completion Date: January 2007

### **Master of Science, Mechanical Engineering, Stanford University, Stanford, CA**

Concentration: Mechatronics, 3.81 GPA, Breadth Areas: Robotics, Biomechanics and Vehicle Dynamics

Completion Date: June 2003

### **Bachelor of Science, Mechanical Engineering, University of Nevada, Las Vegas, NV**

Concentration: Mechanical Design and the Honors Program, 3.94 GPA

Summa cum Laude, top graduate in the College of Engineering

Completion Date: May 2001

## Academic Appointments

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### **Senior Lecturer - University of Pennsylvania, Philadelphia, PA**

Department: Mechanical Engineering and Applied Mechanics

July 11 - present

### **Lecturer - University of Pennsylvania, Philadelphia, PA**

Department: Mechanical Engineering and Applied Mechanics

September 2007 - July 2011

### **Director of Laboratory Programs - University of Pennsylvania, Philadelphia, PA**

Department: Mechanical Engineering and Applied Mechanics

September 2008 - present

### **Postdoctoral Research Fellow - Johns Hopkins University, Baltimore, MD**

Computer-Integrated Surgical Systems and Technology ERC, Advisor: Dr. Gabor Fichtinger

January 2007 - September 2007

## Teaching

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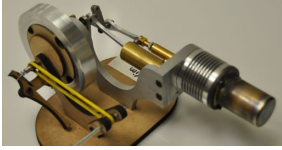
### **Introduction to Mechanical Design (MEAM 101) - University of Pennsylvania**

Targeting mechanical engineering freshman as well as students in other majors, this course covers the fundamentals of the mechanical design process, including needfinding, product definition, computer-aided design, basic computer simulation; rapid prototyping, and various fundamental design principles. This course was redesigned for the Spring of 2008. *Semesters taught (students):* Spring'08 (53), Spring'09 (90), Fall'09 (48), Spring'10 (65), Fall'10 (49), Spring'11 (70), Fall'11 (49), Spring'12 (68)



### **Fundamentals of Mechanical Prototyping (MEAM 150) - University of Pennsylvania**

Intended for mechanical engineering sophomores, this course provides an immersive, hands-on education in prototype development and fabrication, including layout, measurement, part generation, milling, turning, computer-controlled machining, and other manufacturing processes. Through the construction of a semester-long project, students gain proficiency in the skills necessary to successfully prototype a variety of mechanical systems. This course was redesigned for the Spring of 2008. *Semesters taught (students):* Spring'08 (19), Summer'08 (10), Fall'08 (24), Spring'09 (23), Summer'09 (14), Fall'09 (23), Spring'10 (20), Summer'10 (16), Fall'10 (22), Spring'11 (20)



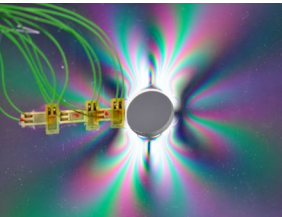
### Machine Design and Manufacturing (MEAM 201) - University of Pennsylvania

This course replaced MEAM150 after the Spring of 2011 to integrate additional theoretical components and more closely tie the manufacturing content to core mechanical-engineering design principles. *Semesters taught (students): Fall'12 (31), Spring'12 (25)*



### Engineering Mechanics: Dynamics (MEAM 211) - University of Pennsylvania

This required sophomore-level course introduces the basic concepts in kinematics and dynamics that are necessary to understand, analyze and design mechanisms and machines. *Semesters taught (students): Spring'08\* (33)*



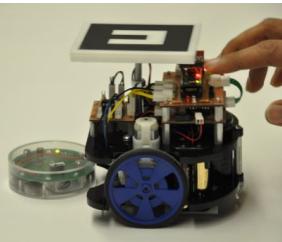
### Sophomore Design Laboratory (MEAM 247 a/b) - University of Pennsylvania

This required sophomore-level laboratory course teaches principles of experimentation and measurement systems as well as design. The Fall semester follows closely with MEAM 210 (Statics and Strength of Materials), while the Spring semester is coordinated with both MEAM 203 (Thermodynamics) and MEAM 211 (Engineering Mechanics: Dynamics). *Semesters taught (students): Spring'08 (33), Fall'08 (59), Spring'09 (53), Fall'09 (66), Spring'10 (67), Fall'10 (58), Spring'11 (56), Fall'11 (75), Spring'12 (66)*



