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About

Stuart Hillmansen is a Senior Lecturer in Electrical Energy Systems, and Head of the Traction Research Group within the School of Electronic, Electrical and Computer Engineering.
The group are part of the Birmingham Centre for Railway Research and Education.

Stuart has over 50 research publications in scientific journals, conferences, and publically available reports.

He has a wide teaching portfolio, which includes leading the Traction Systems Design module, and is also responsible for organising the final year masters projects and the MSc research projects.

Qualifications

Senior Lecturer in Electrical Energy Systems:

PhD in Mechanical Engineering (Imperial College London) Awarded the Unwin Prize for Best Engineering Thesis.

MSc DIC in Advance Mechanical Engineering (Imperial College London)

BSc (hons) ARCS Physics 1st class (Imperial College London)

Biography

Dr Stuart Hillmansen is a Senior Lecturer in Electrical Energy Systems within the Department of Electronic, Electrical and Computer Engineering at the University of Birmingham. His main area of research interest is in hybrid traction systems for use in railway vehicles. He is a member of the Birmingham Centre for Railway Research and Education in the University of Birmingham. His recent research has been supported by the European Commission, EPSRC, Network Rail, Arup, Advantage West Midlands, the Department for Transport, The Technology and Strategy Board, Atkins Rail. He has authored a number of papers on railway energy consumption and presented the work at a number of international conferences.

Dr Hillmansen leads the Railway Traction Systems Group in the University of Birmingham. The main achievement since Dr Hillmansen joined Birmingham is to have re-established the University's international reputation for traction research, and to have produced fundamental research which has a direct and current benefit to the railway industry. The group have developed leading expertise in hybrid rail propulsion and our expertise and research results have been used by the UK Government to inform the procurement of new rolling stock. This work is continuing and is now supported by the Energy Systems Integration Laboratory which has been funded by AWM and ERDF. This laboratory will assist the team in producing outstanding research outputs for many years to come.

Teaching

Lectures BEng/MEng2 Electrical Energy Systems 20
Lectures BEng/MEng2 Electrical Power 20
Lectures MEng4 Electrical Energy Conversion Systems 10
Lectures MSc (civ) Fundamentals of Railway Traction System Design 30
Lectures MRes (Met and Mat) Fundamentals of Electric Power 1.5
Practicals BEng/MEng2 DC motor experiment (new) ~12
Practicals BEng/MEng2 Transformer lab ~3
Practicals MEng4 Drives and converters lab ~3
Practicals MSc (civ) Traction systems lab ~48
Tutorials MSc (civ) Traction systems tutorials 4
Tutorials BEng/MEng2 Electrical Energy Systems 2
Tutorials MEng4 Electrical Energy Conversion Systems 2
Other MSc (EECE) MSc project briefings 2
Other MEng (EECE) MEng Final Year Project Briefings 2

Postgraduate supervision

9 PhD students (4 as supervisor 5 as co-supervisor)
2 Mhil students (1 as supervisor 1 as co-supervisor)

Research

Research
As head of the Railway Research Group's traction systems research, Dr Hillmansen has developed key themes, built up its reputation internationally in both academic

circles and industry and co-ordinated its dissemination.

Developing key themes
Improving the energy efficiency of railway systems relies on frontline developments in railway traction systems. Developing and testing cutting edge hypothesis in this field not only creates interesting and challenging PhD programmes for the team, but ensures that the practical applications of the research are timely and of great importance to both industry and the Department for Transport (DfT) both of whom have carbon reduction strategies. This has led to a number of deployments with direct or collaborative funding. Software developed by Dr Hillmansen's team for train simulation and optimization is not only being currently applied on the UK's railways but also internationally through collaborations outside the EU in the USA and far east. An example is the application of the simulator to the assessment of new rolling stock designs on the Singapore Mass Rapid Transit system. Previously the software was applied to other high-speed routes in the UK to support the development of the Government's technical specification for the next generation of high speed rolling stock (2007-8). Advanced instrumentation systems designed by Dr Hillmansen's team are deployed in passenger services in the UK. These include instrumented vehicles and infrastructure on the Merseyrail network (with direct funding from the DfT and co-funding by EPSRC).

