William La Cava

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Education

2012 - 2016	Ph.D., Mechanical Engineering, University of Massachusetts Amherst
2009 - 2010	M.Eng., Mechanical Engineering, Cornell University
2005 - 2009	B.S., Mechanical Engineering, Cornell University

Research Experience

2016 - today	**Post-Doctoral Fellow, Epistasis Laboratory, University of Pennsylvania**
	Advisor: Jason Moore
	Institute for Biomedical Informatics
	Fellow, Warren Center for Network and Data Sciences
2012 - 2016	**PhD Candidate, University of Massachusetts Amherst**
	Committee: Kourosh Danai, Lee Spector, Matthew Lackner
	Dissertation: Automatic model form development and adaptation
	NSF IGERT fellow researching offshore wind energy applications
Jun–Aug 2015	**Visiting Researcher, Laboratory of Agent Modeling, University of Lisbon**
	Hosts: Sara Silva, Leonardo Vanneschi
	Subject: Multiclass classification of complex systems using genetic programming
2010 - 2012	**Research Scientist, National Renewable Energy Laboratory (NREL)**
	Supervisors: Paul Veers, Jonathan Keller
	Lead engineer for the Gearbox Reliability Collaborative, a consortium involved in wind turbine gearbox testing, data analysis, and numerical modeling
	Designed and conducted drivetrain simulation and testing programs for a 3 MW wind turbine R&D project
2008 - 2010	**Lead Engineer of Mechanical Power Systems, Cornell 100+ MPG Team**
	Advisor: Albert George
	Design, fabrication and testing for a hybrid-electric vehicle that competed in the Automotive X-Prize and won the 2011 Green Grand Prix, achieving over 120 MPG
2007 - 2008	**Independent Research, Cornell Computational Synthesis Laboratory**
	Advisor: Hod Lipson
	Built and trained a mobile robot with a 5 degree-of-freedom arm and gripper to retrieve objects

Teaching Experience

2007	**Lab Technician, Cornell University** Designed and built robotic platforms for a graduate level artificial intelligence course
2014 - 2015	**Teaching Assistant, University of Massachusetts Amherst** Control Systems Laboratory
2014 - 2016	**Guest Lecturer, University of Massachusetts Amherst** Courses: System Dynamics, Control Systems Laboratory and Offshore Wind Design Topics: linearization; state-space representations; system identification; parameter estimation; and wind turbine control design

Awards

2016	Post-Doctoral Fellowship, Warren Center for Network and Data Sciences
2016	Student Travel Grant, Genetic and Evolutionary Computation Conference
2015	Student Travel Grant, ASME Dynamic Systems and Controls Conference
2015	Best Paper Nomination, Genetic and Evolutionary Computation Conference (GECCO)
2014	XSEDE Startup Allocation Award: Automatic Identification of Dynamic Models for Complex Systems (PI)
2012	NSF Fellowship, IGERT: Offshore Wind Energy Engineering, Environmental Science, and Policy
2011	First Place, Cornell 100+ MPG Team, Green Grand Prix Competition

Publications

Articles in Review

La Cava, William and Jason Moore (2017). "A general feature engineering wrapper for machine learning using ϵ-lexicase survival". In: *EvoStar 2017*. Springer. In Review.

La Cava, William and Jason Moore (2017). "Genetic programming representations for multi-dimensional feature learning in biomedical classification". In: *EvoBio 2017*. Springer. In Review.

La Cava, William, Kushal Sahare, and Kourosh Danai (2016). "Restructuring Controllers to Accommodate Plant Nonlinearities". In: *Journal of Dynamic Systems, Measurement and Control*. In Review.

Journal Articles

La Cava, William, Kourosh Danai, and Lee Spector (2016). "Inference of compact nonlinear dynamic models by epigenetic local search". In: *Engineering Applications of Artificial Intelligence* 55, pp. 292–306. DOI: 10.1016/j.engappai.2016.07.004.

La Cava, William, Kourosh Danai, Lee Spector, Paul Fleming, Alan Wright, and Matthew Lackner (2015). "Automatic identification of wind turbine models using evolutionary multiobjective optimization". In: *Renewable Energy*. DOI: 10.1016/j.renene.2015.09.068.

La Cava, William G. and Kourosh Danai (2015). "Gradient-based adaptation of continuous dynamic model structures". In: *International Journal of Systems Science* 47 (1), pp. 249–263. DOI: 10.1080/00207721.2015.1069905.

Guo, Yi, Jonathan Keller, and William LaCava (2014). "Planetary gear load sharing of wind turbine drivetrains subjected to non-torque loads". en. In: *Wind Energy* 18, pp. 757–768. DOI: 10.1002/we.1731.

