

# Hannes G. Daepf

hdaepf@gmail.com | <http://www.imdl.gatech.edu/Daepf>

Citizenship: American & Swiss

## Education

---

**Georgia Institute of Technology**, Atlanta, GA

Ph.D. in Mechanical Engineering | Advisor: Dr. Wayne Book | GPA: 4.0/4.0 Expected Dec. 2015

Major Area: Systems and Controls | Minor Area: Robotics

Thesis: "Constrained Model Predictive Control for Compliant Position Tracking of Pneumatic Systems"

M.S. in Mechanical Engineering | Advisor: Dr. Wayne Book

December 2011

Thesis: "Development of a Multi-Platform Simulation for a Pneumatically Actuated Quadruped Robot"

**Tufts University**, Medford, MA

B.S. in Mechanical Engineering | GPA: 3.86/4.00 | *Summa cum Laude*

May 2009

## Honors & Awards

---

2011 - 2014	National Defense Science & Engineering Graduate (NDSEG) Fellowship
May 2010	NSF Graduate Research Fellowship Honorable Mention
Summer 2009	German Academic Exchange Service (DAAD) RISE Pro Scholarship
May 2009	Tufts University Mechanical Engineering Department O'Leary Design Award
2006-2009	Pellegrini Scholarship (merit-based)
Summer 2008	NSF Research Experience for Undergraduates (REU)
Summer 2007	DAAD RISE Scholarship

## Experience

---

**Georgia Institute of Technology**, Atlanta, GA

*Graduate Research Assistant studying control of pneumatic systems* Aug. 2009 - Present

- Developing a model predictive controller to achieve safe, compliant, and accurate position control of pneumatic systems for applications with human/environment interaction.
- Created numerical actuator model in Simulink and coupled with C++/OpenGL simulation of four-legged robot dynamics and environment interaction.
- Implemented user interface to robot hardware using 3-Dof Phantom joysticks with haptic feedback.
- Designed & constructed pneumatically powered test platform & robot components.
- Presented results to R&D leaders from fluid power companies such as Caterpillar, Eaton, & HUSCO.
- Managed three undergraduate students and one high school student.
- Collaborated with researchers at multiple universities within the CCEFP, and NSF ERC.

**Deutsche Bahn Systemtechnik**, Munich, Germany

*HVAC and Aerodynamics Intern* May - Aug. 2009

- Contributed towards a model to reduce power consumption in train HVAC systems by assessing impact of driving speed on thermal conductivity values.
- Debugged & improved a VBA program to analyze impacts of strong side winds on high-speed trains.
- Constructed test cases to span a maximal range of desired model performance and validated finished model against experimental results.

**Tufts University**, Medford, MA

*Undergraduate Research Assistant (Senior Thesis Research)* Sept. 2008 - May 2009

- Studied the application of elastomer molds to jellyfish-inspired underwater propulsion methods.
- Fabricated & tested designs that coupled mold geometries with material properties.
- Modeled system using an analytical radial spring representation and a finite element model.
- Produced design capable of 50% diameter reduction under reasonable radial loading.

*Wire Assembly for Accelerated Wound Healing Team Member (Senior Design Project)* Fall 2008

- Designed & constructed a device for applying tension to head wounds for improved wound healing.
- Consulted with clients, a team of doctors at Brigham & Women's Hospital in Boston, MA, to develop engineering specifications and present results.

**Virginia Polytechnic Institute**, Blacksburg, VA

*NSF REU Undergraduate Researcher* June - Aug. 2008

- Modeled earth's atmosphere for the study of global pollution behavior using Weighted Essentially Non-Oscillatory (WENO) schemes to solve the Shallow Water Equations in FORTRAN.

**Fraunhofer Institute for Material Flow & Logistics**, Dortmund, Germany

*Research Intern* May - Aug. 2007

- Studied the effects of rollers on the vibrations of a warehouse racking structure.
- Proofread and assisted with German-English translation of several technical documents.

**Bucknell University**, Lewisburg, PA

*Information Services and Technology Field Support* May - Aug 2006

- Served as liaison to faculty/staff, identifying and addressing technical issues.
- Recognized for "Going the Extra Mile" with GEM Award.

