

Patricio Antonio Vela

<http://www.cds.caltech.edu/~pvela>
pvela@cds.caltech.edu

Permanent Address:

354 Loomis Ave
Atlanta, GA 30312
202.669.4101

Work Address:

Mail Code 0250, GaTech
Atlanta, GA 30332
404.385.5062

EDUCATION: California Institute of Technology, Control and Dynamical Systems, Ph.D., 2003
California Institute of Technology, Control and Dynamical Systems, B.S. with Honors, 1998

GPA: 3.9/4.0

AREAS OF RESEARCH: Nonlinear dynamics and control, robotic locomotion, differential geometry, geometric mechanics, and geometric methods in computer vision.

AWARDS AND RECOGNITIONS

2001-1998 NSF Fellowship Recipient
1998-1994 AT&T Bell Labs Merit Scholarship Recipient

ACADEMIC EXPERIENCE

Mar. 2003 FIRST Robotics Competition Mentor
- Feb. 2003 Mentored an all-girl high school team in their debut entry to the FIRST Robotics competition.

Aug. 2002 Freshman Summer Institute Research Program
Developed and implemented a one month research program on basic nonlinear dynamics and control for two incoming freshman students.

Dec. 2001 Teaching Assistant for CDS110, Introduction to Control Theory
- Sep. 2001 Coordinated the Teaching Assistants, graded homework, and prepared solution sets.

June 2001 Teaching Assistant for CDS205, Geometric Mechanics
- April 2001 Graded homework and prepared a weekly 1-hour recitation lecture.

Summer 1998 CAHSEE, Pasadena, CA
Participated in an intensive summer academic program geared for talented underrepresented minority youth. Designed and taught a 5-week course on structured programming with C as the programming language. The program included a 2-week academic and leadership-training program in Washington D.C.

PROFESSIONAL EXPERIENCE

Present Postdoctoral Researcher, Georgia Institute of Technology
- Fall 2004 Investigating visual processing algorithms for use in an active vision framework. The goal is to develop a realtime feedback strategy for autonomous aircraft utilizing onboard cameras.

Summer 2004 Postdoctoral Researcher, California Institute of Technology
Spring 2004 Graduate Student, California Institute of Technology, Pasadena, CA.
- Fall 1998 Researched differential geometric and geometric mechanical approaches to locomotive control systems. The goal is to create a unified mathematical paradigm within which one can successfully apply geometric control techniques to rapidly prototype and devise control strategies for biologically inspired mechanical systems.

Winter 1998
- Fall 1997 California Institute of Technology, Pasadena, CA.
Software design for data acquisition of a Rijke tube experiment.

Summer 1997 Lucent Technologies, Naperville, IL.
Developed a tool to reverse engineer digital logic and re-engineer the logic into an FPGA or ASIC. The automated process is broken down into the various stages of development (simulation, fault detection, final design, etc.).

Summer 1996 Lucent Technologies (former AT&T Bell Laboratories), Naperville, IL.
Developed a program to automatically update schematic files. Program is to be used in a project to convert old digital logic boards into FPGA logic interfacing with the original analog components. The program updates the schematic with little human interfacing.

Summer 1995 AT&T Bell Laboratories, Naperville, IL.
Determined the feasibility of developing a cross-compiler in the UNIX environment. Began development of the cross-compiler and attempted to automate the process.

Summer 1994 Booz-Allen & Hamilton, McLean, VA.
Image processing. Utilized Khoros library routines to develop a program for data gathering and statistical analysis for pattern recognition. Began to integrate the program and its subprograms in the Tool Command Language (TCL).

Summers 1993,1992 David Taylor Naval Research Laboratory, Bethesda, MD.
Communications software design for remote data acquisition and control of underwater towed vehicles.

OTHER ACADEMIC AND PROFESSIONAL EXPERIENCE

2004 Reviewer for IEEE Transactions on Robotics.

2002 "Geometric Methods for the Analysis and Control of Biomimetic Locomotion"
Workshop Lectures for the Dutch Institute of Control.