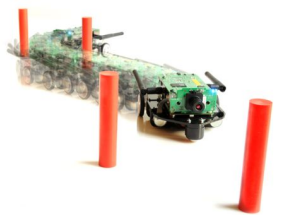
### Junior Design Laboratory (MEAM 347) - University of Pennsylvania

This required junior-level lab course teaches the principles of design and measurement systems including basic electromechanical systems. It follows MEAM 302 (Fluid Dynamics) and MEAM 321 (Vibrations) including experiments in fluid mechanics, and vibration in mechanical systems. *Semesters taught (students): Fall'07\* (61), Fall'08\* (32)*



### Design of Mechatronic Systems (MEAM 410/510) - University of Pennsylvania

Designed for upper-level undergraduates and graduate students, this hands-on, project-based elective provides an integrated introduction to mechanical design (prototyping, materials, actuators and sensors, and fundamental kinematics), electronics (basic circuits, filters, op amps, logic, interface elements), and computing (microprocessor technology, basic control theory, input/output, programming). A number of custom circuits and hardware have been developed to support this course which was largely redesigned for the Fall of 2009. Press related to the 2011 final event can be found on [medesign.seas.upenn.edu](http://medesign.seas.upenn.edu). *Semesters taught (students): Fall'07\* (32), Fall'08 (25), Fall'09 (45), Fall'10 (68), Fall'11 (82)*



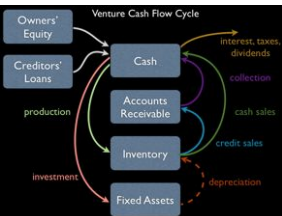
### Introduction to Robotics (MEAM 420/520, CIS 390) - University of Pennsylvania

This upper-level undergraduate/graduate elective course presents the fundamental kinematic, dynamic, and computational principles underlying modern robotic systems. The main topics of the course include: coordinate transformations, manipulator kinematics, mobile-robot kinematics, actuation and sensing, feedback control, vision, motion planning, and learning. The material is reinforced with hands-on lab exercises including basic robot-arm control and the programming of vision-guided mobile robots. *Semesters taught (students): Fall'07\* (43), Fall'08\* (57), Fall'09\* (47), Spring'11 (47), Spring'12 (52)*



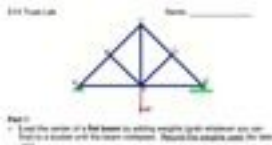
### Integrated CAD/CAM/CAE (IPD 501) - University of Pennsylvania

This course explores the design workflow through a combination of lectures, hands-on exercises, and a semester design project. Topics include: fundamental design principles, project definition and needfinding, advanced computer-aided design, rapid prototyping, computer-controlled machining, and an in-depth exploration of modern analysis and simulation tools. This course was conceived and first introduced for the Spring of 2009. *Semesters taught (students): Spring'09 (16), Spring'10 (8), Spring'11 (12), Spring'12 (9)*



### Engineering Entrepreneurship I (EAS 445/545) - University of Pennsylvania

As the introductory course in the Engineering Entrepreneurship minor program, this course serves to motivate and prepare engineers who are interested in entrepreneurship. Topics include the entrepreneurial process, high-tech product development, investment and venture financing, intellectual property, the IPO process, leadership, and many others. The course follows the case-study format. *Semesters taught (students): Summer'08 (38), Summer'09 (33), Summer'10 (29)*



### Statics (E14) - Stanford University

As a course assistant for Dr. Sheri Sheppard's sophomore-level engineering course, I led weekly lab sessions of up to thirty students, held weekly office hours, organized homework solutions and helped grade exams. *Quarters taught: Fall'04*



### Introduction to Pro/Engineer (MEG 121X) - University of Nevada, Las Vegas

This upper-level undergraduate class introduced students to the fundamentals of three-dimensional solid modeling using Pro/Engineer. This course was independently developed and taught while I was an undergraduate student. *Semesters taught: Spring'00, Fall'00*

## Educational Development

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### The M1 Microcontroller

Envisioned as a tool to support the MEAM 410/510 (Design of Mechatronic Systems) course, the M1 is a custom circuit board build around the ATmega32U4 processor. Coupled with concise online documentation to support educational use, this low-cost, robust, student-friendly design has become the hardware of choice for a multitude of projects both in and out of academia. Published in one IDETC 2010 paper and one RAM article.



### The M2 Microcontroller

Building upon the resounding success of the M1 and finding places for subtle improvements, this pin-compatible second generation microcontroller was released in late May of 2011. Numerous peripherals have also been developed, including a wireless link, a blob tracker, and a 9-DOF IMU.



