

Ozan Keysan

Curriculum Vitae

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Education & Qualifications

- 2013 PhD Electrical Engineering, University of Edinburgh, UK
Thesis Title: Superconducting Generators for Large Offshore Wind Turbines
- 2008 MSc Electrical-Electronics Engineering, Middle East Technical University
Thesis Title: A Non-Invasive Speed and Position Sensor for Induction Machines Using External Search Coils
- 2005 BSc Electrical-Electronics Engineering, Middle East Technical University

Experience

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| 2011–Present | Research Associate | Institute for Energy Systems, University of Edinburgh |
| 2010–2012 | Electrical Machine Design Consultant | NGenTec, Edinburgh |
| 2009–2010 | Research Associate | Institute for Energy Systems, University of Edinburgh |
| 2005–2009 | Research Assistant | Middle East Technical University |

Research Interests

My main area of interest is in the design and development of electrical machines. In particular, I am working on novel machine topologies such as superconducting machines and permanent-magnet machines. I also worked on the structural and thermal analysis of electrical machines and implementation of linear direct-drive generators to wave energy converters.

Research Experience & Projects

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| 2014 | NAREC | Design of next generation HVDC network for the offshore renewable energy industry. My role in the project is to design a high-frequency high-power transformer that can be coupled to the HVDC transmission line. |
| 2011–Present | EU FP7 Project | Marina Platform Project is an EU FP7 project with 17 industrial and academic partners. I am working as a full-time researcher in the project, which aims to design combined wave and wind energy platforms. I've led the work package in the University of Edinburgh, the aim of which is to compare different generator topologies and power take-off systems in terms of efficiency and reliability. |
| 2013 | United Arab Emirates Uni. | Design of a 5 kW permanent-magnet linear generator test rig. |
| 2013 | General Electric | A project to validate the superconducting generator topology that I developed during my PhD. General Electric agreed to loan the superconducting coil, vacuum chamber and other test equipments for the cryogenic experiments. |
| 2011 | NGenTec | Design consultant for a medium-speed generator design. Electromagnetic optimization a 5 MW, 300 rpm permanent-magnet generator has been completed. |

2010	NGenTec	Design and optimization of a 1 MW, 12 rpm direct-drive generator for a wind turbine. The machine has been manufactured and successfully tested.
2010	SMART R&D Grant	Design and testing of a 25 kW axial flux permanent-magnet generator. The experimental results have been used to evaluate the thermal performance of the generator and the cooling system.
2010	Hayward Tyler	Feasibility analysis of a submerged and flooded permanent-magnet generator. Thermal performance of the flooded generator has been investigated as well as the corrosion mechanisms and fluid drag losses.
2009–2010	NPower Project	The feasibility analysis of direct-drive PM generators for two wave energy converters (Aquamarine, AWS Ocean Power) and two tidal energy converters (Marine Current Turbines, Scotrenewables) have been investigated. An analytical and optimization tool is developed, and licensed by University of Edinburgh for further use.
2005–2008	METU	A novel method to estimate the rotor speed and position of an induction motor using the fringing flux out of the rotor cage is developed. An international patent has been awarded to this work.

Teaching Experience

School of Engineering, University of Edinburgh

Laboratory Supervision:

- Power Engineering Lab (2nd year): This course introduces students to the techniques and equipment used in the generation, transmission, distribution and utilisation of electrical power.
- Power Generation Lab (3rd year): The lab aims to give the students experience in working with rotating machines and power electronic equipment and synchronization to the grid.

Courses:

- The Industrial Doctoral Centre for Offshore Renewable Energy (four-year EngD programme), "Introduction to Superconductivity and Superconducting Generators".

Supervision:

- Mario Recio Lara, "Development of a mobile phone application to detect speed and faults of electrical machines", MSc Thesis, 2013.
- Marzia Akbari, "Comparison and control of power take-off systems for combined wind/wave energy platforms", MSc Thesis, 2013.

Middle East Technical University

Laboratory Supervision

- Electromechanical Energy Conversion I-II (EE361, EE362).
- Static Power Conversion (EE463).
- Laboratory coordinator (4 semesters).