## Teaching

---

**Georgia Institute of Technology**, Atlanta, GA

*Graduate Teaching Assistant for ME 2110: Creative Decisions & Design* Aug. 2014 - Present

- Mentored student design teams & assisted with engineering requirement development, LabVIEW, myRIO, and mechatronics design.
- Contributed to coding curriculum development by assisting with manual and reference writing, modifying exercises, and creating commented LabVIEW modules.
- Received consistently high ratings in student course reviews, including top marks in course management, concept familiarity, approachability, and overall effectiveness.

*Teaching Practicum for ME 2202: Rigid Body Dynamics* Spring 2013

- Taught several lectures on topics in dynamics.
- Provided weekly office hour to students and aided with course concepts and homework problems.

## Skills & Knowledge

---

Selected Engineering:	Linear and nonlinear control theory & implementation (including experience with optimal, model predictive, sliding mode, networked, adaptive, feedback linearization, and stochastic control), dynamics & vibration, spectral analysis, optimization, numerical methods, design tools & methods, robotics
Software:	MATLAB/Simulink/xPC Target, LabVIEW, SolidWorks, AutoCAD, Inventor, Microsoft Office, C++, C, FORTRAN, Python, Assembly, html/css, UDP, Visual Basic, $\LaTeX$
Hardware:	Pneumatics, hydraulics, Arduino, myRIO & industrial microcontrollers, CANBus, general machine shop usage (lathe, mill, etc.), 3D printing, laser cutting
Languages:	English (fluent), German (fluent), Swiss German (fluent), French (working knowledge)

## Publications

---

1. **Daepf, HG** and WJ Book, “Model Predictive Control for compliant pneumatic systems.” In ASME 2014 Dynamic Systems and Control Conference, October 22-24, San Antonio (TX), USA (2014).
2. **Daepf, HG** and WJ Book, “Value of a high fidelity actuator model for dynamic simulation of a pneumatic rescue robot”. Proc. of the 19th IFAC World Congress, August 24-29, Cape Town, South Africa (2014).
3. **Daepf, HG** and WJ Book, “Predictive friction compensation for control of pneumatic actuators”. Proceedings of the 8th Fluid Power Net International (FPNI) PhD Symposium, June 11-13 2014, Lappeenranta, Finland (2014).
4. Mizumoto, H, **HG Daepf**, WJ Book and F Matsuno, “Teleoperation system using past image records for legged robot”. IEEE/RSJ International Symposium on Safety, Security, and Rescue Robotics (SSRR), Kyoto, Japan, November 1 - 5, 2011.
5. **HG Daepf**, 2011. “Development of a multi-platform simulation for a pneumatically-actuated quadruped robot”. Thesis, Georgia Institute of Technology.
6. Chipalkatty, R, **H Daepf**, M Egerstedt and W Book, “Human-in-the-Loop: MPC for shared control of a quadruped rescue robot”. IEEE/RSJ IROS 2011, San Francisco (CA), USA, September 25 - 30, 2011.
7. **Daepf, HG** and WJ Book, “Modeling and simulation of a pneumatically-actuated rescue robot”. Proceedings of the 52nd National Conference on Fluid Power, Las Vegas (NV), USA, March 23 - 25, 2011.
8. **Daepf, HG**, WJ Book, TY Kim and PP Radecki, “An interactive simulation for a fluid-powered legged search and rescue robot”. Proceedings of 2010 International Symposium on Flexible Automation, Tokyo, Japan, July 12-14, (2010).
9. **Daepf, HG** and WJ Book, “A user interface with multisensory feedback for a fluid powered rescue robot”. Proceedings of 6th FPNI – PhD Symposium, June 15-19 2010, West Lafayette (IN), USA (2010).

## Professional Affiliations

---

IEEE, ASME, Tau Beta Pi

## Activities & Interests

---

Tufts Symphony Orchestra, Trumpet (13+ years), Travel, Web design, DIY projects

A more comprehensive overview of my research, interests, and project descriptions can be found on my website at <http://www.imdl.gatech.edu/Daepf>.