### The MX rapid mechatronic-prototyping system

Developed to provide a very rapid mechanism for prototyping common robotic and mechatronic systems, this custom circuit and hardware combination includes onboard smart charging of a Li-Ion cell battery over USB, a port for an M1 or M2, dual H-bridge DC motor drivers, a bank of configurable I/O pins, and three expansion bays for modules including wireless communications, inertial measurement, servo control, and more.



### Compact Wireless Mobile Robot Platform

Developed to support projects in the MEAM420/520, CIS390 (Introduction to Robotics) course, this fully-wireless robot includes an M1 microcontroller for low-level hardware control, an onboard 640x480 pixel 802.11g camera, and complete power conditioning and charging circuitry. The robot is controlled via Matlab through a custom wireless link to the M1 microcontroller.



### MEAM.Design wiki

Originally conceived as a way for students to share knowledge about the software used in the MEAM labs, this has become the de-facto online home for design activity in the department. In addition to reference material for our many labs, the publically-accessible site provides students with convenient access to all of the lecture slides, project descriptions, and assignments for my classes.

## Engineering Research

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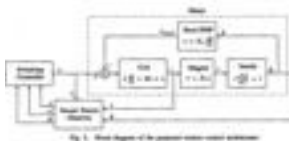
### **Robotic Prostate Brachytherapy - ERC CISST, Johns Hopkins University**

Finalized the design of a robotic needle placement system for transrectal-ultrasound-guided prostate brachytherapy. Developed an optical tracking system to verify needle location/angle prior to surgical insertion. Coordinated the first robotically-guided TRUS trials on human patients. Co-authored two journal articles, an abstract for the American Brachytherapy Society meeting, and a podium MICCAI conference paper. *Sep'06 - Jun'07*



### **Event-Based Haptics - Telerobotics Lab, Stanford University**

Co-developed a novel strategy to produce realistic high-frequency force feedback in haptic interactions. Contributions included a thorough analysis of the effects of changing user impedance during tapping events, followed by the development of an algorithm to control for changes in grip force during virtual haptic interactions. Further work extended the event-based paradigm into two-degree-of-freedom motion, including the analysis and reproduction of the salient effects of step-change surface discontinuities. Co-authored one funded NSF proposal, one journal article and three conference papers. *Aug'04 - Jan'07*



### **Switching Motor Control - Telerobotics Lab, Stanford University**

Working toward a novel motion control architecture, this project involved a detailed investigation of DC motor current response, resulting in the discovery of a significant current-jump effect resulting from step changes in motor voltage which is not accounted for in traditional motor models. A first-order switching controller was constructed and tested, and this work resulted in one co-authored journal article and three conference papers. *Jun'02 - Aug'04*



### **Hydrogen Internal-Combustion Engine - Energy Research Center, UNLV**

The main focus of this project was the modification of a stock eight-cylinder internal-combustion engine to run on gaseous hydrogen for use in a hybrid electric bus. The project involved the custom design and construction of numerous components using both manual and CNC manufacturing processes. Extensive dynamometer testing was performed throughout the project to assess improvements and guide further work. Co-authored five conference papers. *Dec'99 - Sep'01*

## Venture Experience

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### **Tangent Robotics, L.L.C.**

Chief Technical Officer on a three-person team to develop a novel two-degree-of-freedom spherical actuator first conceived during the Spring of 2009. The company was incorporated in May of 2010. We secured a \$25,000 grant from the Pennsylvania Assistive Technology Commercialization Initiative (PATCI) to continue project development.

### **Parametric Dining, L.L.C.**

Chief Technical Officer on a three-person team seeking to modernize the restaurant bill-paying experience.

## Professional Experience

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### **Statics Solutions Manual, Sheri Sheppard, Ph.D., Stanford, CA**

Contributing Author. Responsible for solving and typesetting over 500 solutions to accompany a new textbook on statics analysis. Additional responsibilities included interfacing with the publisher and coordinating the accuracy checking process, as well as the management of a group of other contributors. *May'04 - Jan'07*

### **Mechanical Engineer, THAAD, Lockheed Martin Missiles & Space, Sunnyvale, CA**

Mechanical engineer, Theatre High-Altitude Area Defense project. Identified, mediated and resolved integration issues between project subassembly teams as a member of the systems integration group. *Jun'02 - Jun'04*

### **Mechanical Engineering Intern, Bently Nevada Corporation, Minden, NV**

Engineering intern. Duties ranged from electronics assembly to the design of custom test equipment. Work involved close collaboration with both engineering and manufacturing on three separate projects. *Summer'96 - Summer'99*



