

# CURRICULUM VITAE

**NAME:** JONATHAN BIRD **DATE:** 19 JANUARY 2016

**RANK:** ASSOCIATE PROFESSOR

**DEPARTMENT:** ELECTRICAL AND COMPUTER ENGINEERING

**OFFICE LOACTION:** PORTLAND STATE UNIVERSITY  
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## 1. EDUCATION

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- **Doctor of Philosophy, University of Wisconsin-Madison**  
Electrical and Computer Engineering, May 2007  
Dissertation Title: An Investigation into the use of Electrodynamic Wheels for High-Speed Ground Transportation  
Major: Energy and Power Systems, Minor: Physics and Mechanical Engineering
- **Master of Science, University of Wisconsin-Madison**  
Electrical and Computer Engineering, May 2004
- **Bachelor of Engineering (1<sup>st</sup> Class honours), University of Auckland, New Zealand**  
Electrical and Electronic Engineering, May 2000
- **Bachelor of Business, University of Auckland, New Zealand**  
Major: Operations Research, May 2000

## 2. EXPERIENCE

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### **Present - 2015 September**

Associate Professor  
Portland State University

### **2015 August - 2015 July**

Associate Professor (with tenure)  
University of North Carolina at Charlotte

### **2015 July - 2009 August**

Assistant Professor  
University of North Carolina at Charlotte

### **2009 August – 2009 January**

Visiting Assistant Professor  
University of North Carolina at Charlotte

**2008 December - 2007 January**

Senior Project Engineer – Electrical Engineering - Motors

General Motors Corporation, Advanced Technology Center, Torrance, California

- I worked on the design and development of finite element based analysis methods for novel motors and traditional induction and interior permanent magnet traction motors for hybrid and fuel cell vehicle applications. I investigated numerical noise analysis suppression techniques and sensorless design methodologies for interior permanent magnet motors.

**2006 December - 2000 September**

Research Assistant

University of Wisconsin – Madison

**2006 December - 2003 September**

Teaching Assistant

University of Wisconsin – Madison

**2000 June – 2000 August**

English Teacher, English World, Cheung Ju, South Korea

**3. TEACHING ACCOMPLISHMENTS**

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**3.1. COURSES TAUGHT**

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*Teaching:* Taught 15 semester-long courses covering 9 different topics.

*Curriculum:* Developed three new graduate courses

**ECGR3142 Electromagnetic Devices**

Spring 2009, 2010 and 2011.

**ECGR3254 Senior Design II for Electrical Engineers**

Spring 2011.

**ECGR4143/5195 Electric Machines**

Fall 2010, 2011 and 2012

**ECGR6090/8090, Design of Renewable Energy Electromagnetic Devices  
(now ECGR6198/ ECGR8198)**

Spring 2012.

**ECGR6090/8090 Dynamics and Control of AC Drives (now ECGR6199/ ECGR8199)**

Spring 2010.

**ECGR5090 Applied Computational Electromagnetics**

Spring 2009.

**ECGR3121 Introduction to Electromagnetic Fields**

Spring 2013, Spring 2014, Fall 2014.

**ECGR6111/ ECGR8111 Linear Systems Theory**

Fall 2013.

**ECGR6115/ECGR8115 Optimal Control Theory I**

Fall 2014.

## 3.2. STUDENTS ADVISED

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### **Graduated Students (3 Ph.D., 3 M.S. Thesis, 1 M.S. Project)**

- [7] Uppalapati K. K. “An investigation into the torque density capabilities of flux-focusing magnetic gearboxes”, **Ph.D. Dissertation**, Dec. 2015
- [6] Subra P. “Three Dimensional Steady State and Transient Eddy Current Modeling,” **Ph.D. Dissertation**, May, 2014.
- [5] Wright, J., “Brushless DC Motor System Modelling and Control”. **M.S. Project**, Dec. 2013.
- [4] Vedanadam M. A., “Design of a Flux Focusing Axial Magnetic Gear”, **M.S. Thesis**, Dec. 2013.
- [3] Padmanathan P., “Design of a Continuously Variable Magnetic Gear”, **M.S. Thesis**, Dec. 2013.
- [2] Paudel N., “Dynamic Suspension Modeling of an Eddy-Current Device: An Application to MAGLEV,” **Ph.D. Dissertation**, May 2012.
- [1] Bobba D., “3-D Analytic Based Modeling of an Electrodynamic Wheel and the Performance of Electrodynamic Wheels in series for Urban Transportation,” **M.S. Thesis**, Dec. 2011.

