ESR9: Matteo Vagnoli

Railway bridge condition monitoring and fault diagnostics

Research

- Development of a Bayesian Belief Network (BBN) methodology for bridge condition monitoring and damage diagnostics
- Development of a data-driven methodology for identifying the health state of bridge elements by analysing the bridge vibration behaviour
- Development of a machine learning method (Neuro-Fuzzy classifier) to automatically monitor and assess the health state of bridge elements
- Development of a data mining method for analysing database of infrastructure behaviour in order to identify and diagnose changes of the infrastructure health state

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For more information you can read our papers

Training

i	Fellow	Communicati... Skills	Networking	Personal/ Professional Skills	Research Output	Teaching Skills	Technical Skills	Type of Activity	Start date	End date	Title of course/conference/activity and location	No. hours
	ESR9	☐	☑	☐	☐	☐	☑	Meeting	06/10/15	06/10/15	Asset management Meeting between Network rail and the University of Nottingham, UNOTT, Nottingham, UK.	
	ESR9	☐	☑	☐	☐	☐	☑	Meeting	30/10/15	30/10/15	Meeting with Industrial Partner, AECOM, Nottingham UK	
	ESR9	☐	☐	☑	☐	☐	☐	Seminar (<=1 day)	10/11/15	10/11/15	Academic Discussion Skills, UNOTT, Nottingham, UK.	4
	ESR9	☐	☑	☐	☐	☐	☑	Course (>1 day)	16/11/15	19/11/15	Advanced methods for reliability, availability, maintenance, diagnostics and prognostics of industrial equipment, Politecnico di Milano, Milan, Italy	32
	ESR9	☐	☑	☐	☐	☐	☑	Meeting	23/11/15	23/11/15	Meeting with Industrial Partner, AECOM, Nottingham UK	
	ESR9	☐	☐	☐	☐	☐	☑	Seminar (<=1 day)	07/12/15	07/12/15	Centre for Risk and Reliability Engineering (CRRE) Seminar, UNOTT, Nottingham, UK	4
	ESR9	☐	☐	☑	☐	☐	☐	Seminar (<=1 day)	10/12/15	10/12/15	Getting going on your thesis, UNOTT, Nottingham, UK	4
	ESR9	☑	☐	☑	☐	☐	☐	Language Course	11/01/16	09/05/16	French Level 1 New Beginners Evening Classes, UNOTT, Nottingham, UK	36
	ESR9	☐	☑	☐	☐	☐	☑	Meeting	13/01/16	13/01/16	Meeting with Industrial Partner, AECOM, Nottingham UK	
	ESR9	☐	☐	☐	☐	☐	☑	Course (>1 day)	21/01/16	28/01/16	Quantitative methods for Engineers, UNOTT, Nottingham, UK	16
	ESR9	☐	☐	☐	☐	☐	☑	Seminar (<=1 day)	11/02/16	11/02/16	Introduction to C++ for Engineering Programmers, UNOTT, Nottingham, UK	8
	ESR9	☐	☐	☐	☐	☐	☑	Seminar (<=1 day)	18/02/16	18/02/16	Introduction to C++ for Engineering Programmers, UNOTT, Nottingham, UK	8
	ESR9	☐	☐	☑	☐	☐	☐	Seminar (<=1 day)	29/02/16	29/02/16	Preparing for the viva, UNOTT, Nottingham, UK	4
	ESR9	☐	☑	☐	☐	☐	☑	Meeting	03/03/16	03/03/16	Meeting with Network Rail, Nottingham, UK	4
	ESR9	☐	☐	☑	☐	☐	☐	Seminar (<=1 day)	12/04/16	12/04/16	Powerpoint: Creating a Research Poster, UNOTT, Nottingham, UK	4
	ESR9	☐	☐	☐	☐	☐	☑	Meeting	27/04/16	24/04/16	Meeting with Network Rail, UNOTT, Nottingham, UK	

