Justin Manzo

226 Upson Hall
Cornell University
Ithaca, NY 14853

(607) 279-8394
jem54@cornell.edu
US Citizen

Objective

Hands-on Ph.D. in Mechanical Engineering with mechatronics background seeking opportunity to solve fast-paced applied engineering and research challenges in industry or government setting with robotics or aerospace applications. Opportunity to assume leadership and systems-level roles in a strong team-oriented setting preferred.

Education

Ph.D.	Mechanical Engineering Focus: Aerospace, Structures, and Mechatronics Cornell University	Expected July 2009
M.S.	Mechanical Engineering Focus: Mechanical Systems GPA: 3.5/4.0	May 2006
B.S.	Mechanical Engineering, Cum Laude Concentration: Dynamics and Controls GPA: 3.5/4.0	May 2003

Research

Research has focused on development of morphing wing structures using alternative actuator devices such as shape memory alloy, with emphasis on adaptive structures and a requisite knowledge of aerodynamics. Investigations into biological wing shapes have provided inspiration for candidate airframe designs, including shore bird, pterosaur, and bat morphology. Shape changing wings have been studied analytically, computationally, and experimentally to assess the performance of proposed morphing actuator systems. Compact active joint mechanisms were developed from the ground up, using novel materials such as shape memory polymer. Feedback control logic was applied to these complex systems on morphing wing ironbird prototypes, including microprocessor programming and development of a wind tunnel testing platform. Flight-worthy morphing wing aircraft employing bat-like membrane wings with embedded actuators are currently in development.

Qualifications

- Background in novel actuator systems with applications to aerial robotics and mechatronic systems
- Experience in feedback control, robotics, alternative actuator technologies, sensors, mechanical design, finite element analysis, computational fluid dynamics, computer aided drafting, MATLAB, machining, welding
- Sole developer for restructured laboratory series in core robotics course using advanced microcontrollers
- Presenter bi-annually to 150+ incoming graduate student teaching assistants on topics of facilitating active learning, improved presentation styles, and stress management issues
- Featured on Animal Planet Network TV Program *Chasing Nature,* showcasing graduate students from top US engineering schools based on performance in the field of bio-inspired engineering

Publications

4. Manzo, J. and Garcia, E. "Optimization of the Smart Joint" (in review).

3. Leylek, E., Manzo, J. and Garcia, E. "Morphing Bat Wing Aerodynamics and Optimization", *Journal of Aircraft* 2008 (in review).

2. Manzo, J. and Garcia, E. "Changes in aerodynamics due to morphing on the hyper-elliptical cambered span (HECS) wing", *Smart Materials and Structures* 2008 (in review).

1. Manzo, J. and Garcia, E. "Methodology for Design of an Active Rigidity Joint," *J. Int. Mat. Sys. Struct.* 2008, doi:10.1177/1045389X08093826.

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Conference Proceedings and Papers

13. Manzo, J., Leylek, E. and Garcia, E. "Drawing Insight from Nature: A Bat Wing for Morphing Aircraft", Proc. ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems, October 28-30, Ellicott City, MD, 2008.
12. Manzo, J. and Garcia, E. "The Smart Joint: Model and Optimization of a Shape Memory Alloy/Shape Memory Polymer Composite Actuator", Proc. ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems, October 28-30, Ellicott City, MD, 2008.
11. Leylek, E., Manzo, J. and Garcia, E. "A Bat-wing Aircraft Using the Smart Joint Mechanism", *Advances in Science and Technology* 2008 (58): 41-46.
10. Garcia, E., Wickenheiser, A., Dietl, J. and Manzo, J. "Morphing Aircraft in Perching Maneuvers", 3rd International Conference on Smart Materials, Structures, and Systems, June 8-13, Acireale, Sicily, 2008.
9. Leylek, E. A., Manzo, J. E. and Garcia, E. "Analysis of Bat Wings for Morphing", Smart Structures and Materials 2008: Active and Passive Smart Structures and Integrated Systems II, March 10-13, San Diego, CA. published in: Proc. SPIE Vol. 6928, 2008.
8. Manzo, J. E. and Garcia, E. "Optimization and Implementation of the Smart Joint Actuator", Smart Structures and Materials 2008: Active and Passive Smart Structures and Integrated Systems II, March 10-13, San Diego, CA. published in: Proc. SPIE Vol. 6928, 2008.
7. Manzo, J. and Garcia, E. "Active Rigidity Smart Joint for a Bat-Wing Micro Air Vehicle", ASME International Mechanical Engineering Congress and Exposition, November 11-15, Seattle, WA. published in: ASME IMECE2007-43065, 2007.
6. Manzo, J. and Garcia, E. "Evolutionary Flight and Enabling Smart Actuator Devices", Smart Structures and Materials 2007: Active and Passive Smart Structures and Integrated Systems, March 18-22, San Diego, CA. published in: Proc. SPIE Vol. 6525, 65250L, 2007.
5. Manzo, J. "Beginner's Guide to C Programming for the ATMEL Mega32". Cornell internal document, 2006.
4. Manzo, J. and Garcia, E. "Smart Material Mechanisms for Morphing Aircraft", CanSmart International Workshop on Smart Materials and Smart Structures, October 12-13, Toronto, Ontario, Canada, 2006.
3. Manzo, J. "Shape Memory Alloy Actuated Macro-Scale Morphing Aircraft Mechanisms", AIAA Region I-NE Student Conference, March 31, Syracuse, NY, 2006.
2. Manzo, J., Garcia, E., Wickenheiser, A., and Horner, G. "Design of a shape-memory alloy actuated macro-scale morphing aircraft mechanism", Smart Structures and Materials 2005: Smart Structures and Integrated Systems, March 6-10, San Diego, CA. published in: Proc. SPIE Vol. 5764, pp. 232-240, 2005.
1. Manzo, J., Garcia, E., Wickenheiser, A., and Horner, G. "Adaptive structural systems and compliant skin technology of morphing aircraft structures", Smart Structures and Materials 2004: Smart Structures and Integrated Systems, March 14-17, San Diego, CA. published in: Proc. SPIE Vol. 5390, pp. 225-234, 2004.