### **Visiting Scholars (2 Ph.D., 1 Post-doc)**

- [3] Yin Chin, Ph.D. Candidate, School of Electrical Engineering, Southeast University, Nanjing, China, Nov 2015 – March 2016
- [2] Yang Zhang – Ph.D. Candidate, Southwest JiaoTong University, China, May 2014 – April 2015
- [1] Dr. Wei Qin, Lecturer, School of Electrical Engineering, Beijing Jiaotong University, Beijing, China, May 2015 – January 2016

### **Served on Graduate Committee**

- Abolbashari M., Ph.D. Committee Member, Advisor: Dr. Farahi
- Kaushal D., M.S. Committee Member, Advisor: Dr. Kamalasadani
- Mandal L., Ph.D. Committee Member, Advisor: Dr. Cox
- Neel S., M.S. Committee Member, Advisor: Dr. Parkhideh
- Smith M., M.S. Committee Member, Advisor: Dr. Cox
- Calvin M., M.S. Committee Member, Advisor: W. Williams

### **Current Graduate Students Advising (4 Ph.D.)**

- Wright J., *Dynamic Control of a Maglev Vehicle using Electrodynamic Wheels*, Ph.D. candidate, Years complete: 1, Expected graduation: Dec. 2018 [at UNCC]
- Som D., *Design of a Wind Turbine Magnetically Geared Generator*, Ph.D. candidate, Years complete: 1, Expected graduation: Dec. 2018 [at UNCC]
- Kang Y., *Investigating the Torque Capabilities of Cycloidal Magnetic Gears* Ph.D. candidate, Years complete: 1.5, Expected graduation: Aug. 2018 [at UNCC]
- Bahrami, M., *A Low Cost Magnetically Geared Lead Screw*, Ph.D. candidate, Years complete: 1.5, Expected graduation: Aug. 2019 [at Portland State University]

### **Senior Design Projects Advised (6 projects)**

- Hovis J., Phillips M., Barker K., *UNCC Near Space Balloon Rocket Project*, completion date: Dec. 2014, Funding source: NASA
- Ryan A., Boehm C., Bennett L., Raynor C., *Near Space Balloon Project*, completion date: Dec. 2013, Funding source: NASA
- Davis G., Kuffour E., *Maclean Power Analysis Team II*, completed May 6 2011, Funding source: Maclean Power

- Spataro E., Robinson P., Singleton J., Best S., *Light Weight Electric Vehicle Transmission*, completed May 6 2011, Funding source: Start-up funds
- Weaver R., Chandous J., Joyce A., *Light Weight Electric Vehicle Transmission*, completed May 7 2010, Funding source: NASA
- Pastwick D., Ervin D., Branch A., *Design and Build a High Speed Flux Focusing Magnetic Rotor*, completed May 7 2010, Funding source: National Science Foundation

#### **Undergraduate Research Assistants**

##### **Electromagnetic Launch Assistance for Space Vehicles Using Electrodynamic Wheels:**

- Garner C., Summer 2012, Fall 2012
- Kane G., Summer 2012, Fall 2012
- Storm T., Summer 2012, Fall 2012
- Clingenpeel T., Spring 2013, Summer 2013, Fall 2014

##### **Development of a Low Cost Form of Maglev Transportation Using Electrodynamic Wheels:**

- Bomela W. Spring, Summer 2012, Fall, Spring, Summer 2010, Spring 2009
- Tatak E., Spring 2009
- Branch A., Summer 2009

##### **Ocean Energy Power Take-Off Using Magnetic Gears (Year 1 - Year 4):**

- Garner J., Fall, Spring, Summer 2012
- Calvin M., Fall 2012, Spring 2013
- Chan, Chun Yin, Fall 2014

### **3.3. NEW COURSE DEVELOPMENT**

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ECGR6198/ ECGR8198 Design of Renewable Energy Electromagnetic Devices

