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£9 million Research England funding will make UK computer modelling unique in the world

The UK is to become a world-leader in high-performance computer modelling used to predict and tackle rapidly emerging societal and environmental challenges, from simulating large scale disasters and security incidents in real time, to developing lighter, stronger materials for transport and aerospace.

Research England announced today Expanding Excellence in England (E3) funding of £9 million for the University of Greenwich, following a competitive bidding process. The grant will fund the amalgamation and expansion of two award-winning multidisciplinary teams at the university over the next five years. The Fire Safety Engineering Group (FSEG), led by Prof Ed Galea, and the Computational Science & Engineering Group (CSEG), led by Prof Koulis Pericleous and Associate Prof Andrew Kao, have a long track record of impactful research excellence in fire safety, evacuation, computational science and engineering. Their mathematical models, computational simulations and bespoke software harness the expertise of multidisciplinary teams, reflecting the fact that societal challenges are rarely solved through single discipline research.

Research England's independent assessment panel emphasised how impressed they were with the university's fire safety research and how important it is. The E3 expansion will take the teams' world-leading expertise to the next level by utilising High-Performance Computing (HPC) enhanced with Artificial Intelligence (AI), Virtual Reality (VR), and Mixed Reality (MR) for large-scale, interactive real-time simulations. The research themes reflect UK and international priorities, such as the need to tackle the ever-present and growing concerns with physical security, to enhance urban resilience to natural and anthropogenic disasters, to promote energy security and sustainable manufacturing, and to mitigate the impact of climate change.

Prof Ed Galea, director of the Fire Safety Engineering Group said:

'The E3 funding will generate the scale and pace for a quantum leap in UK computer modelling capacity and capability that will be unique in the world. It will expand the scale and complexity of the digital worlds we can create and the real-world challenges we can simulate within them. High-Performance Computing enhanced with Artificial Intelligence and Virtual and Mixed Reality will drive more effective solutions to real world problems, such as more efficient mitigation strategies for urban-scale natural and anthropogenic disasters, enhanced training for first responders in disaster response, and the design of safer buildings through enhanced real-time two-way coupling of fire and evacuation modelling.

'We are grateful to Research England and for the significant support for our proposal from local (London/ Southeast), national, and international collaborators and partners in industry, government and the public sector, who share our excitement for the potential highlighted in our proposal.'

Professor Jane Harrington, Vice-Chancellor and CEO of the University of Greenwich said:

'The University of Greenwich is committed to world class research and innovation that tackles real world challenges and has tangible impact. The E3 grant demonstrates how strategic funding for our excellent research teams can unlock significant potential to increase their impact on society and the environment. This value extends beyond our immediate surroundings, reaching students, local communities, business, industry, government and public services nationally and around the world.'

For media enquiries or interview requests, contact Tom Bacon at the University of Greenwich on 07949918035 or t.g.bacon@gre.ac.uk

Notes

Greenwich Campus

Old Royal Naval College
Park Row
London SE10 9LS

Tel: +44 (0)20 8331 8000

The Research England Excellence in England (E3) fund supports small and excellent research units and departments in higher education providers across England to expand and increase their activity where they have potential to grow.

The University of Greenwich E3 expansion will link three cross-cutting themes: Materials Science and Engineering (MSE), focused on lighter, stronger materials for transport and aerospace (targeting recyclability, low waste and energy efficiency); Safety and Security (S&S) taking large-scale disaster, fire and evacuation modelling across scales encompassing cityscapes, incorporating real-time interactivity through Virtual Reality/Mixed Reality (VR/MR), and expanding modelling to include two-way dynamic coupling for fire and evacuation; and Digital Cities/London (DCL), an emergent theme where interdisciplinary research will develop the evidence-base to protect UK cities/populations from pollution, pathogen dispersal, natural/ anthropogenic disasters and to support policy decisions (e.g., Ultra Low Emission Zones implementation).

The University of Greenwich will act as a hub for impactful research and knowledge exchange at all levels well into the future. The E3 investment will initially double the current staff base of the two teams, and their external research income is projected to triple in five years. Combined with capital investment to expand their HPC provision, E3 will allow the teams to pursue avenues of ground-breaking research in conjunction with many more strategic partners.

To translate their unique expertise to the next generation of researchers and practitioners, the teams will develop taught postgraduate and CPD courses, and expand their doctoral training, harnessing local, national and global talent. These courses, coupled with underpinning research, will embed their expertise in business and industry through KTP exchanges, and by offering their software tools as a cloud service with graduates trained to fully utilise these resources.

Additional quote from Associate Prof, Andrew Kao, of the Computational Science & Engineering Group (CSEG):

‘The E3 grant will drive the multi-scale research needed to address major societal challenges affecting the environment, quality of life, safety, security and the economy. For example, climate change is a global issue with local implications such as extreme weather events. Our multi-scale approach will allow us to represent urban scales and the effect weather systems have on pollution and the environment, down to street level. Our research in sustainable advanced manufacturing will lead to electrification of flight with lightweight materials, a circular economy through better recycling techniques and improved metal 3D printing for both manufacturing and biomedical industries.’

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