Honours & Awards

- 2013 Staff Scholarship, University of Edinburgh.
- 2012 Young Researcher Support, International Conference on Superconductivity and Magnetism, ICSM.
- 2012-2013 PhD Overseas Fee Waiver and Stipend, University of Edinburgh.
- 2011 Young Researcher Award and Travel Grant, European Conference on Applied Superconductivity, EUCAS.
- 2011 IEEE Membership and Travel Grant, IEEE Power Electronics Society.
- 2011 Best Poster Award, IEEE International Electric Machines and Drives Conference, IEMDC.
- 2010 Best Paper Award, IEEE International Conference on Electrical Machines, ICEM.
- 2010-2012 PhD Scholarship on Renewable Energy, Hopewell Holdings, Hong Kong.
- 2005–2007 TUBITAK Graduate Fellowship.
- 2005 Ranked 2nd in the Academic Personnel and Graduate Education Exam (ALES).
- 2005 Finalist in the METU Entrepreneurship Competition (Yeni İşler Yeni Fikirler).
- 2001–2005 Dean's high honour list (3 times), Dean's honour list (3 times).

Courses & Seminars

- Future Reliable Renewable Energy Conversion Systems, 4th Flagship Seminar, Chongqing, China, 2012.
- Supervising Postgraduate Research, Iain Davidson, 2013.
- Large-Scale Parallel Computing, University of Edinburgh, 2013.
- Superconducting Machines, UK Magnetics Society, University of Oxford, 2012.
- Thermal and Mechanical Aspects of High Performance Electrical Machines, UK Magnetics Society, 2011.
- LaTeX for scientific publications, Skills Development Edinburgh, 2010.
- Opera 2D/3D FEA Analysis of Electrical Machines, Cobham Ltd. Vector Fields, 2009.
- Marine and Tidal Energy Workshop, Industrial Problems in Marine Energy Workshop, 2009.
- Project Management for Researchers, Fistrail Training & Consultancy Ltd., 2009.
- Project Presentation on International Venture Capital Forum, Athens, 2006.
- Project Management and Entrepreneurship Course, 30 days, METU Technopolis, 2005.

Memberships

- 2011–Present IEEE Member
- 2011–Present IEEE Power and Energy Society Member
- 2010–Present UK Magnetics Society Member
- 2005–Present TMMOB Electrical Engineers Society Member

Academic Work

- Reviews for IEEE Transactions of Industrial Electronics
- IEEE Transactions of Industrial Informatics
- IET Renewable Power Generation Journal
- IEEE International Conference on Electrical Machines and Drives
- IET Power Electronics, Machines and Drives Conference
- IEEE International Conference on Electrical Machines

Software

- Programming: Python, R, Matlab, C++.
- Finite Element Analysis: Opera, FEMM, ANSYS, Gmsh, GetDP.
- Computer Aided Design: SolidWorks, AutoCad.
- Computational Fluid Dynamics: OpenFOAM.

Activities & Hobbies

Mountaineering Active Member of METU Mountaineering Club
 Sailing Dinghy and Yacht Sailing, Certificate of Competence For Operators of Pleasure Craft.
 Blogging asuyatuyolar.org

Languages

English (Fluent), Spanish (Intermediate), Chinese (Beginner)

Publications

Refereed Journal Papers

1. Keysan, O., M. Mueller, A. McDonald, N. Hodgins, and J. Shek (2012). Designing the C-GEN lightweight direct drive generator for wave and tidal energy. *IET Renewable Power Generation* **6**(3), 161.
2. Keysan, O. and B. Ertan (2012). Real Time Speed & Position Estimation Using Rotor Slot Harmonics. *IEEE Transactions on Industrial Informatics* (c), 1–1.
3. Keysan, O., D. Olczak, and M. A. Mueller (Dec. 2012). A Modular Superconducting Generator for Offshore Wind Turbines. *Journal of Superconductivity and Novel Magnetism*, 1–5.
4. Hodgins, N., O. Keysan, A. McDonald, and M. Mueller (2011). Design and Testing of a Linear Generator for Wave Energy Applications. *IEEE Transactions on Industrial Electronics* (c), 1–10.
5. Keysan, O. and M. A. Mueller (Oct. 2011). A Homopolar HTSG Topology for Large Direct-Drive Wind Turbines. *IEEE Transactions on Applied Superconductivity* **21**(5), 3523–3531.
6. Keysan, O. and H. B. Ertan (2009). Determination of rotor slot number of an induction motor using an external search coil. *Facta universitatis-series: Electronics and Energetics* **22**(2), 227–234.