ECGR6199/ ECGR8199 Dynamics and Control of AC Drives

ECGR5090 Applied Computational Electromagnetics

## 4. RESEARCH ACCOMPLISHMENTS

### 4.1. PUBLICATIONS

#### **Peer Reviewed Journal Publications [20 total]**

- [1] J. Bird and T. A. Lipo, "Characteristics of an electrodynamic wheel using a 2-D steady-state model," *IEEE Transactions on Magnetics*, vol. 43, pp. 3395-3405, Aug. 2007. DOI: <http://dx.doi.org/10.1109/TMAG.2007.900572>
- [2] J. Bird and T. A. Lipo, "A 3D steady-state magnetic charge finite element model of an electrodynamic wheel," *IEEE Transactions on Magnetics*, vol. 44, pp. 253-265, Feb. 2008. DOI: <http://dx.doi.org/10.1109/TMAG.2007.911597>
- [3] J. Bird and T. A. Lipo, "Calculating the forces created by an electrodynamic wheel using a 2D steady-state finite element model," *IEEE Transactions on Magnetics*, vol. 44, pp. 365-372, Mar. 2008. DOI: <http://dx.doi.org/10.1109/TMAG.2007.913038>
- [4] J. Bird and T. A. Lipo, "Modeling the 3-D rotational and translational motion of a Halbach rotor above a split-sheet guideway," *IEEE Transactions on Magnetics*, vol. 45, pp. 3233-3242, Sept. 2009. DOI: <http://dx.doi.org/10.1109/TMAG.2009.2021160>
- [5] N. Paudel and J. Z. Bird, "General 2-D steady-state force and power equations for a traveling time-varying magnetic source above a conductive plate " *IEEE Transactions on Magnetics*, vol. 48, pp. 95-100, Jan. 2012. DOI: <http://dx.doi.org/10.1109/TMAG.2011.2161638>
- [6] N. Paudel, S. Paul, *et al.*, "General 2-D transient eddy current force equations for a magnetic source moving above a conductive plate," *Progress in Electromagnetic Research B*, vol. 43, pp. 255-277, 2012. DOI: <http://dx.doi.org/10.2528/PIERB12072414>
- [7] S. Paul, D. Bobba, N. Paudel and J. Bird, "Source Field Modeling in Air Using Magnetic Charge Sheets", *IEEE Transactions on Magnetics*, Vol. 48, No. 11, pp 3879 – 3882, Nov. 2012, DOI: <http://dx.doi.org/10.1109/TMAG.2012.2201927>
- [8] N. Paudel and J. Z. Bird, "Modeling the dynamic electromechanical suspension behavior of an electrodynamic eddy current maglev device," *Progress in Electromagnetic Research B*, vol. 49, pp. 1-30, 2013. DOI: <http://dx.doi.org/10.2528/PIERB12121115>
- [9] V. M. Acharya and J. Z. Bird, "A flux focusing axial magnetic gear," *IEEE Transactions on Magnetics*, vol 49, pp 4092-4095, July, 2013. DOI: <http://dx.doi.org/10.1109/TMAG.2013.2248703>
- [10] W. Bomela, J. Z. Bird, and V. M. Acharya, "The performance of a transverse flux magnetic gear," *IEEE Transactions on Magnetics*, vol. 50, No. 1, Article # 4000104, Jan. 2014. DOI: <http://dx.doi.org/10.1109/TMAG.2013.2277431>
- [11] S. Paul and J. Z. Bird, "A 3-D analytic eddy current model for a finite width conductive plate," *COMPEL: The International Journal for Computation and Mathematics in Electrical and Electronic Engineering*, vol. 33, Iss: 1/2, pp 688-706, 2014. DOI: <http://dx.doi.org/10.1108/COMPEL-03-2013-0083>
- [12] Uppalapati K. and J. Z. Bird, "An Iterative Magnetomechanical Deflection Model for a Magnetic Gear", *IEEE Transaction on Magnetics*, Vol. 50. No. 2, pp. 245-248, Feb. 2014. DOI: <http://dx.doi.org/10.1109/TMAG.2013.2283018>
- [13] S. Paul, W. Bomela, N. Paudel, J.Z. Bird., "3-D Eddy Current Torque Modeling" , *IEEE Transactions on Magnetics*, , Vol. 50. No. 2, pp. 905-908, Feb. 2014. DOI: <http://dx.doi.org/10.1109/TMAG.2013.2285566>

- [14] K. Uppalapati, W. Bomela, J. Bird, M. Calvin, J. Wright, "Experimental Evaluation of Low-Speed Flux Focusing Magnetic Gearboxes," *IEEE Transactions on Industrial Applications*, Vol.50, No. 6, pp. 3637 – 3643, Nov/Dec, 2014.  
DOI: <http://dx.doi.org/10.1109/TIA.2014.2312551>
- [15] S. Paul and J. Z. Bird, "Analytic 3-D eddy current model of a finite width conductive plate including edge-effects", *International Journal of Applied Electromagnetics and Mechanics*, Vol. 45, no 1-4, 2014, pp. 565-571.  
DOI: <http://dx.doi.org/10.3233/JAE-141874>
- [16] K. Uppalapati and J. Z. Bird, "Magnetic gear axial scaling analysis using magnetomechanical deflection analysis ", *International Journal of Applied Electromagnetics and Mechanics*, Vol. 45, no 1-4, pp. 565-571, 2014.  
DOI: <http://dx.doi.org/10.3233/JAE-141878>
- [17] N. Paudel, S. Paul, W. Bomela, J.Z. Bird., "Dynamic Electromechanical Eddy Current Force Modeling," *COMPEL: The International Journal for Computation and Mathematics in Electrical and Electronic Engineering*, Vol. 33, no. 6, pp.2101 – 2120, 2014. DOI: <http://dx.doi.org/10.1108/COMPEL-08-2013-0266>
- [18] S. Paul, J. Wright, and J. Z. Bird, "3-D Steady-State Eddy-Current Damping and Stiffness Terms for a Finite Thickness Conductive Plate," *IEEE Transactions on Magnetics*, vol. 50, Article #: 6301404, Nov., 2014. DOI: <http://dx.doi.org/10.1109/TMAG.2014.2327097>
- [19] Y. Chen; W. Zhang; J. Z. Bird, S. Paul, K. Zhang, "A 3-D Analytic-Based Model of a Null-Flux Halbach Array Electrodynamic Suspension Device," in *IEEE Transactions on Magnetics*, vol.51, no.11, Article # 8300405, Nov. 2015, DOI: <http://dx.doi.org/10.1109/TMAG.2015.2444331>
- [20] Kang Li, Bird, J., Kadel, J., Williams, W. "A Flux-Focusing Cycloidal Magnetic Gearbox," in *IEEE Transactions on Magnetics*, vol.51, no.11, Article # 8109504, Nov. 2015, DOI: <http://dx.doi.org/10.1109/TMAG.2015.2440218>

