

Prof. Weisi Guo

CONTACT DETAILS

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WORK EXPERIENCE

- 10/2019- | **Chair of Human Machine Intelligence**, Cranfield University, UK
Turing Fellow, Alan Turing Institute, UK
PI on £2.4m (investigator on £6m) of grants, supervisor to 15 PRDA years (all primary), and 14 PhD students. Expertise in signal processing, data science, machine learning, sensing, communications, resilience, network science, and nano-networks.
- 2012-19 | Associate Professor (2017-19), University of Warwick, UK
Assistant Professor (2012-17), University of Warwick, UK
- 2011-12 | Research Associate at University of Sheffield, UK
EPSRC/VCE Strategic Partnership (EP/G064105/1-2), Swansea University (2010-11).
- 2005-07 | Telecommunication Engineer at T-Mobile International, UK & Germany
Automating performance evaluation of radio air interface.

EDUCATION

- 2007-11 | PhD in COMPUTER SCIENCE,
University of Cambridge, UK
Advisor: Dr. I. WASELL | EPSRC Project EP/E012108/1
- 2001-05 | MEng in GENERAL ENGINEERING, MA (Cantab)
University of Cambridge, UK
4-Year Combined Undergraduate and Masters Degree

ACADEMIC HIGHLIGHTS

- Funding** | **PI on £2.4m** to host (15 PDRA years, 87% buyout active)
EPSRC, H2020, InnovateUK, Royal Society, DSTL, USAF, Turing, LRF
Coordinator on €1m+ H2020 grant, Turing Fellowship
- Publications** | **82 Journal Papers:** Q1/Q2 (JCR) - 59; IEEE - 51, IET - 10, IOP - 1, RS - 4, NPG - 2
First/corresponding author - 42, without PhD supervisor - 80
Impact factor (JCR): total - 336, mean - 4.1
3 featured / cover articles, 2 IEEE recommended reading, 1 top 10% cited
1 Nature commentary: *Retool AI to Forecast and Limit Wars*, vol.562, 2018
63 Conference Proceedings: IEEE flagship - 26, IEEE/ACM - 61
4 Book Chapters: Cambridge University Press
- Citations** | **Google Scholar: 2540+**, **h-index 23**, **i10-index 63**
Scopus: 1500+, h-index 17; ResearchGate: 2000+
- Awards** | **IET Innovation Award (2015)**, **Bell Labs Prize Finalist (2014, 2016, 2019)**
IEEE Best Paper (CSNDSP 2014), IEEE Exemplary Reviewer (WCL 2018)

RESEARCH IMPACT

National Policy	<i>Data for Public Good</i> - National Infrastructure Commission, 2017
Regional Policy	<i>Digital Strategy</i> - C&W Local Enterprise Authority, 2016
National Capability	Secure Molecular Underwater Communications - DSTL, 2017-18 Conflict Prediction Capability - Turing D&S, 2017-19 Online Counter Radicalization Graph Analytics - DSTL, 2019
Commercial	Knowledge Transfer with UK SME - Ranplan, 2018-20 Knowledge Transfer with EU SME - WINGS-ICT, 2017-21
Standardization	IEEE 1906.1 - Nanoscale Communications (2015-)
Media Coverage	BBC Interview & Article, the Economist, Wired, Wall Street Journal

PROFESSIONAL ACTIVITIES & INVITED TALKS

Professional Body	Senior Member IEEE, Member IET, Fellow HEA, Fellow RSS
Editorship	Royal Society Open Science (2019-) IEEE Trans. on Molecular, Biological & Multiscale Comm. (2019-) IEEE Access (2018-) IEEE JSAC - MBMC Series (2014-15)
Peer-Review Stats	Publons: 139 reviews, 29 editorials (IEEE journals) https://publons.com/author/1577822
Grant Reviewer	NSF, EPSRC, H2020, NSERC, Royal Society, Leverhulme
Journal Reviewer	NPG: Nature, Nature Communication, Nature Machine Intelligence IEEE: JSAC, TWC, TCOM, TVT, CM, WC, CL, WCL, TMBMC, TNBS
Reviewer Award	IEEE Exemplary Reviewer (WCL 2018)
Track Chair	IEEE ICC - Big Data Track (2020)
Symp. Chair	IEEE VTC (2010), IEEE WCNC (2013), IEEE ICC (2019)
TPC Member	IEEE Globecom (2015-19), IEEE ICC (2014-19), ACM Nanocom (2018-19) AAAI (2020)