Book Chapters

1. Keysan, O. (2014). “Electrical Generator Technologies for Offshore Wind Turbines”. In: *IET offshore wind farm online reference*, pp.1–20.
2. Keysan, O. (2013). “Application of high temperature superconducting machines to direct drive renewable energy systems”. In: *Electrical Drives for Direct Drive Renewable Energy Systems*. Ed. by M. Mueller and H. Polinder. Woodhead Publication. ISBN: 84569-783-9.

Patent

1. Keysan, O. and H. B. Ertan (2011). *Speed and Rotor Position Estimation of Electrical Machines Using Rotor Slot Harmonics and Higher Order Rotor Slot Harmonics*.

Papers in Conference Proceedings

1. Keysan, O, P Radyjowski, J Burchell, and M. A. Mueller (2014). Towards More Reliable and Cost Effective Superconducting Generators for Wind Turbines. In: *IET Power Electronics, Machines and Drives (PEMD) Conference*. Manchester, pp.1–5.

2. Keysan, O. and M. A. Mueller (2014). Sizing of Electrical Generators for a Floating OWC Array. In: *European Wind Energy Conference*. Barcelona, pp.1–7.
3. Echenique, E., O. Keysan, and M. Mueller (2013). Rotor Loss Prediction in Air-Cored Permanent Magnet Machines. In: *ieeexplore.ieee.org*. Ed. by Chicago, pp.1–8.
4. Keysan, O., J. Burchell, and M. A. Mueller (2013). Magnetic and Structural Analysis of a Transverse Flux Claw Pole Linear Machine (Invited Paper). In: *IEEE International Conference on Industrial Technology*. Cape Town, pp.1–5.
5. Keysan, O. and M. A. Mueller (2013). An Open Source Tool to Estimate Mass and Efficiency of Wind Turbine Power Take-off Systems. In: *IET Renewable Power Generation Conference 2013*. Beijing, pp.1–6.
6. Keysan, O. and M. Mueller (2012). A linear superconducting generator for wave energy converters. In: *6th IET International Conference on Power Electronics, Machines and Drives (PEMD 2012)*. Bristol: IET, pp.B134–B134. ISBN: 978-1-84919-616-1.
7. Keysan, O., A. McDonald, and M. Mueller (2011). A Direct Drive Permanent Magnet Generator Design for a Tidal Current Turbine (SeaGen). In: *International Electric Machines and Drives Conference*, pp.1–6.
8. Keysan, O. and M. Mueller (2011). Superconducting generators for renewable energy applications. In: *IET Conference on Renewable Power Generation (RPG 2011)*. Vol. 2020. Edinburgh: IET, pp.12–12.
9. Keysan, O. and M. A. Mueller (2011). A Transverse Flux High-Temperature Superconducting Generator Topology for Large Direct Drive Wind Turbines. In: *Superconductivity Centennial Conference*. Vol. 01, pp.1–6.
10. Hodgins, N., O. Keysan, A. McDonald, and M. Mueller (Sept. 2010). Linear generator for direct drive wave energy applications. In: *The XIX International Conference on Electrical Machines - ICEM 2010*. IEEE, pp.1–6. ISBN: 978-1-4244-4174-7.
11. Keysan, O. and H. B. Ertan (May 2010). Higher order rotor slot harmonics for rotor speed & position estimation. In: *2010 12th International Conference on Optimization of Electrical and Electronic Equipment*. Brasov: IEEE, pp.416–421. ISBN: 978-1-4244-7019-8.
12. Keysan, O. and H. B. Ertan (Sept. 2010). Speed & position estimation by demodulating rotor slot harmonics. In: *The XIX International Conference on Electrical Machines - ICEM 2010*. 3. IEEE, pp.1–6. ISBN: 978-1-4244-4174-7.
13. Keysan, O., A. McDonald, and M. Mueller (2010). Integrated Design and Optimization of a Direct Drive Axial Flux Permanent Magnet Generator for a Tidal Turbine. In: *International Conference on Renewable Energies and Power Quality - ICREPQ'10*. Granada.
14. Keysan, O., A. McDonald, M. Mueller, R. Doherty, and M. Hamilton (2010). C-GEN, a lightweight direct drive generator for marine energy converters. In: *5th IET International Conference on Power Electronics, Machines and Drives (PEMD 2010)*. IET, pp.1–6. ISBN: 978 1 84919 231 6.
15. Hodgins, N., A. McDonald, J. Shek, O. Keysan, and M. Mueller (2009). Current and Future Developments of the C-GEN Lightweight Direct Drive Generator for Wave & Tidal Energy. In: *Proceedings of the 8th European Wave and Tidal Energy Conference*. Uppsala.