### **Peer Reviewed Conference Papers [38 total]**

- [1] J. Bird and T. A. Lipo, "An electrodynamic wheel: an integrated propulsion and levitation machine," in *Electric Machines and Drives Conference*, June, 2003, June 1-4, pp. 1410-1416. DOI: <http://dx.doi.org/10.1109/IEMDC.2003.1210636>
- [2] J. Bird and T. A. Lipo, "A preliminary investigation of an electrodynamic wheel for simultaneously creating levitation and propulsion," in *18th International Conference on Magnetically Levitated Systems and Linear Drives*, Shanghai, China, 2004, pp. 316-325.
- [3] J. Bird and T. A. Lipo, "Electrodynamic wheel and flat passive track topologies capable of creating lift, thrust and guidance forces simultaneously," in *8th International Symposium On Magnetic Suspension Technology*, Dresden, Germany, Sept. 26-28, Sept. 2005.
- [4] J. Bird and T. A. Lipo, "A study of the effect of using electrodynamic wheels in series," in *8th International Symposium on Magnetic Suspension Technology*, Dresden, Sept. 26-28, Sept. 2005, pp. 52-56
- [5] J. Bird and T. A. Lipo, "The experimental verification of lift, thrust and guidance forces for an electrodynamic wheel rotating over a split-sheet guideway," in *19th International Conference on Magnetically Levitated Systems and Linear Drives*, Dresden, Germany, Sept. 13-15, 2006.
- [6] J. Bird, "Modelling a 3D eddy current problem using the weak formulation of the convective A\*-phi steady state method," in *Comsol Conference 2009*, Boston, MA,