TEACHING & ADMIN HIGHLIGHTS

Qualification	Fellow of Higher Education Academy (FHEA)
Awards	Best Lecturer 2016 (voted by students)
Employer Recognition	University Merit Award (2012, 2016, 2017, 2018)
Student Feedback	Consistently 90-100% in all areas
Taught Modules	Signal Processing (UG - MSc), Wireless Networks (MSc)
Wider Activities	Warwick Student Hyperloop Advisory Council
Pedagogical Advances	Trans-Media Teaching, Incremental Assessment,
External Examiner	Exeter University - Computer Science (2018-22)
Faculty Level Admin	Research Committee (2012-) Cities Research Theme Lead (2012-)
Faculty Level Training	Microsoft Azure Evangelist at Turing (2017-)

MY CURRENT TEAM

Research Fellows (7)	A. Pagani, W. Qi, G. Aquino, G. Moutsinas, L. Lin, N. Tckachenko-Love, S. Chotvijit
PhD Students (11)	G. Mosquera, A. Alturki, M. Abbaszadeh, A. Sonea, Y. Liu, Z. Wei, M. Mazzamurro, S. Sun, J. Wang, C. Li, M. Zou
External PhDs (2)	L. Zha, T. Sajjad
MSc/MRes (5)	S. Sun, C. Pilgrim, J. Cowlard, P. Strong, Y. Zhu
Previous RA/RFs (4)	A. Al-Shami, I. Atthanayake, S. Esfahani, S. Qiu
Past PhDs (5)	H. Yuan, S. Qiu, N. Gupta, A. Pamuncak, Z. Cheng

Research Vision & Grants

RESEARCH VISION

As human society is becoming increasingly inter-connected, it also faces serious challenges in the form of man-made and natural stressors. Our connected resilience is not well understood. On the one hand, we wish to grow as a civilization and increase our interactions through new multiplexed interaction networks, but on the other hand, we are conscious of the dangers of connected vulnerability in the cyber- and physical-domains. At the heart of my research is the attempt to use data science to discover and model hidden relationships between connectivity, complexity, and resilience for coupled social and physical systems. This in turn informs the design of new resilient engineering and computer systems.

TRACK-RECORD & REF

The award-winning Data-Embedded-Networks (DEN) Lab led by Dr. Weisi Guo has been at the forefront of developing methods in network science, signal processing, and communication theory. By bridging computer science and engineering, the research has advanced man-kind's understanding of complex connected systems and been instrumental in designing national-scale networks (5G & IoT, rail transport, water distribution) and pioneering new nano-scale networks (IEEE Standardization P1906). Going forwards, the lab continues to work with a variety of commercial (UK & EU SMEs) and government bodies to expand the impact. Dr. Guo has five 3-4 star papers with clear commercial, government, and academic impact evidence.

Research Grants as PI to Host

Funder contribution value to host shown

£1.43m (Warwick) £0.54m (Turing) | Post-Doc Years: 15.7

Theme	Project Name	Funding Body	Duration	Value
Resilient Networks	Complexity Twin for Resilient Ecosystems (CoTRE)	EPSRC EP/R041725/1	2018-20 2 Years	£235k
	Machine Learning	Data Aware Wireless Networks for Internet-of-Everything (DAWN4IoE)	EC H2020 778305	2017-21 4 Years €270k (€1.1m)
Machine Learning	Online Data Integrated Network (ODIN)	InnovateUK Ranplan KTP-10734	2018-20 2.5 Years	£199k
	Machine Learning	Crowd Data Science for 5G Rollout (COCKPIT-5G)	InnovateUK 29634	2019-20 10 Months £104k
Resilient Networks	Global Urban Analytics for Resilient Defence (GUARD)	Alan Turing Institute	2017-20 2 Years	£250k
	Resilient Networks	Coupled Human And Natural Critical Ecosystems (CHANCE)	Alan Turing Institute	2018-21 3 Years £290k
Resilient Networks	Unstable Behaviour on the Edge of Communities	DSTL ACC6005162	2019 8 Months	£100k
Nano Networks	Molecular Signaling in Complex Environments (MoSig)	US AFOSR FA9550-17-1-0056	2017-21 3.5 Years	\$166k
	Nano Networks	Molecular Communications in EM Denied Environments	DSTL ACC102665	2017-18 8 Months £90k
Nano Networks	Molecular Communications for Internet of Nano Things	EC H2020 792799	2018-20 2 Years	€194k
Fellowship	Turing Fellow (0.4 FTE)	Alan Turing Institute	2017-19	£49k
Total (PI)				£2.4m