National Papers

1. Ertan, H. B. and O. Keysan (2012). Rotor Oluk Harmoniklerini Kullanarak Asenkron Motorlar İçin Gerçek Zamanda Sensörsüz Hız ve Konum Kestirimi. In: *Elektrik-Elektronik ve Bilgisayar Mühendisliği Sempozyumu*, pp.1–6.
2. Keysan, O. and H. B. Ertan (2012). Asenkron Motorlarda Oluk Sayısının Gövde Dışına Takılan Bir Bobinle Belirlenmesi. *EMO Bilimsel Dergi* 2(3), 29–35.
3. Ertan, H. B. and O. Keysan (2009). Govde disina yerlestirilmis bobin ile asenkron motor hizinin olculmesi. In: *Elektrik-Elektronik, Bilgisayar, Biyomedikal Mühendisliği 13. Ulusal Kongresi*. Vol. 2. 3, pp.37–43.

Technical Reports

1. Keysan, O. and M. A. Mueller (2012). *Marina Platform Deliverable 7.2.2, Wind Energy System Components*. Tech. rep., pp. 1–67.

2. Keysan, O. and M. A. Mueller (2012). *Marina Platform Deliverable 7.3, Critical Components for Wave Energy Converter Power Take-off Systems*. Tech. rep., pp. 1–48.
3. Keysan, O. (2010). *Hayward Tyler, Marinisation of a Direct Drive Permanent Magnet Machine*. Tech. rep., pp. 1–30.
4. Keysan, O. (2009). *Aquamarine Power, Oyster C-Gen Rotary Machine Design*. Tech. rep., pp. 1–45.
5. Keysan, O. (2009). *Archimedes Wave Swing, C-Gen Direct Drive Linear Machine Design*. Tech. rep., pp. 1–28.
6. Keysan, O. (2009). *Marine Current Turbines, C-Gen Direct Drive Machine Design*. Tech. rep., pp. 1–31.
7. Keysan, O. (2009). *Scotrenewables, Tidal Turbine C-Gen Direct Drive Machine Design*. Tech. rep., pp. 1–48.

Thesis

1. Keysan, O. (2014). “Superconducting Generators for Large Offshore Wind Turbines”. PhD Dissertation. University of Edinburgh, p. 228.
2. Keysan, O. (2008). “A Non-Invasive Speed and Position Sensor for Induction Machines Using External Search Coils”. MSc. Middle East Technical University, p. 213.

Manuscripts in Preparation

1. Mueller, M. A., O. Keysan, A. Kumaraperumal, and M. Galbraith (2014). “Heat Pipes in Air Cored Windings for Improved Thermal Performance”.
2. Lara, M. R. and O. Keysan (2013). “Detection of Electrical Machine Faults Using Smart Phones”.