- USA, Oct. 8-10, 2009. <http://www.comsol.com/paper/modeling-a-3d-eddy-current-problem-using-the-weak-formulation-of-the-convective--6387>
- [7] J. Bird, "Evaluating the Guidance Force Capabilities of Flat Passive Maglev Guideway Topologies Using the  $A-\phi$  Formulation," *The 17<sup>th</sup> International Conference on the Computation of Electromagnetic Fields (COMPUMAG)*, Florianopolis, Brazil, Nov. 22-26, Nov. 22-26, 2009.
- [8] S. Paul, D. Bobba, *et al.*, "Three dimensional transient modeling of a Halbach rotor moving above a conductive guideway using fictitious magnetic charge," *14th Biennial IEEE Conference on Electromagnetic Field Computation*, Chicago, IL., 2010, May 9-12. DOI: <http://dx.doi.org/10.1109/CEFC.2010.5481464>
- [9] N. Paudel and J. Bird, "2D Analytical Based Model of a Rotor Moving Over a Conductive Guideway," presented at the *14th Biennial IEEE Conference on Electromagnetic Field Computation*, Chicago, IL, May 9-12, 2010.
- [10] N. Paudel, J. Bird, *et al.*, "A Transient 2D model of an electrodynamic wheel moving above a conductive guideway," in *IEEE International Electric Machines and Drives Conference*, Niagra Falls, Canada, May 15-18, 2011. DOI: <http://dx.doi.org/10.1109/IEMDC.2011.5994657>
- [11] J. Bird, "Magnetic Rolling Resistance," presented at the *IEEE International Magnetics Conference*, Taipei, Taiwan, April 25-29, 2011.
- [12] N. Paudel, J. Z. Bird, *et al.*, "Modeling the dynamic suspension behavior of an eddy current device " in *3rd IEEE Energy Conversion Congress & Exposition.*, Phoenix, AZ, Sept. 17-22, 2011, pp. 1692-1699. DOI: <http://dx.doi.org/10.1109/ECCE.2011.6063986>
- [13] K. Uppalapati and J. Bird, "A flux focusing ferrite magnetic gear," *Power Electronics, Machines and Drives Conference*, Bristol, UK., March 27-29, 2012. DOI: <http://dx.doi.org/10.1049/cp.2012.0303>
- [14] S. Paul, D. Bobba, *et al.*, "Three Dimensional Magnetic Charge Modeling of Permanent Magnet Rotors," *IEEE International Magnetic Conference (INTERMAG)*, Vancouver, Canada, May 7-11th, 2012.
- [15] S. Paul and J. Bird, " Three dimensional analytic modeling of the field distribution in a conductive region due to a moving magnetic rotor " *IEEE International Magnetic Conference (INTERMAG)*, Vancouver, May 7-11, 2012.
- [16] K. Uppalapati and J. Bird, "A high-performance flux focusing magnetic gear using ferrite magnets," *American Society of Naval Engineers - Electric Machines Technology Symposium*, Philadelphia, PA, May 23-24, 2012  
[https://www.navalengineers.org/ProceedingsDocs/EMTS2012/Papers/53\\_Bird\\_EMMS2012Paper.pdf](https://www.navalengineers.org/ProceedingsDocs/EMTS2012/Papers/53_Bird_EMMS2012Paper.pdf)
- [17] S. Hazra, S. Bhattacharya, *et al.*, "Ocean energy power take-off using oscillating paddle," in *4th IEEE Energy Conversion Congress & Exposition*, Raleigh, NC, Sept. 15-20th, 2012. DOI: <http://dx.doi.org/10.1109/ECCE.2012.6342793>
- [18] K. K. Uppalapati, J. Z. Bird, *et al.*, "Performance of a magnetic gear using ferrite magnets for low speed ocean power generation," in *4th IEEE Energy Conversion Congress & Exposition*, , Raleigh, NC, Sept. 15-20th, 2012. DOI: <http://dx.doi.org/10.1109/ECCE.2012.6342498>
- [19] V. M. Acharya and J. Z. Bird, "A flux focusing axial magnetic gear," in *Joint IEEE International Magnetics (INTERMAG) and MMM Conference* Chicago, 14-18 Jan., 2013.
- [20] P. Padmanathan, J. Z. Bird, "A continuously variable magnetic gear", *9<sup>th</sup> IEEE International Electric Machines and Drives Conference*, Chicago, IL, May 12-15, 2013, DOI: <http://dx.doi.org/10.1109/IEMDC.2013.6556277>



- [21] K. Uppalapati and J. Z. Bird, "An Iterative Magnetomechanical Deflection Model for a Magnetic Gear:", *The 19<sup>th</sup> International Conference on the Computation of Electromagnetic Fields (COMPUMAG)*, June 30 – July 4<sup>th</sup>, 2013, Budapest, Hungary.
- [22] S. Paul, W. Bomela, J. Z. Bird, "3-D Eddy Current Torque Modeling", presented at the *19<sup>th</sup> International Conference on the Computation of Electromagnetic Fields (COMPUMAG)*, June 30 – July 4<sup>th</sup>, 2013, Budapest, Hungary.
- [23] W. Bomela, J. Z. Bird, A. M. Vedanadam, "The performance of a transverse flux magnetic gear", *The 3rd International Symposium on Advanced Magnetic Materials and Applications (ISAMMA 2013)*, Taichung, Taiwan, July 21 - July 25, 2013
- [24] S. Paul, and J. Z. Bird, "An Analytic Based 3-D Eddy Current Model of a Finite Width Linear Conducting Plate with an Arbitrary Source", *The 16<sup>th</sup> International Symposium on Applied Electromagnetics and Mechanics*, Quebec, Canada, July 31 – Aug. 2, 2013
- [25] K. Uppalapati and J. Z. Bird, "Mechanical Displacement Modelling of a Magnetic Gear Steel Bar", *16th International Symposium on Applied Electromagnetics and Mechanics (ISEM)*, Quebec, Canada, July 31 – Aug. 2, 2013
- [26] K. K. Uppalapati, J. Z. Bird, "Construction of a Low Speed Flux Focusing Magnetic Gear," *The 5th IEEE Energy Conversion Congress & Exposition (ECCE2013)*, Denver, CO, Sept. 15-19th, 2013. DOI: <http://dx.doi.org/10.1109/ECCE.2013.6646976>
- [27] Acharya, V. M., M. D. Calvin and J. Z. Bird (2014). A low torque ripple flux focusing axial magnetic gear. *7th IET Inter. Conf. Power Elect. Mach. Drives*. Manchester, UK. April 2014. DOI: <http://dx.doi.org/10.1049/cp.2014.0476>
- [28] Bird, J. Z., "Marine hydrokinetic power take-off using magnetic gearing", *2nd Marine Energy Technology Symposium*, Seattle, WA, April 2014  
[http://www.globalmarinerenewable.com/images/pdf/METS\\_PAPERS\\_VII/75-Bird.pdf](http://www.globalmarinerenewable.com/images/pdf/METS_PAPERS_VII/75-Bird.pdf)
- [29] Padmanathan, P. and J. Z. Bird, "A continuously variable magnetic gear performance comparison", presented at *IEEE International Magnetics Conference (INTERMAG)*. Dresden, Germany. May 2014.
- [30] Paul, S. J. Wright and J. Z. Bird, "3-D Steady-State Eddy Current Damping and Stiffness Terms for a Finite Thickness Conductive Plate ", *IEEE International Magnetics Conference (INTERMAG)*. Dresden, Germany. May 2014.
- [31] K. Uppalapati, J. Wright, M. Calvin, J. Z. Bird, "Efficiency Analysis of Magnetic Gears", *Sixteenth Biennial IEEE Conference on Electromagnetic Field Computation*, Annecy, France, May 25-28, 2014.
- [32] V. M. Acharya, J. Bird, S. Paul, "Scaling Analysis of Radial and Axial Rotary Magnetic Devices", *Sixteenth Biennial IEEE Conference on Electromagnetic Field Computation*, Annecy, France, May 25-28, 2014.
- [33] K. K. Uppalapati, J. Z. Bird, M. Calvin, J. Wright, J. Pritchard, W. Williams " A Magnetic Gearbox with an Active Region Torque Density of 239Nm/L," *6th IEEE Energy Conversion Congress & Exposition (ECCE2014)*, Pittsburgh, PA, Sept. 14-18th, 2014., DOI: <http://dx.doi.org/10.1109/ECCE.2014.6953585>
- [34] W. Williams, J. Bird, M. Calvin, P. Nguyen, A Comparison of FMEA for Mechanical Gearboxes and Magnetic Gearboxes, *Proceedings of the 3rd Marine Energy Technology Symposium*, April 27-29, 2015, Washington, D.C.
- [35] Y. Chen; W. Zhang; J. Z. Bird, S. Paul, K. Zhang, "A 3-D Analytic-Based Model of a Null-Flux Halbach Array Electrodynamic Suspension Device," presented at *IEEE International Magnetics Conference (INTERMAG)*. Beijing, China, 11-15 May 2015.