## Journal & Magazine Articles

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- J. Fiene. *The Robockey Cup: A Look at Mechatronics Education in 2009*. **Robotics & Automation Magazine**. Volume 17(3). September 2010.
- D. Y. Song, E. C. Burdette, J. Fiene, E. Armour, G. Kronreif, A. Deguet, I. Iordachita, G. Fichtinger, P. Kazanzides. *Robotic Needle Guide for Prostate Brachytherapy: Clinical Testing of Feasibility and Performance*. **Brachytherapy**. Volume 7(2). April 2008.
- G. Fichtinger, J. Fiene, C. W. Kennedy, G. Kronreif, I. Iordachita, D. Y. Song, E. C. Burdette, P. Kazanzides. *Robotic Assistance for Ultrasound-Guided Prostate Brachytherapy*. **Medical Image Analysis Journal (MedIA)**. Volume 12(4):535-545. August 2008.
- K. J. Kuchenbecker, J. Fiene, and G. Niemeyer. *Improving Contact Realism through Event-Based Haptic Feedback*. **IEEE Transactions on Visualization and Computer Graphics**. Volume 12(2):219-230. March 2006.
- J. Fiene and G. Niemeyer. *Toward Switching Motor Control*. **IEEE/ASME Transactions on Mechatronics**. Volume 11(1):27-34. February 2006.

## Conference Publications

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- M. Shomin, J. Fiene. *Teaching Manipulator Kinematics by Painting with Light*. In Proceedings, **ASME International Design Engineering Technical Conference**. August 2011.
- J. Fiene. *The M1: A Custom Mechatronics Platform for Robotics Education*. In Proceedings, **ASME International Design Engineering Technical Conference**. August 2010.
- K. N. Winfree, J. Gewirtz, T. Mather, J. Fiene, and K. J. Kuchenbecker. *A High Fidelity Ungrounded Torque Feedback Device: The iTorqU 2.0*. In Proceedings, **IEEE World Haptics Conference**, March 2009.
- J. Fiene and M. Yim. *Project First: A Case Study in Mechatronics Course Design*. In Proceedings, **ASME International Design Engineering Technical Conference**. August 2008.
- M. Yim, K. J. Kuchenbecker, P. Arratia, J. Bassani, J. Fiene, V. Kumar, J. Lukes. *Practice-Integrated Undergraduate Curriculum in Mechanical Engineering*. In Proceedings, **ASME Annual Conference & Exposition**, June 2008.
- G. Fichtinger, J. Fiene, C. Kennedy, G. Kronreif, I. Iordachita, D. Song, E. Burdette, P. Kazanzides. *Robotic Assistance for Ultrasound Guided Prostate Brachytherapy*. In Proceedings, **MICCAI**. November 2007.
- J. Fiene and K. J. Kuchenbecker. *Shaping Event-Based Haptic Transients Via an Improved Understanding of Real Contact Dynamics*. In Proceedings, **IEEE World Haptics Conference**. March 2007.
- J. Fiene, K. J. Kuchenbecker and G. Niemeyer. *Event-Based Haptics with Grip Force Compensation*. In Proceedings, **14th Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems**. March 2006.
- J. Fiene and G. Niemeyer. *Toward High-Speed Switching Motor Control for Human Interactive Robotics*. In Proceedings, **IEEE International Conference on Robotics and Automation**. April 2005.
- K. J. Kuchenbecker, J. Fiene and G. Niemeyer. *Event-Based Haptics and Acceleration Matching: Portraying and Assessing the Realism of Contact*. In Proceedings, **IEEE World Haptics Conference**. March 2005.
- G. Niemeyer and J. Fiene. *Switching Motor Control: Toward an Integrated Amplifier Design with Position Feedback*. In Proceedings, **American Controls Conference**. June 2004.
- J. Fiene and G. Niemeyer. *Switching Motor Control: An Integrated Amplifier Design for Improved Velocity Estimation and Feedback*. In Proceedings, **IEEE International Conference on Robotics and Automation**. April 2004.
- G. Niemeyer, K. J. Kuchenbecker, R. Bonneau, P. Mitra, A. M. Reid, J. Fiene, and G. Weldon. *THUMP: an Immersive Haptic Console for Surgical Simulation and Training*. In Proceedings, **Medicine Meets Virtual Reality**. January 2004.
- W. Ju, S. Madsen, J. Fiene, M. Bolas, I. McDowall and R. Faste. *Interaction Devices for Hands-On Desktop Design*. In Proceedings, **SPIE: Stereoscopic Displays and Virtual Reality Systems X**. January 2003.
- J. Fiene, T. Braithwaite, R. Boehm, Y. Baghzouz and T. Kell. *Development of a Hydrogen Engine for a Hybrid Electric Bus*. In Proceedings of the **SAE World Congress**. March 2002.