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ESR9	☑	☑	☐	☑	☐	☑	Conference	05/07/16	08/07/16	3rd European Conference of the Prognostics and Health Management Society, Bilbao, Spain	24
ESR9	☐	☑	☐	☐	☐	☑	Secondment (Long Stay >= 3 months)	12/09/16	23/12/16	Secondment at AECOM, Chilwell, Birmingham, UK	
ESR9	☐	☑	☑	☐	☐	☑	Field Test	30/01/17	30/01/17	Visual inspection of a railway bridge with Network rail and AECOM	8
ESR9	☐	☑	☑	☐	☐	☐	Seminar (<=1 day)	17/03/17	17/03/17	Infrastructure Management Research at the Swiss Federal Institute of Technology	4
ESR9	☑	☑	☐	☑	☐	☑	Conference	25/04/17	27/04/17	The Stephenson Conference, Institution of Mechanical Engineers, London 25 April 2017 - 27 April 2017	
ESR9	☑	☑	☑	☑	☐	☑	Conference	30/05/17	31/05/17	the 52nd ESReDA Seminar on Critical Infrastructures: Enhancing Preparedness & Resilience for the Security of Citizens and Services Supply Continuity	
ESR9	☑	☑	☑	☑	☐	☑	Conference	19/06/17	22/06/17	the European Safety and Reliability conference (ESREL 2017)	
ESR9	☑	☑	☑	☐	☐	☑	Course (>1 day)	17/07/17	04/08/17	Partecipation to the Asia Pacific Europe Summer School (APESS) on on Smart Structures Technology	120
ESR9	☑	☑	☑	☑	☐	☑	Conference	12/09/17	14/09/17	The 11th International Workshop on Structural Health Monitoring	
ESR9	☐	☑	☐	☐	☐	☑	Seminar (<=1 day)	06/10/17	06/10/17	SEminar titled "Object-oriented probabilistic safety analyses with AltaRica 3.0", held at the universtiy of Nottingham	2
ESR9	☐	☑	☐	☐	☐	☑	Seminar (<=1 day)	11/10/17	11/10/17	SEminar titled "Data centric Geoscience research and innovation", at the university of Nottingham	2
ESR9	☐	☑	☐	☐	☐	☑	Seminar (<=1 day)	30/10/17	30/10/17	Seminar titled "Risk Analysis of Power Plants", at the university of Nottingham	2
ESR9	☑	☐	☑	☑	☐	☐	Workshop	13/03/18	13/08/18	Invited speaker at the meeting of the Safety and Reliability Society, Midlands Branch	2

Dissemination

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i	Fellow	Type of activity	Start date	End date	Title of the Publication	Authors	Location, journal or conference (full reference)	Brief description of activity	Link to Institutional Repository	Other links
		▽								
	ESR9 Matteo Vagnoli	Conference poster	05/07/16	08/07/16	Railway Bridge Condition Monitoring and Fault Diagnostics	Vagnoli, M., Remenyte-Prescott, R., Andrews, J.	3rd European Conference of the Prognostics and Health Management Society,PHME16, Bilbao, Spain	Poster presentation	N/A	http://esr9truss.blogsp
	ESR9 Matteo Vagnoli	Conference publication	25/04/17	27/04/17	Railway bridge fault detection using Bayesian belief network	Vagnoli, M., Remenyte-Prescott, R., Andrews, J.	The Stephenson Conference, Institution of Mechanical Engineers, London 25 April 2017 - 27 April 2017		http://eprints.notting	
	ESR9 Matteo Vagnoli	Conference publication	30/05/17	31/05/17	Towards a real-time Structural Health Monitoring of railway bridges	Vagnoli, M., Remenyte-Prescott, R., Andrews, J.	52nd European Safety, Reliability & Data Association May 29, 2017 – May 31, 2017 Lithuanian Energy Institute & Vytautas Magnus University Kaunas Lithuania		https://www.researm	
	ESR9 Matteo Vagnoli	Conference publication	18/06/17	23/06/17	A fuzzy-based Bayesian Belief Network approach for railway bridge condition monitoring and fault detection	Vagnoli, M., Remenyte-Prescott, R., Andrews, J.	European Safety and Reliability Conference (ESREL) 2017 18-22 june 2017 Portorož, Slovenia		http://eprints.notti	https://www.research
	ESR9 Matteo Vagnoli	Conference publication	12/09/17	14/09/17	A data mining tool for detecting and predicting abnormal behaviour of railway tunnels	Matteo Vagnoli, Rasa Remenyte-Prescott, Daniel Thompson, John Andrews, Paul Clarke, Neil Atkinson	The 11th International Workshop on Structural Health Monitoring, 12-14 September 2017, Stanford, California, USA		http://eprints.notti	
	ESR9 Matteo Vagnoli	Conference publication	27/08/18		A machine learning classifier for condition monitoring and damage detection of bridge infrastructure	Vagnoli, M., Remenyte-Prescott, R., Andrews, J.	Civil Engineering Research in Ireland Conference (CERI 2018), Dublin, Ireland, August 29-30.			
	ESR9 Matteo Vagnoli	Conference publication	13/07/18		TRUSS-ITN methods for detecting bridge damage from response to traffic	Gonzalez, A., Martinez, D., OBrien, E.J., Casero, M., Moughty, J.J., Casas, J.R., Vagnoli, M., Remenyte-Prescott, R., Andrew, J., Huseynov, F. and	Proceedings of 9th International Conference on Bridge Maintenance, Safety and Management (IABMAS 2018), Melbourne, Australia, July 9-13.			
	ESR9 Matteo Vagnoli	Conference publication	05/12/17		Structural Health Monitoring Developments in TRUSS Marie Skłodowska-Curie Innovative Training Network	González, A., Huseynov, F., Heitner, B., Vagnoli, M., Moughty, J.J., Barrias, A., Martinez, D., Chen, S., OBrien, E., Laefer, D., Casas, J.R., Remenyte-Prescott, R., Yalamas, T., Brownjohn, J.	Proceedings of 8th International Conference on Structural Health Monitoring of Intelligent Infrastructure (SHMII-8), Brisbane, Australia, December 5-8.			
	ESR9 Matteo Vagnoli	Conference publication	30/10/18		Structural health monitoring of bridges: a Bayesian network approach	Vagnoli, M., Remenyte-Prescott, R., Andrews, J.	International Association for Life-Cycle Civil Engineering (IALCCE), Gent, 2018			