- [36] Kang Li; Bird, J.; Kadel, J.; Williams, W., "A Flux-Focusing Cycloidal Magnetic Gearbox," presented at *IEEE International Magnetics Conference (INTERMAG)*, Beijing, China, 11-15 May 2015.
- [37] J. Wright, J. Z. Bird, Electrodynamics wheel maglev vehicle force modeling using a state-space eddy current approach, *XVII International Symposium on Electromagnetic Fields in Mechatronics, Electrical and Electronic Engineering*, Valencia, Spain, September 10-12, 2015
- [38] M. B. Kouhshahi, J. Bird, A magnetically geared lead screw, *XVII International Symposium on Electromagnetic Fields in Mechatronics, Electrical and Electronic Engineering*, Valencia, Spain, September 10-12, 2015

### **Other (Invited Presentations)**

- [1] Bird, J. Z., "Magnetic gearing for Marine hydrokinetic power take-off : Opportunity and Challenges", Marine Hydrokinetic (MHK) panel session at *the IEEE Power and Energy Society, General Meeting* in Baltimore, Maryland for July 27-31, 2014
- [2] Bird, J. Z., "An introduction to magnetically geared electrical machines – opportunities and challenges", *Leuphana University*, Luneburg, Germany, May 19, 2014
- [3] Bird, J. Z., "Electrical Power Take-Off Technology for Ocean Power Generation", *Leuphana University*, Luneburg, Germany, May 26, 2014
- [4] Bird, J. Z., "Flux Focusing Magnetic Gear Design Using JMAG", *JMAG User Conference*, Detroit, MI, USA, October 16th, 2012
- [5] Bird, J. Z., "Magnetic gearbox design using JMAG", *JMAG User Conference*, Detroit, MI, USA, October 22<sup>nd</sup>, 2015

### **PATENTS ISSUED**

- [1] R. Blissenbach., J. Bird *Methods and apparatus for preventing demagnetization in interior permanent magnet machines*, Nov. 2010, U.S. patent number 7,843,100
- [2] R. Blissenbach, K. Le, D.D. Dang, J. Bird, *Method and apparatus for a permanent magnet machine with segmented ferrite magnets*, Mar. 2011, U.S. patent number 7,902,711
- [3] J. Bird, R. Blissenbach, D. D. Dang, E. Hatch, K. Le, *Method and apparatus for a permanent magnet machine with a direct liquid cooled stator*, Aug, 21, 2012, Pub. No.: US 8247933 B2
- [4] J. Bird, *Flux focusing magnetic gear assembly using ferrite magnets or the like*, April 8, 2013, International Patent No: WO2013052516 A1

### **Invention Disclosures**

- [5] J. Bird, M. B. Kouhshahi, *Magnetically Geared Lead Screw*, Filed 07/23/2015, Application No. 61/195,951
- [5] J. Bird, *Multistage Coaxial Magnetic Gearbox*, Filed: 5/12/2015, Application No. 61/160,345.