Conference Presentations

"Bat Wing Morphing Aircraft Design and Optimization", ASME SMASIS Conference, October 28-30, 2008.

"The Smart Joint: Model and Optimization", ASME SMASIS Conference, October 28-30, 2008.

"Optimization and Implementation of the Smart Joint Actuator", SPIE Smart Structures/NDE Conference, March 9-13, 2008.

"Evolutionary Flight and Enabling Smart Actuator Devices", SPIE Smart Structures/NDE Conference, March 18-21, 2007.

"Active Rigidity Smart Joint for a Bat-Wing Micro-Air Vehicle", ASME International Mechanical Engineering Congress & Exposition, November 11-15, 2007.

"Design of a shape memory alloy-actuated macro-scale morphing aircraft mechanism", AIAA Region I-NE Student Paper Competition, March 31, 2006.

"Design of a shape memory alloy-actuated macro-scale morphing aircraft mechanism", SPIE Smart Structures/NDE Conference, March 7-10, 2005.

Invited Presentations

Cornerstone Research Group, Inc. "Design of a Bat-Wing Morphing Aircraft with Embedded SMA/SMP 'Smart Joint' Actuators", May 15, 2009.

Cornell Systems Engineering Day "Biological Flight and Bio-inspired Mechanisms", April 17, 2009.

Cornell University MAE378 – Mechatronics "Beginner's Guide to C Programming for the ATMEL Mega32", Cornell Mechatronics, Oct. 31-Nov. 5, 2008.

Engineering Learning Initiatives Teaching Assistant Training "Facilitating Active Learning", August 24, 2008.

Engineering Learning Initiatives Teaching Assistant Training "Active and Cooperative Learning Strategies for TAs", January 18 & 31 2008, August 2007, January 2007, August 2006.

Cornell University Sibley Graduates in Mechanical & Aerospace (SiGMA) "Developing the Bat-Wing Aircraft and Smart Joint Morphing Actuators", March 5, 2008.

Cornell University MAE378 – Mechatronics "ATMEL Interrupts, Timers, ADC". Introductory lecture series, October 25 & 30, 2007.

Cornell University Sibley School of Mechanical and Aerospace Dynamics & Controls Seminar "A Compliant Joint Mechanism for Morphing Aircraft Structures", October 2, 2007.

Cornell Society of Engineers' Annual Conference, April 2003, presented poster.

Leadership Experience

CORNELL UNIVERSITY, Engineering Learning Initiatives, Ithaca, NY

Graduate Teaching Assistant (TA) Fellow — Fall 2007 - Present

Conduct year-round training of Teaching Assistant (TA) Educators. Coordinate mid-term evaluations of all Engineering College TAs, conduct focus groups on TA training perceptions, and organize / facilitate TA Development. Increased new TA training certification from an average 80% to 95%.

Engineering Teaching Assistant (TA) Trainer — Fall 2006 - Present

Emphases on audience engagement techniques, presentation skills, effective TA preparation.

Leadershape Cluster Facilitator — Summer, 2008

Facilitated one week leadership training for 40 students; led group discussions and activities on vision creation, integrity, short- and long-term goal setting, diversity and inclusive leadership, work styles, and formulating action steps.