J. Fiene, L. Shi, T. Braithwaite, J. Gall, Y. Baghzouz, R. Boehm and T. Kell. *Status Report on Progress on a Hydrogen-Fueled Hybrid-Electric Bus*. In Proceedings of the **National Hydrogen Association Annual Meeting**. June 2001.

J. Fiene, J. Gaal, T. Braithwaite, L. Shi, R. Boehm, Y. Baghzouz and T. Kell. *The Development of a Hydro-gen-Fueled Internal Combustion Engine*. In Proceedings of the **Solar Energy Conference**. April 2001.

J. Van Dam, J. Fiene, R. Boehm and T. Kell. *Development of a Hydrogen-Fueled Internal Combustion Engine for a Hybrid Electric Bus*. In **ENERGY 2000** (P. Catania - editor), Technomic Publishing Company, July 2000.

Y. Baghzouz, J. Fiene, J. Van Dam, L. Shi, E. Wilkinson, R. Boehm and T. Kell. *Progress on Improvements to a Hydrogen/Electric Hybrid Bus*. In Proceedings of the **Hydrogen Program Annual Review**. May 2000.

Y. Baghzouz, J. Fiene, J. Van Dam, L. Shi, E. Wilkinson and R. Boehm. *Modifications to a Hydrogen/Electric Hybrid Bus*. In Proceedings of the **25th Intersociety Energy Conversion Engineering Conference**. July 2000.

## Technical Presentations

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*The M1: A Custom Mechatronics Platform for Robotics Education*. **ASME International Design Engineering Technical Conference**, Montreal, Canada. August 2010.

*A Case Study in Mechatronics Course Design*. **ASME International Design Engineering Technical Conference**, Brooklyn, New York. August 2008.

*Shaping Event-Based Haptic Transients Via an Improved Understand of Real Contact Dynamics*. **2nd World Haptics Conference**, Tsukuba, Japan. March 22, 2007.

*Toward Realistic Haptic Interactions with Virtual Rigid Objects*. **Johns Hopkins University Center for Integrated Surgical Systems and Technology Seminar**, Baltimore, Maryland. February 7, 2007.

*Event-Based Haptics with Grip Force Compensation*. **14th Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems**, Alexandria, Virginia. March 25, 2006.

*Toward High-Speed Switching Motor Control*. **International Conference on Robotics and Automation**, Barcelona, Spain. April 20, 2005.

*Switching Motor Control: Toward an Integrated Amplifier Design with Position Feedback*. **American Controls Conference**, Boston, Massachusetts. June 30, 2004.

## Honors & Awards

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**Hatfield Award for Excellence in Teaching in the Lecturer and Practice Professor Track**, UPenn SEAS, 2012

**AUVSI Academic Champion**, AUVSI Annual Conference, 2011

**Best Paper Award for Haptic Technology**, World Haptics Conference, 2007

**Second-Best Paper Award**, Medical Image Analysis, Special MICCAI Issue, 2007

**National Science Foundation Graduate Research Fellow**, 2001-2004

**Best Poster Award**, Medicine Meets Virtual Reality, 2004

**Department of Defense Secret-Level Clearance**, March 2003

**Licensed Engineering Intern**, State of Nevada, 2001

**Barry M. Goldwater Scholar**, 2000-2001

**UNLV Male Scholar Athlete of the Year**, Varsity Swimming, 1997-1998

# Project Advisement

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## **MEAM Waterjet**, 2011-2012 (MEAM Senior Design)

*Adam Libert, Nisan Lerea, Carlee Wagner, Neel Doshi, Nick Bartlett*

This MEAM 445/446 project designed and built a fully-functional abrasive waterjet capable of cutting two-dimensional shapes from quarter-inch-thick steel and aluminum. The team won the MEAM Gemmill Award for their creativity and the quality of execution on this very challenging project.