## 4.2. RESEARCH GRANTS AWARDED (\$2,725,193)

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### **Ocean Energy Power Take-Off Using Magnetic Gearing**

Principal Investigator: Jonathan Bird  
Co. PI: Wesley Williams, ET, UNCC  
Source of Support: North Carolina Coastal Studies Institute  
Award Period: July 1<sup>st</sup> 2015 – June 30<sup>th</sup> 2016  
Award Amount: \$245,000

### **Advanced High Torque Density Magnetically Geared Generator**

Principal Investigator: Jonathan Bird  
Co-PI: Wesley Williams, ET, UNCC  
Source of Support: Department of Energy  
Award Period: January 1<sup>st</sup> 2015 – June 30<sup>st</sup> 2016 (estimated start)  
Award Amount: \$500,000  
Web link: <http://energy.gov/eere/articles/energy-department-awards-45-million-innovative-wind-power-rd-projects>

### **An Investigation into the Performance of Magnetically Geared Devices for Marine Hydrokinetic and Wind Applications**

Principal Investigator: Jonathan Bird  
Source of Support: National Science Foundation  
Award Period: August 15<sup>th</sup> 2014 – August 14<sup>th</sup> 2017  
Award Amount: \$388,508  
Web link: [http://www.nsf.gov/awardsearch/showAward?AWD\\_ID=1408310](http://www.nsf.gov/awardsearch/showAward?AWD_ID=1408310)

### **Ocean Energy Power Take-Off Using Magnetic Gearing**

Principal Investigator: Jonathan Bird  
Co. PI: Wesley Williams, ET, UNCC  
Source of Support: North Carolina Coastal Studies Institute  
Award Period: July 1<sup>st</sup> 2014 – June 30<sup>th</sup> 2015  
Award Amount: \$305,000

### **Ocean Energy Power Take-Off Using Magnetic Gears – Year 3**

Principal Investigator: Jonathan Bird  
Co. PI: Wesley Williams, UNCC, Subhashish Bhattacharya, NCSU  
Source of Support: North Carolina Coastal Studies Institute  
Award Period: July 1<sup>st</sup> 2013 – June 30<sup>th</sup> 2014  
Award Amount: \$334,000

### **Ocean Energy Power Take-Off Using Magnetic Gears – Year 2**

Principal Investigator: Jonathan Bird  
Co. PI: Aixi Zhou, ET, UNCC, Subhashish Bhattacharya, NCSU  
Source of Support: North Carolina Coastal Studies Institute  
Award Period: July 1<sup>st</sup> 2012 – June 30<sup>th</sup> 2013  
Award Amount: \$348,946

### **Ocean Energy Power Take-Off Using Magnetic Gears**

Principal Investigator: Jonathan Bird  
Co. PI: Aixi Zhou, ET, UNCC, Subhashish Bhattacharya, NCSU  
Source of Support: North Carolina Coastal Studies Institute  
Award Period: July 1<sup>st</sup> 2011 – June 30<sup>th</sup> 2012  
Award Amount: \$223,605

## **Development of a Low Cost Form of Maglev Transportation Using Electrodynamic Wheels**

Principal Investigator: Jonathan Bird

Source of Support: National Science Foundation

Award Period: Sept. 1<sup>st</sup> 2009–August 31<sup>st</sup> 2013

Award Amount: \$349,134

Web link: <http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=0925941>

## **Electromagnetic Launch Assistance for Space Vehicles Using Electrodynamic Wheels**

Principal Investigator: Jonathan Bird

Source of Support: North Carolina Space Grant (NASA)

Award Period: July 1<sup>st</sup> 2011 – September 30<sup>th</sup> 2014

Award Amount: \$25,000

## **Various Senior Design Project Awards**

Principal Investigator: Jonathan Bird

Source of Support: North Carolina Space Grant (NASA)

Source of Support: NASA

Awarded Amounts: \$6,000

## **5. SERVICE**

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### **5.1. MAJOR COMMITTEE ASSIGNMENTS**

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- Department Chair Search Committee Member (2014)
- Department Review Committee for Promotion and Tenure (2012, non-voting member)
- Undergraduate Course Advisor (2011, 2012, 2013)
- Power Engineering Technical Thrust Member (2010 - 2014)
- Ad hoc Committee on Educational Software (2011, 2012)
- Faculty Hiring Committee Member (2011, 2012)
- Ph.D. Qualifying Examination Member (2010- 2012)