CORNELL UNIVERSITY, Sibley School of Mechanical & Aerospace Engineering, Ithaca, NY

Laboratory Course Development Coordinator for *Mechatronics* Course — Summer 2006

Restructured lab content to include ATMEL chipset, training lab teaching assistants in C programming. Annual presentation series in Mechatronics course to entire Mechanical Engineering junior class on C programming for robotics applications.

Teaching Assistant:

- MAE 378 Mechatronics – laboratory TA for prototype 'advanced' ATMEL lab group — Fall 2006
- MAE 225 Mechanical Synthesis – design, machine shop, and laboratory TA — Spring 2006
- MAE 326 System Dynamics – laboratory TA — Spring 2005
- Average evaluation score of 4.42 out of 5 across all courses taught (College of Engineering average is ~4.15)

Research Supervisor

Managed 4-5 undergraduate / Master's students on research and design projects

Founder / Project Manager, Cornell Battlebots — 2002 – 2003

Design, fabrication, and publicity team leads; procured funding, recruited students, managed sub-teams

Fellowships, Awards, and Distinctions

- Graduate TA Fellow, Engineering Learning Initiatives, Fall 2007 - Present.
- NASA Langley Graduate Student Research Program, Fall 2003 - Spring 2007.
- Learning Initiatives for Future Engineers grant, Fall 2002.

- Liu Foundation project team grant, Fall 2002 - Spring 2003.

Professional Affiliations

- American Society of Mechanical Engineers
- American Institute of Aeronautics and Astronautics
- SPIE – Society of Photo-Optical Instrumentation Engineers

Advised Students

Morgan, Lee **B.S.**	"Planar Hyper-Elliptic Cambered Span (HECS) Wing Construction"	Fall 2003 - Spring 2004
Myselimi, Ardita **B.S.**	"CFD Analysis of 2D HECS Airfoil"	Fall 2003 - Spring 2004
Sen, Gaurav **M. Eng.**	"Morphing Aircraft Skins"	Fall 2003 - Spring 2004
Leylek, Emily **B.S.**	"Effect of Thickness and Camber in Low Reynolds Number Airfoils for a Bio-inspired Morphing Wing"	Fall 2007 - Spring 2008
Callahan, Richard **M. Eng.**	"Bio-Inspired Bat Wing Design and Fabrication"	Sept. 2008 - Present
Rathi, Nidhi **B.S.**	"Production of Aircraft Body for Future Testing of Synthetic Bat-Inspired Wings"	Sept. 2008 - Present

Special Skills

- Software – proficiency in MATLAB, Solidworks, ANSYS, XFOIL, Pro Engineer, Microsoft Office Suite, C programming. Working knowledge of FLUENT, LabView, AVR, CodeVision, HTML
- Hardware – proficient in ATMEL microcontroller implementation, printed circuit board design/fabrication. Experience with Texas Instruments MSP 430 system
- Fabrication – educator for machining, experience in welding, composite lay-up (fiberglass, carbon fiber)
- Teaching and presentation – experienced lecturer to mixed audiences on technical and educational subjects
- Proficient in wind tunnel testing and instrumentation
- Design / fabrication / pilot experience on small-scale unmanned aircraft

Personal

- Born October 23, 1981 in Chicago, IL
- Languages: English (native), Spanish (conversational), Italian (conversational)
- Interests: cycling, R/C flight, cooking, travel

Television and Acting Credits

- *Chasing Nature*, Season 1, Episode 4: Archer Fish. **Beyond Entertainment**. Original air date: January 24, 2006.
- *Engineering Real World*. **Cornell University**. November 6, 2007. Ethics Presentation / Play, delivered to entire engineering incoming class of 700 students. Role of Engineering Manager.

References

Ephrahim Garcia, Ph.D. Associate Professor, Sibley School of Mechanical and Aerospace Engineering Cornell University	Linda Tompkins Associate Director, Engineering Learning Initiatives 170B Olin Hall College of Engineering	Jason R. Foley, Ph.D. Mechanical Engineer, Penetration Fuzing Fuzes Branch, Munitions Directorate, Air Force Research Laboratory

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224 Upson Hall Ithaca, New York 14853 Ph: 607-255-4366 Fax: 607-255-1222 EG84@cornell.edu	Cornell University Ithaca, NY 14853 Ph: 607-255-8861 Fax: 607-255-9297 LT57@cornell.edu	AFRL/RWMF 306 W. Eglin Blvd., Bldg. 432 Eglin AFB, FL 32542-5430 Ph: 850-883-0584 jason.foley@eglin.af.mil