Industry
The dissemination activities of the group regularly attract the attention of the industry and we often showcase our work in high-level meetings with senior members of high profile companies. The group work closely with Atkins rail group and are participating in a KTP with them. Our multi-train simulator will be fully incorporated in Atkins' suite of rail related design and analysis tools. Dr Hillmansen is principle investigator of the Energy Storage and Integration Laboratory (established in April 2010 and funded by AWM and ERDF through the Science City programme) that supports the research through cutting edge experimentation and validation of simulation studies. The laboratory has already generated significant interest from the industry, and has been featured in railway and engineering publications. The laboratory will support our long term research aspirations and will help translate the outputs from our research into tangible industry impacts.

UK profile
Recognition of the value of Dr Hillmansen's research can be seen from the invites from key UK bodies. The Government's Energy and Climate Change Select Committee requested Dr Hillmansen's evidence (both oral and written (2008)) to inform their report on Low Carbon Technologies in a Green Economy. The DfT's Technical Strategy Advisory Group requested Dr Hillmansen's contribution in developing a future strategy for energy for the railway industry (2008). Dr Hillmansen also has been invited to contribute to the development of the future technical strategy of the railway, and have supported the Government's Technical Strategy Advisory Group on a number of occasions. Since 2005, Dr Hillmansen has been a member of the DfT chaired Future Fuels Technology Group.

The group regularly present their results to The Railway Industry Association, the Railway Safety and Standards board and the Vehicle Train Energy System Interface.

The IMechE appointed Dr Hillmansen as an editorial board member (Proceedings of the Institution of Mechanical Engineering Part F: Journal of Rail and Rapid Transit) and as a member of the Conferences and Seminars Committee

International profile
On the international stage Dr Hillmansen is heavily involved with EU FP7 research projects, and is principle investigator on two projects. Both projects are likely to lead onto significant future funding. Dr Hillmansen co-chaired the 4th International Railway Traction Systems Conference attended by delegates from the UK, the USA, Australia, Far East and the EU. Dr Hillmansen is regularly invited to address international conferences (including high profile conferences in Japan and Hong Kong) and to peer review papers from international journals. The group are collaborating with Vehicle Projects INC in the USA, who have developed a number of fuel cell demonstrators (including a switcher locomotive), and have jointly prepared an article for publication. In Singapore, our simulator is being used to assess the performance of the latest rolling stock running on their metro.

Publications
Results from Dr Hillmansen's research has been published in literature and are published in numerous conferences. The research is now established and the rate of publications is about 4-5 journal papers per year and which is in addition to several conferences (attended by the research team and students).

Other activities

External duties
- RRUK representative on the Industry panel – Future Fuels Technology Group
- Board Member of Proc IMechE Part F: Journal of Rail and Rapid Transit
- Member of the IMechE conferences and seminars committee
- Organising special issue of Part F focusing on RRUK phase 2
- Chair of 4th International Conference on Railway Traction Systems
- EURNEX pole 7 co-leader
- Invited to present evidence to the Select Committee on Energy and Climate Change.
- Lecture on IET CPD course on Electrification Infrastructure

Publications

PUBLICATIONS
Journals:
1. Meegahawatte, D; Hillmansen, S; Roberts, C, et al. Analysis of a fuel cell hybrid commuter railway vehicle JOURNAL OF POWER SOURCES Volume: 195 Issue: 23 Pages: 7829-7837 Published: 2010. Journal impact factor 3.792.

2. Hillmansen, S; Roberts, C, Energy storage devices in hybrid railway vehicles: a kinematic analysis P I MECH ENG F-J RAI Volume: 221 Issue: 1 Pages: 135-143 Published: MAR 2007. Journal impact factor 0.434.

3. Yoichi Kayamori, S. Hillmansen, P.S.J. Crofton, Roderick A. Smith, Ductile Crack Propagation Characteristics in Thin Steel Tubes, Journal Key Engineering Materials (Volumes 353 - 358) Pages 248-253 DOI 10.4028/www.scientific.net/KEM.353-358.248 2007. Journal impact factor 0.224.

4. Yoichi Kayamori, S. Hillmansen, P.S.J. Crofton, Roderick A. Smith, Ductile Crack Propagation Characteristics in Steel Thin Single Edge Notched Tension Specimens, Journal Materials Science Forum (Volumes 539 - 543) Pages 2180-2185 DOI 10.4028/www.scientific.net/MSF.539-543.2180 2007. Journal impact factor 0.399.