LaCava, William, Yi Guo, Chris Marks, Yihan Xing, and Torgeir Moan (2013). "Three-dimensional bearing load share behaviour in the planetary stage of a wind turbine gearbox". en. In: *IET Renewable Power Generation* 7.4, pp. 359–369. DOI: 10.1049/iet-rpg.2012.0274.

Peer-reviewed Conference Proceedings

La Cava, William, Lee Spector, and Kourosh Danai (2016). "Epsilon-Lexicase Selection for Regression". In: *Proceedings of the 2016 on Genetic and Evolutionary Computation Conference*. ACM, pp. 741–748. DOI: 10.1145/2908812.2908898.

Park, Semyung, Matthew A Lackner, John Cross-Whiter, A Rodriguez Tsouroukdissian, and William La Cava (2016). "An Investigation of Passive and Semi-Active Tuned Mass Dampers for a Tension Leg Platform Floating Offshore Wind Turbine in ULS Conditions". In: *ASME 2016 35th International Conference on Ocean, Offshore and Arctic Engineering*. American Society of Mechanical Engineers, V003T02A061–V003T02A061.

Guo, Y, J Keller, W La Cava, J Austin, AR Nejad, C Halse, L Bastard, and J Helsen (2015). "Recommendations on Model Fidelity for Wind Turbine Gearbox Simulations". In: *Conference for Wind Power Drives (CWD) 2015*. AAchen, Germany.

La Cava, William and Kourosh Danai (2015). "Model Structure Adaptation: A Gradient-based Approach". In: *ASME 2015 Dynamic Systems and Control Conference*. Columbus, Ohio: ASME.

La Cava, William, Kourosh Danai, Lee Spector, Paul Fleming, Alan D. Wright, and Matthew Lackner (2015). "Automated Identification of Closed-Loop Wind Turbine Dynamics via Genetic Programming". In: *ASME 2015 Dynamic Systems and Control Conference*. Columbus, Ohio: ASME.

La Cava, William, Thomas Helmuth, Lee Spector, and Kourosh Danai (2015). "Genetic Programming with Epigenetic Local Search". In: *Proceedings of the Genetic and Evolutionary Computation Conference*. GECCO 2015. Madrid, Spain: ACM Press, pp. 1055–1062. DOI: 10.1145/2739480.2754763.

La Cava, William, Lee Spector, Kourosh Danai, and Matthew Lackner (2014). "Evolving differential equations with developmental linear genetic programming and epigenetic hill climbing". en. In: *Companion proceedings of the 2014 conference on Genetic and Evolutionary Computation*. GECCO 2014. Vancouver, B.C.: ACM Press, pp. 141–142. DOI: 10.1145/2598394.2598491.

Guo, Yi, Jonathan Keller, and William LaCava (2012). "Combined effects of gravity, bending moment, bearing clearance, and input torque on wind turbine planetary gear load sharing". In: *AGMA Fall Technical Meeting*. Dearborn, MI: AGMA.

Keller, Jonathan, Hal F. Link, Yi Guo, William LaCava, and Brian P. McNiff (2012). "Gearbox reliability collaborative phase 1 and 2: testing and modelling results". In: *Conference proceedings of ISMA2012-USD2012*. International Conference on Noise and Vibration engineering. Leuven, Belgium.

LaCava, William, Jonathan Keller, and Brian McNiff (2012). "Gearbox reliability collaborative: test and model investigation of sun orbit and planet load share in a wind turbine gearbox". In: *AIAA 53rd Structures, Structural Dynamics, and Materials and Colocated Conferences*. Honolulu, Hawaii.

LaCava, William, Y. Xing, Y. Guo, and Torgeir Moan (2012). "Determining wind turbine gearbox model complexity using measurement validation and cost comparison". In: *European Wind Energy Association annual event*. Copenhagen, Denmark.

LaCava, William, B McNiff, and J van Dam (2011). "NREL Gearbox Reliability Collaborative: Comparing In-field Gearbox Response to Different Dynamometer Test Conditions". In: AWEA Windpower 2011. Anaheim, California: AWEA.

Book Chapters

Kannappan, Karthik, Lee Spector, Moshe Sipper, Thomas Helmuth, William La Cava, Jake Wisdom, and Omri Bernstein (2015). "Analyzing a Decade of Human-Competitive ("HUMIE") Winners: What Can We Learn?" In: *Genetic Programming Theory and Practice XII*. Springer, pp. 149–166.

La Cava, William and Lee Spector (2015). "Inheritable Epigenetics in Genetic Programming". In: *Genetic Programming Theory and Practice XII*. Ed. by Rick Riolo, William P. Worzel, and Mark Kotanchek. Cham: Springer International Publishing, pp. 37–51.

Dissertations

La Cava, William G (2016). "Automatic Development and Adaptation of Concise Nonlinear Models for System Identification". In: *Doctoral Dissertations May 2014 - current.* Vol. 731. PhD Dissertation, University of Massachusetts Amherst.