### **5.2. PROFESSIONAL AND SCHOLARLY ORGANIZATIONS**

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#### **Program Session Chair**

- Session Chair: 6th Annual IEEE Energy Conversion Congress & Exposition, Pittsburgh PA, Sept. 14-18th, 2014
- Session Chair: Motor, Generators and Actuators, IEEE International Magnetic (INTERMAG) Conference, Dresden, Germany, May 4 – 8, 2014
- Session Chair: 5th Annual IEEE Energy Conversion Congress & Exposition, Denver, CO, Sept. 15-19th, 2013
- Session Chair: Motor, Generators and Actuators I, 12<sup>th</sup> Joint MMM / IEEE International Magnetic (INTERMAG) Conference, Chicago, Illinois, USA, Jan. 14-18th, 2013
- Session Chair: 4th Annual IEEE Energy Conversion Congress & Exposition, Raleigh, NC, Sept. 15-20th, 2012.
- Session Chair: Motor, Generators and Actuators I, IEEE International Magnetic Conference (INTERMAG), Vancouver, Canada, May 7-11th, 2012.

#### **Journal Paper Reviewer**

- COMPEL: International Journal for Computation and Mathematics in Electrical and Electronic Engineering (2011: 3 papers, 2012: 2 papers, 2013: 1 paper)

- Electric Power Components and Systems, Taylor & Francis (2009: 1 paper)
- IEEE Transactions on Magnetic Journal (2006: 2 paper, 2008: 3 papers, 2009: 4 papers, 2010: 2 papers, 2011: 5 papers, 2012: 11 papers, 2013: 16 papers, 2014: 14 papers)
- IEEE Transactions on Smart Grids (2011: 3 papers)
- IEEE Transactions on Industry Applications (2013: 3 papers, 2014: 4 papers)
- International Journal of Applied Electromagnetics and Mechanics (2012: 1 paper)
- International Journal of Numerical Modelling: Electronic Networks, Devices and Fields (2014: 1 paper)
- Progress in Electromagnetic Research (2013: 1 paper)

### **Conference Paper Reviewer**

- Sixteenth Biennial IEEE Conference on Electromagnetic Field Computation, Annecy, France, May 25-28, 2014. (8 papers reviewed)
- 6<sup>th</sup> IEEE Energy Conversion Congress & Expo, Pittsburgh PA, Sept. 14-18th, 2014 (5 papers reviewed)
- 19<sup>th</sup> International Conference on the Computation of Electromagnetic Fields (COMPUMAG), June 30 – July 4<sup>th</sup>, 2013, Budapest, Hungary. (6 papers reviewed)
- 5<sup>th</sup> IEEE Energy Conversion Congress & Expo, Denver, Colorado, Sept. 15-19, 2013 (7 papers reviewed)
- IEEE International Electric Machines and Drives Conference, Chicago, IL, May 12-15, 2013 (6 papers reviewed)
- Joint IEEE International Magnetics (INTERMAG) and MMM Conference, Chicago, IL, Jan. 2013 (2013: 3 papers)
- 4<sup>th</sup> IEEE Energy Conversion Congress & Expo, Raleigh, NC, Sept. 15-20 2012 (5 papers reviewed)
- IEEE International Magnetic Conference (INTERMAG), Vancouver, Canada, May 7-11th, 2012. (5 papers reviewed)
- IEEE EnergyTech 2012, Cleveland, Ohio, May 29-31, 2012. (3 papers reviewed)
- 3<sup>rd</sup> IEEE Energy Conversion Congress & Expo, Phoenix AZ, Sept. 17-23, 2011 (7 papers reviewed)
- 2<sup>nd</sup> IEEE Energy Conversion Congress & Expo, Atlanta, GA, Sept. 12-16, 2010 (11 papers reviewed)
- IEEE International Magnetics Conference (INTERMAG), Madrid, Spain, May 4-8 2008 (3 papers reviewed)
- IEEE International Electric Machines and Drives Conference, Madison WI, June 1-4, 2003 (4 papers reviewed)

### **Outreach and Community Service**

- **Mallard Creek Elementary School Outreach** - In order to create a greater connection between UNCC and local schools the PI created a Near Space Balloon Project (sponsored by NASA N.C. Space Grant Consortium). The project involves launching weather balloons with cameras and instrumentation on-board in order to photograph, video and measure space related parameters. One such balloon was launched from a local elementary school. The school integrated the material from the launch into their curriculum.
- **Engineering Open Day Demonstrations** – Twice a year the PI’s lab is open to the general public to visit. Laboratory demonstrations of the sub-scale MAGLEV vehicle and magnetic gear test stand operating are provided to potential incoming students and their parents.
- **North Carolina Science Festival** – During the 2014 UNCC North Carolina Science Festival a weather balloon demonstration was provided by senior design students supervised by myself and Dr. Willis.