5. Bocharnikov, YV; Tobias, AM; Roberts, C, et al. Optimal driving strategy for traction energy saving on DC suburban railways.: IET ELECTRIC POWER APPLICATIONS Volume: 1 Issue: 5 Pages: 675-682 Published: 2007. Journal impact factor 1.212.

6. Hatano, L; Smith, RA; Hillmansen, S, International railway comparisons P I MECH ENG F-J RAI Volume: 221 Issue: 1 Pages: 117-123 Published: MAR 2007. Journal impact factor 0.434.

7. Smith RA, Hillmansen S A brief historical overview of the fatigue of railway axles P I MECH ENG F-J RAI 218 (4): 267-277 DEC 2004. Journal impact factor 0.434.

8. Hillmansen S, Smith RA The management of fatigue crack growth in railway axles P I MECH ENG F-J RAI 218 (4): 327-336 DEC 2004. Journal impact factor 0.434.

9. Leevers PS, Hillmansen S, Moreno LDF Specimen temperature conditioning and drift before an S4 pipe fracture test POLYM TEST 23 (6): 727-735 SEP 2004. Journal impact factor 1.994.

10. Hillmansen S The application of fuel cell technology to rail transport operations P I MECH ENG F-J RAI 217 (4): 291-298 2003. Journal impact factor 0.434.

11. Hillmansen S, Haward RN Adiabatic failure in polyethylene POLYMER 42 (22): 9301-9312 OCT 2001. Journal impact factor 3.573

12. Ivankovic A, Hillmansen S Evolution of dynamic fractures in poly(methyl methacrylate) PLAST RUBBER COMPOS 30 (2): 88-93 2001. Journal impact factor 0.4.

13. Leevers PS, Hazra S, Hillmansen S Impact resistance of thermoplastics - Prediction from bulk properties PLAST RUBBER COMPOS 29 (9): 460-467 2000. Journal impact factor 0.4.

14. Hillmansen S, Hobeika S, Haward RN, et al. The effect of strain rate, temperature, and molecular mass on the tensile deformation of polyethylene POLYM ENG SCI 40 (2): 481-489 FEB 2000. Journal impact factor 1.248.

Journal (accepted for publication)
1. S Lu, S Hillmansen, C Roberts. A power management strategy for multiple unit railroad vehicles, accepted for publication in IEEE Transactions of Vehicular Technology.

2. E Stewart, P Weston, S Hillmansen, C Roberts. Using bogie mounted sensors to understand the dynamics of 3rd rail current collection systems, accepted for publication in the RRUK special issue of the Proceedings of the IMechE: Part F – Journal of Rail and Rapid Transit.

Journal (ready for submission or recently submitted)
1. A. Hoffrichter, A. Miller, S. Hillmansen, and C Roberts. Well to wheel analysis for hydrogen, diesel and electric traction for railway propulsion. Submitted to Transportation Research Part D.

2. S. Lu, S. Hillmansen, and C. Roberts, “Train trajectory optimisation” IEEE Transaction for Intelligent Transportation Systems. To be submitted for publication on Oct. 2010.

3. Edward Stewart, Paul Weston, Clive Roberts and Stuart Hillmansen, Monitoring the energy consumption in DC railways. Invited paper for the IET Electrical Systems in Transportation.

Journal Editorials
1. Hillmansen S Special issue on railway axles P I MECH ENG F-J RAI 218 (4): I-II DEC 2004

2. Hillmansen, S; Baker, C; Powrie, W Special issue on rail research UK Source: PROCEEDINGS OF THE INSTITUTION OF MECHANICAL ENGINEERS PART F-JOURNAL OF RAIL AND RAPID TRANSIT Volume: 221 Issue: 1 Pages: I-III Published: MAR 2007

Journal Discussions
1. Hillmansen S, Smith RA. Discussion: benefits of lower-mass trains for high speed rail operations. Transport; Proceedings of the Institution of Civil Engineers 2005; 158:179–182.

Book chapters:
1. Leevers, P.S., Haward, R.N., Hazra, S., and Hillmansen, S. Fast fracture of thermoplastics as a micro-scale tensile drawing process, in Fracture of Polymers, Composites and Adhesives, J.G. Williams and A. Pavan, Editors. (2000), Elsevier Science Publishers. pp. 335-345.