Technical Reports

Rodriguez Tsouroukdissian, Arturo, Mathew Lackner, John Cross-Whiter, Se Myung Park, Pariya Pourazarm, William La Cava, and Sungho Lee (2016). *Smart Novel Semi-Active Tuned Mass Damper for Fixed-Bottom and Floating Offshore Wind (Paper)*. Tech. rep. Alstom Renewable US LLC (GE Subsidiary), aka-Alsom Power Inc.

La Cava, William and Matthew Lackner (2015). *Theory manual for the tuned mass damper module in FAST 8*. Tech. rep. University of Massachusetts Amherst. DOI: DOI:10.13140/rg.2.1.4565.9684.

Link, H, W LaCava, J van Dam, B McNiff, S Sheng, R Wallen, M McDade, S Lambert, S Butterfield, and F Oyague (2011). *Gearbox reliability collaborative project report: findings from phase 1 and phase 2 testing*. Tech. rep. NREL/TP-5000-51885. National Renewable Energy Laboratory.

Sheng, S, H Link, W LaCava, J Van Dam, B McNiff, P Veers, J Keller, S Butterfield, and F Oyague (2011). *Wind turbine drivetrain condition monitoring during GRC phase 1 and phase 2 testing*. Tech. rep. NREL/TP-5000-52748. National Renewable Energy Laboratory.

Software

La Cava, William (2015). *ellenGP*. DOI: 10.5281/zenodo.13927.

La Cava, William and Matthew Lackner (2015). *Tuned Mass Damper Module for FAST v8*. URL: https://nwtc.nrel.gov/tmd.

Video

La Cava, William (2015). *Visualizing Genetic Programming Genomes*. URL: http://www.williamlacava.com/gp_genomes.html.

La Cava, William, et. al. (2013). *Offshore Wind in the Caribbean*. 2013 IGERT Video and Poster Competition. URL: https://vimeo.com/65178378.

Invited Talks

La Cava, William (2015). *Developing compact nonlinear dynamic models with biologically inspired algorithms*. Computer Science and Artificial Intelligence Laboratory, Massachusetts Institute of Technology.

La Cava, William (2015). *Genetic programming with epigenetic local search*. Laboratory of Agent Modeling, University of Lisbon.

La Cava, William (2015). *Intelligible system modeling with applications to wind energy (and genomics!)* Institute for Biomedical Informatics, University of Pennsylvania.

La Cava, William (2013). *Gearbox Reliability Collaborative: Findings from Phase 1 and 2*. Norwegian University of Science and Technology.

Other Presentations

La Cava, William (2015). *Agent-based Models: building reliable, intelligible classifiers*. IGERT Seminar, UMass Amherst.
La Cava, William (2014). *Evolutionary Identification of Wind Turbine Dynamics*. IGERT Seminar, UMass Amherst.
La Cava, William (2014). *UMass Wind Energy IGERT: Engineering Research*. Collaborative meetings, University of Maine.
La Cava, William (2013). *Stochastic optimization techniques for system identification and control design*. Symposium, North American Wind Energy Academy.

Service

Organizer	Collaboration with University of Maine's Advanced Structures and Composites Center (2014)
	Gearbox Reliability Collaborative Annual Meeting, National Renewable Energy Laboratory (2011, 2012)
Member	Association of Computing Machinery (ACM)
	American Society of Mechanical Engineers (ASME)
	American Institute of Aeronautics and Astronautics (AIAA)
Referee	Renewable Energy Journal
	Wind Energy Journal
	Information Journal
	AIAA Wind Energy Symposium (2014)
	ASME Dynamic Systems and Controls Conference (2015)

Volunteer & Outreach Activities

Jun - Aug 2015	**NSF REU Mentor**
	Mentored an undergraduate summer project: Using genetic programming to automatically develop models from observational data
2013 - 2014	**Invited Science Teacher, Four Rivers Charter School**
	Taught two classes on wind energy to high school students
2011 - 2012	**Volunteer, Boulder Food Rescue**
	This organization has saved hundreds of thousands of pounds of left over food from grocery stores and bakeries and delivered it to homeless shelters and other community food stations.
2001 - 2005	**American Cancer Society Relay for Life**

Other Interests

Film	I write, direct, and produce short fictional films, including:
	"MADG" (2014), *Sound on Sound Film Festival* (premiere), *Florence Night Out*
	"Vacuumland Trilogy" (2008), *The Project Competition*
Music	VP, Fanclub Collective, a music promotion agency in Ithaca, NY (2005 - 2010)
	I have written, recorded, and produced several albums
	Co-founder of a small record label that operates in Denver
Language	Spanish (advanced), Portuguese and Italian (beginner)
Sports	rock climbing, soccer