Other Research, Networking, & Studentship Grants

Theme	Project Name	Funding Body	Duration	Value
Urban Science	EPSRC Centre for Doctoral Training in Urban Science and Progress	EPSRC (CDT) EP/L016400/1	2019-22 4 Years	~£46k (CI) (£3.9m)
Urban Science	PhD Studentship: Patterns of City Formation and Development	EPSRC (DTP) EP/N509796/1	2018-22 4 Years	
Urban Science	SEED - Mobile Urban Sensing for Sunlight Exposure Database	Alumni Donation	2014-17 2 Years	£50k (PI)
Urban Science	Urban Science and Information Engineering	British Council	2013-15 2 Years	£5k (PI) (£10k)
Urban Science	Digital & Physical Access to Critical Financial Service Infrastructure	Think Forward Initiative	2019 10 Months	€10k (CI)
Resilient Networks	Case Study: Nature Inspired Routing for Resilient Networked Systems	EPSRC (ENCORE+) EP/N010019/1	2017-18 1 Year	£9.6k
Nano Networks	PhD Studentship: Towards Invisible Nanoscale Chemical Tagging	LRF ICON-23	2017-21 4 Years	£50k (CI)
Nano Networks	SmallTalk - Talking between Small Things	Royal Society & NSFC IE150708	2016-18 2 Years	£10k (PI) (£20k)
Nano Networks	Nano Communications	Royal Society & CNRS IE130762	2012-14 2 Years	£5k (PI) (£10k)

REF Papers for 2021

Title: Molecular vs. Electromagnetic Wave Propagation Loss in Macro-Scale Environments
Journal: IEEE Transactions on Molecular, Biological, and Multi-Scale Communications
Summary: First paper to explicitly compare electromagnetic against molecular communications, and is published in the inaugural IEEE Transactions of this area (migrated from incubation at IEEE JSAC - rank 1 journal in telecommunications). The collaboration is a result of Bell Labs Prize (finalist 2014), and led to the IET Innovation Award (2015). Follow-on funding from DSTL (ACC102665, £90k, 2017-18) has enabled us to continue this research and develop DSTL technical reports for UK defence & security needs in under-water and electromagnetically-denied environments.

Title: Iunius - a Cross Layer Peer-to-Peer System with Device-to-Device Communications
Journal: IEEE Transactions on Wireless Communications
Summary: Here, we develop cross-layer implementation of peer-to-peer and device-to-device wireless communications, which led to a significant collaborative grant (EC H2020, 778305, €1.1m, 2017-21) with UK SME (Ranplan) and EU SME (WINGS-ICT), of which the author is the coordinator. This has facilitated the transfer of knowledge into new wireless network design. Since 2017, Ranplan has been listed on Nasdaq (\approx £3m) and WINGS-ICT has improved its profit margin (€0.5m to €1.5m) and grown employee base from 9 to 74. The research was also used to inform the Local Enterprise Partnership's Digital Strategy with direct impact on 5G rollout.

Title: Learning-based Spectrum Sharing & Spatial Reuse in mm-Wave Ultra Dense Networks
Journal: IEEE Transactions on Vehicular Technology
Summary: A novel machine learning approach is developed to improve efficient spectrum usage and cell deployment. Working with UK SME (Ranplan), two collaborative grants were awarded (InnovateUK, 10734 & 29634, total £420k, 2018-20), facilitating the transfer of knowledge into 5G algorithms. Since then, Ranplan has been listed on Nasdaq (£3m). The author is now leading the "Big Data" track at IEEE flagship conference ICC (2020). The output was submitted as evidence for the National Infrastructure Commission's Data for Public Good report (2017), highlighting the vital role of machine learning for national infrastructures.

Title: Local Convexity Inspired Low-Complexity Non-Coherent Signal Detector for Molecular Communications
Journal: IEEE Transactions on Communications
Summary: This is the first paper to develop low-complexity algorithms for nano-molecular signal receivers. The novel algorithms can achieve maximum likelihood estimation without matrix operations, reducing complexity by an order of magnitude. This led to interest from US military and secured USAF funding for a 4 year PhD studentship (FA9550-17-1-0056, \$166k, 2017-21). The resulting research enabled the author to be a Scientist-in-Charge in attracting a successful Marie-Curie fellowship (EC H2020, 792799, €195k, 2018-20). The work is now impacting IEEE standardization efforts (P1905), where the author sits on the steering panel.

Title: Resilience or Robustness: Identifying Topological Vulnerabilities in Rail Networks
Journal: Royal Society Open Science
Summary: This is an empirical study on the resilience of UK rail network, based on both real commuter flow data and topological structure. The research highlights simple low-cost solutions in re-routing trains to reduce the impact of cascade delays and cancellations. The media exposure from the analysis includes Press Association and local newspapers. The research was supported by an EPSRC ENCORE+ case study (EP/N010019/1) and Lloyd's Register Foundation grant (CHANCE, £290k, 2018-21). Further research under EPSRC grant (EP/R041725/1, £238k, 2018-20) is now taking place with impact stakeholder Department for Transport.