2. Ivankovic, A. Murphy, N., and Hillmansen, S, Dynamic Fractures in PMMA in Crack Dynamics, eds: A. Ivankovic and M H Aliabadi, WIT 2004 ISBN 1-85312-948-8.

3. ‘Railway Axles’, S. Hillmansen and R.A. Smith, pp 2-79 to 2-83, in ‘Best Practice in Wheel-Rail Interface Management for Mixed Traffic Railways’, F. Schmid (Editor in Chief) et al. Published by Birmingham University Press and A&N Harris, ISBN 978-0-952-9997-3-7, Birmingham and London, September 2010.

Letters
1. Hillmansen S Nuclear fusion isn't fiction PROF ENG 17 (17): 22-22 OCT 6 2004

Royal Academy of Engineering publications
1. Yong, J., Smith RA, Hillmansen . and L. Hatano, What Price Speed - Revisited, Ingenia Issue 22, pp. 46 - 51, 2005.

Published Government reports
1. S Hillmansen, C Roberts, A McGordon, P Jennings, 2007. Final Report: Concept Validation for Hybrid Trains CONTRACT REFERENCE NO: DfTRG/0078/2007 for the Department of Transport. 2008

2. S Hillmansen, C Roberts, A McGordon, P Jennings, 2008. Final Report: DMU Hybrid Concept Evaluation - Follow on Work DfTRG/0078/2007 for the Department of Transport. 2009

Government report contributions
1. Low Carbon Technologies in a Green Economy HC 193-I, Fourth Report of Session 2009-10 - Volume I: Report, Together with Formal Minutes Author: House of Commons - Energy and Climate Change Committee Publisher:TSO (The Stationery Office)

2. Low carbon technologies in a green economy: fourth report of session 2009-10: Vol. 2 Oral and written evidence, House of Commons papers 193-II 2009-10 Corporate Author: Great Britain Parliament House of Commons Energy and Climate Change Committee, Publisher:TSO (The Stationery Office)

Conference publications:
1. Hillmansen, S; Greenshields, CJ; Ivankovic, A Experimental study of the dynamics of rapid crack propagation in plastic pipes Conference Information: 12th Bienniel Conference on Fracture of the European-Structural-Integrity-Society (ECF 12), Date: SEP 14-18, 1998 SHEFFIELD ENGLAND Source: ECF 12: FRACTURE FROM DEFECTS, VOLS. I-III Pages: 1417-1422 Published: 1998

2. Davis, P; Hillmansen, S; Leevers, P Small-scale testing for brittle-tough transitions of Rapid Crack Propagation in PE pipelines Conference Information: 58th Annual Technical Conference of the Society-of-Plastics-Engineers, Date: MAY 07-11, 2000 ORLANDO FL Source: ANTEC 2000: SOCIETY OF PLASTICS ENGINEERS TECHNICAL PAPERS, CONFERENCE PROCEEDINGS, VOLS I-III Pages: 3153-3157 Published: 2000

3. Smith, R.A., and Hillmansen, S.: Monitoring Fatigue in Railway Axles, International Wheelsets Conference. Rome 2001.

4. Ivankovic, A; Hillmansen, S. Evolution of dynamic fractures in poly(methyl methacrylate) Conference Information: 11th International Conference on Deformation, Yield and Fracture of Polymers, Date: APR 10-13, 2000 CHURCHILL COLL CAMBRIDGE ENGLAND Source: PLASTICS RUBBER AND COMPOSITES Volume: 30 Issue: 2 Pages: 88-93 Published: 2001

5. Murphy, N., Ivankovic, A., Hillmansen, S., A numerical and experimental investigation of dynamic fracture of polymethyl methacrylate, 10 Anniversary ACME-UK Conference Swansea 2002.

6. Hillmansen, S., Smith R.A., Intelligent measurement of the in-service rail vehicle axle environment, presented in the International Heavy Haul Conference, Dallas 2003.

7. Hillmansen, S., Fatigue crack growth in railway axles, presented at the International Seminar on Railway Axles, Imperial College London, September 2003.

8. Hillmansen, S., Smith RA, Assessing Fatigue Crack Growth in Railway Axles from icf11.com. Proceedings of the XI International Conference on Fracture, 2005 - icf11.com, Torino Italy.