2002-1998 Graduate Recruiter for Caltech.

2002 Reviewer for Acta Applicandae Mathematicae.

2002 Reviewer for Advanced Robotics.

2001 Program Committee, IEEE/RSJ International Conference on Intelligent Robots and Systems.

PUBLICATIONS

Vela P.A., Morgansen K.A., and Burdick J.W. "Second Order Averaging Methods for Oscillatory Control of Underactuated Systems." *in preparation*.

Vela P.A. and Burdick J.W. "A General Averaging Theory via Series Expansions." *submitted for publication*.

Vela P.A. and Burdick J.W. "Averaging Methods for Control Part I: Driftless Systems." *submitted for publication*.

Vela P.A. and Burdick J.W. "Geometric Homogeneity and Configuration Controllability of Nonlinear Systems." *to be submitted*.

Betser A., Vela P.A., and Tannenbaum A. "Flying in Formation Using a Pursuit Guidance Algorithm." *preprint*.

PROCEEDINGS

Betser A., Vela P.A., and Tannenbaum A. "Automatic Tracking of Flying Vehicles Using Geodesic Snakes and Kalman Filtering" *submitted to 2004 IEEE Conference on Decision and Control*

Vela P.A. and Burdick J.W. "Control of Aqua-Biomimetic Locomotion via Averaging Theory" *proceedings Second International Symposium on Aqua-Biomechanisms (2003)*

Vela P.A. and Burdick J.W. "Control of Underactuated Mechanical Systems with Drift Using Higher-Order Averaging Theory." *proceedings 2003 IEEE Conference on Decision and Control*.

Vela P.A. and Burdick J.W. "Geometric Homogeneity and Controllability of Nonlinear Systems." *proceedings 2003 IEEE Conference on Decision and Control*.

Vela P.A. and Burdick J.W. "Control of Underactuated Mechanical Systems via Averaging Theory." *proceedings 2003 IEEE International Conference on Robotics and Automation* .

Vela P.A. and Burdick J.W. "Control of Underactuated Driftless Systems Using Higher-Order Averaging Theory." *proceedings 2003 IEEE American Control Conference*.

Vela P.A. and Burdick J.W. "A General Averaging Theory via Series Expansions." *proceedings 2003 IEEE American Control Conference*.

Vela P.A., Morgansen K.A., and Burdick J.W. "Underwater Locomotion from Oscillatory Shape Deformations." *proceedings 2002 IEEE Conference on Decision and Control*.

Morgansen K.A., Vela P.A., and Burdick J.W. "Trajectory Stabilization for a Planar Carangiform Robot Fish." *proceedings 2002 IEEE International Conference on Robotics and Automation*.

Vela P.A., Morgansen K.A., and Burdick J.W. "Second Order Averaging Methods for Oscillatory Control of Underactuated Mechanical Systems." *proceedings 2002 IEEE American Control Conference*.
Recieved award for Best Paper in Session.

REFERENCES

Professor Joel W. Burdick
Mail Code 104-44, Caltech
Pasadena, CA 91125
(FAX) 626.583.4963
626.395.4139
jwb@robotics.caltech.edu

Professor Jerrold E. Marsden
Mail Code 107-81, Caltech
Pasadena, CA 91125
(FAX) 626.796.8914
626.395.4176
marsden@cds.caltech.edu

Professor Richard M. Murray
Mail Code 107-81, Caltech
Pasadena, CA 91125
(FAX) 626.796.8914
626.395.6460
murray@cds.caltech.edu

Professor Allen R. Tannenbaum
Mail Code 0250, GeorgiaTech
Atlanta, GA 30332
(FAX) 404.894.7583
404.894.0290
tannenba@ece.gatech.edu

HOBBIES

Foreign, classical, and innovative films, literature, poetry, photography, taiji, volunteer tutor.