Dissemination

Fellow	Type of activity	Start date	End date	Title of the Publication	Authors	Location, journal or conference (full reference)	Brief description of activity	Link to Institutional Repository	Other links
ESR9 Matteo Vagnoli	Journal publication	16/06/17		RAILWAY BRIDGE STRUCTURAL HEALTH MONITORING AND FAULT DETECTION: STATE-OF-THE-ART METHODS AND FUTURE CHALLENGES	Vagnoli, M., Remenyte-Prescott, R., Andrews, J.	Structural health monitoring journal (SNIP value 1.752, Impact factor 3.193)	doi: 10.1177/147592	http://eprints.nottin	http://journals.sagepu
ESR9 Matteo Vagnoli	Journal publication	13/07/17		AN ENSEMBLE-BASED CHANGE-POINT DETECTION METHOD FOR IDENTIFYING UNEXPECTED BEHAVIOUR OF RAILWAY TUNNEL INFRASTRUCTURES	Vagnoli, M., Remenyte-Prescott, R.	tunnelling underground space technology			https://www.sciencedi
ESR9 Matteo Vagnoli	Journal publication	19/02/18		CONDITION MONITORING AND DETERIORATION DIAGNOSTICS OF BRIDGES: A BAYESIAN BELIEF NETWORK APPROACH	Vagnoli, M., Remenyte-Prescott, R., Andrews, J.	Reliability Engineering and System Safety			
ESR9 Matteo Vagnoli	Journal publication	24/07/18		An Automatic Bridge Damage Diagnostics Method using Empirical Mode Decomposition (EMD)-based Health Indicators and Neuro-fuzzy Classification	Vagnoli, M., Remenyte-Prescott, R.	Mechanical Systems and Signal Processing			

- 3 more journal papers being drafted

Outreach

			i	Fellow	Communicati... Skills	Networking	Personal/ Professional Skills	Research Output	Teaching Skills	Technical Skills	Type of Activity	Start date	End date	Title of course/conference/activity and location	No. hours
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19				ESR9	☑	☑	☐	☐	☐	☐	Outreach (open day, talks)	28/09/16	28/09/16	Explaining my research activity to an italian magazine	
20				ESR9	☑	☑	☐	☑	☐	☑	Outreach (open day, talks)	02/10/16	02/10/16	Explaining my research activity to an italian newspaper	
32				ESR9	☑	☑	☐	☑	☐	☑	Outreach (open day, talks)	17/08/18	17/08/18	Interview for a italian magazine about artificial intelligence and structural health monitoring after the genoa bridge collapse (http://www.casentinopiu.it/tragedia-di-genova-ling-matteo-vagnoli-il-futuro-e-linte	
34				ESR9	☑	☐	☑	☐	☑	☐	Outreach (open day, talks)	30/06/17	01/07/17	Demonstrator at the open day of the university of Nottingham	
74															