9. Kayamori, Y; Hillmansen, S; Crofton, PSJ, et al. Ductile crack propagation characteristics in thin steel tubes Conference Information: Asian Pacific Conference for Fracture and Strength (APCFS'06), Date: NOV 22-25, 2006 Sanya PEOPLES R CHINA Source: PROGRESSES IN FRACTURE AND STRENGTH OF MATERIALS AND

STRUCTURES, 1-4 Volume: 353-358 Pages: 248-253 Published: 2007

10. Kayamori, Y; Hillmansen, S; Crofton, PSJ, et al. Ductile crack propagation characteristics in steel thin single edge notched tension specimens Conference Information: 5th International Conference on Processing and Manufacturing of Advanced Materials, Date: JUL 04-08, 2006 Vancouver CANADA Source: THERMEC 2006, Pts 1-5 Volume: 539-543 Pages: 2180-2185 Published: 2007

11. S Hillmansen, C Roberts, C Goodman. 2007. Integration of energy storage in hybrid railway vehicles (In Proceedings of the 3rd UIC Energy Efficiency Conference, Portoroz, Slovenia).

12. Y Bocharnikov, C Roberts, S Hillmansen, A Tobias, 2007. Net energy reduction in DC railways by means of train trajectory optimisation and train rescheduling (In Proceedings of the 3rd International Conference on Railway Traction Systems, Tokyo, Japan).

13. S Hillmansen, C Roberts, D Aguirre, S Singainy, C Goodman, 2007. Chemical battery storage devices for hybrid railway vehicles (In Proceedings of the 3rd International Conference on Railway Traction Systems, Tokyo, Japan).

14. Y Bocharnikov, C Roberts, S Hillmansen, C Goodman, 2007. Net energy reduction in DC railways by means of train trajectory optimisation and train rescheduling (Presented at 3rd UIC Railway Energy Conference, Portoroz, Slovenia).

15. S. Lu, S. Hillmansen, and C. Roberts, “Optimising hybrid traction system for railway vehicles” in U21 International Conference on Energy Technologies and Public Policy, Sep. 2008. Poster Presentation.

16. S.Lu, D.H.Meegahaswatte, S.Guo, S.Hillmansen, C.Roberts, and C.J.Goodman, "Analysis of Energy Storage Devices in Hybrid Railway Vehicles", International conference on railway engineering , IET, Apr. 2008

17. Weston, P. F.; Stewart, E.; Roberts, C.; Hillmansen, S.; Measuring the dynamic interaction between electric vehicle shoegear and the third rail Publication Title Railway Engineering - Challenges for Railway Transportation in Information Age, 2008. ICRE 2008.

18. G Hull, C Roberts, S Hillmansen, 2008. Energy efficiency of a railway power network with simulation (Presented at 1st U21 International Conference on Energy Technologies and Policy, Birmingham, UK).

19. P Weston, E Stewart, C Roberts, S Hillmansen, 2008. Analysis of electric shoegear dynamics (In Proceedings of the 8th World Congress on Railway Research, Seoul, Korea).

20. Hillmansen, S.; Sustainable traction drives Publication Title Railway Electrification Infrastructure and Systems, 2009. REIS 2009. 4th IET professional Development Course

21. G Hull, C Roberts, S Hillmansen, 2010. Simulation of energy efficiency improvements on commuter railways (In Proceedings of the 4th IET International Conference on Railway Traction Systems, Birmingham, UK).

22. W Mingli, C Roberts, S Hillmansen, 2010. Modelling of AC feeding systems of electric railways based on a uniform multi-conductor chain circuit topology (In Proceedings of the 4th IET International Conference on Railway Traction Systems, Birmingham, UK).

23. E Stewart, P Weston, S Hillmansen, C Roberts, 2010. Understanding energy consumption in DC railways (In Proceedings of the 4th IET International Conference on Railway Traction Systems, Birmingham, UK).

24. S Lu, S Hillmansen, C Roberts, 2010. Power management strategy study for a multiple unit train (In Proceedings of the 4th IET International Conference on Railway Traction Systems, Birmingham, UK).

25. A Hoffrichter, S Hillmansen, C Roberts, 2010. Review and assessment of hydrogen propelled railway vehicles (In Proceedings of the 4th IET International Conference on Railway Traction Systems, Birmingham, UK).

26. Silmon, Joe; Hillmansen, Stuart; Investigating discontinuous electrification and energy storage on the northern Trans-Pennine route. Railway Traction Systems (RTS 2010), IET Conference on 13-15 April 2010

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