## **REVO**, 2011-2012 (MEAM Senior Design)

*Christine Kappeyne, Andrew Guenin, Andrew McAleer, Marin McDermott, Ian Stephens*

This MEAM 445/446 project designed and constructed a novel twelve-sided modular spherical robot. Built around an aluminum wireframe housing a small Linux computer, inertial sensors, and onboard batteries, the twelve modules were designed to execute rapid 3-cm extrusions/retractions, which when synchronized would propel the sphere along a path.



## **PACE Sustainable Urban Transport Project**, 2010-2012

As one of 50 schools in the Partners for the Advancement of Collaborative Engineering Education program, Penn has an opportunity to participate in a number of multi-university projects and competitions. This particular endeavor seeks to redefine urban transport, and we have been paired with the University of Cincinnati, McMaster University, and the University of British Columbia.



## **Alpha Bicycle**, 2010-2011 (MEAM Senior Design)

*Evan Dvorak, Lucas Hartman, Geoff Johnson, Katie Savarise, Katie Rohacz*

This MEAM 445/446 project, which won both the MEAM Gemmill Award and the overall SEAS senior-design competition, sought to improve upon many aspects of the modern urban bicycle, including a novel drivetrain, fully-integrated braking systems, custom sensors and electronics, and an amazing attention to overall aesthetic design.



## **Robotic Omnidirectional Mobile Platform for Education and Research**, 2009-2010 (MEAM Senior Design)

*Michael Shomin, Davesh Shah*

This MEAM 445/446 capstone design project focused on the creation of a small 5-degree-of-freedom mobile manipulator. The team utilized the M1 microcontroller described above. Their work earned them the MEAM department's Couloucoundis prize.



## **Parametric Products**, 2009-2010 (IPD Thesis)

*Jason Halpern, Chris Xydis*

Build around a tightly integrated CAD/CAM workflow, the focus of this project was the development of a system for the creation of highly customizable machined goods and products.



## **Additive Manufacturing and Advanced Composites**, 2009-2010 (IPD Thesis)

*Matthew Nowicki*

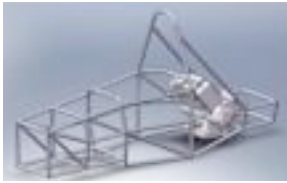
This work focused on the development of a novel process to combine the many benefits of additive-layer manufacturing with the strength of carbon-fiber composition technology.



## **The PowerFlower**, 2008-2009 (MEAM Senior Design)

*Nicholas Araujo, Jason Halpern, Thomas Macrina, Derek Ondrusek, Matthew Sylvester*

This capstone design project involved the design, manufacture, assembly, and testing of a portable solar collector. The project was awarded the MEAM department's Best Poster for a Superior Project award, and placed third in the school-wide senior-design competition.



**Formula SAE - Suspension & Chassis**, 2008-2009 (MEAM Senior Design)

*Matthew Nowicki, Mark Washington, Chris Xydis*

This senior design project focused on the design, simulation, and analysis of the welded chassis and unique suspension for the school's Formula SAE vehicle. Comparisons between the simulation and extensive test data were used to prove and validate their work.



**Formula SAE - Powertrain**, 2008-2009 (MEAM Senior Design)

*Ross Nickerson, Michael Wolfe*

Taking advantage of the many benefits of additive-layer manufacturing, this capstone design project focused on improving the intake system for the Formula SAE vehicle.

**Formula SAE - Vehicle Dynamic Analysis**, Fall'10, *Ryan Kumbang*

**Collapsible Photovoltaic Concentrator**, Spring'08, *Jason Halpern*

**Formula SAE - Differential Design**, Spring'08, *Glauber Mosqueira, Matthew Nowicki*

**Touch Thimble Haptic Device**, Spring'08, *Neil Tenenholtz, Alex Tozzo*

**Microturbine Pump Design**, Spring'08, *Gabriel Head*

**Dynamic Model of A Gamma-Type Stirling Engine**, Spring'08, *Gabriel Kopin*

**An Investigation of Winglet Effects**, Spring'08, *Daniel White*

**Dynamic Modeling of the Phantom Haptic Device**, Spring'08, *Barry Scharfman*

**Formula SAE - Intake Manifold Design**, Fall'07, *Matthew Nowicki, Ross Nickerson*

**Persistence-of-Vision Kite Analysis**, Fall'07, *Elizabeth Ramos*

**Formula SAE - Radiator Ducting Design**, Fall'07, *Laura Anne Cramer*

## Service

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**Student advising for MEAM (undergraduate) and ROBO (masters) programs**, ~30 active students

**MEAM shop and labs committee**, 2010-present

**MEAM display committee**, 2010-present

**MEAM website redesign committee**, 2008-2009