PhD Advert Template

Project title: Modelling urban development to satisfy the UN Sustainable Development Goals (SDGs)

Project ID *(optional)*: *Please leave blank*

Accept all year-round applications

Funding information: Self-funded students only

Project description:

The UK requires significant new housing and related physical and social infrastructure to accommodate population growth and changing household composition. Such development needs to be undertaken in an economic, engineered, environmental and socially sustainable manner. The United Nations Sustainable Development Goals (UN SDGs) provide a strong conceptual framework by which to assess the sustainability of urban development. However, in order to plan and deliver sustainable development in the future requires a stronger coupling of existing urban models to a multi-objective evaluation of the UN SDGs.

This PhD project will develop a multi-objective framework that will allow urban development models to be evaluated directly in relation to the delivery of the SDGs. Key research questions that the PhD will look to address include:

1. How can the UN SDGs be translated to an appropriate set of deliverable spatial metrics for the UK?
2. How can urban development models be adapted to indicate the future economic, engineered, environmental and social sustainability of urban development via a set of UN SDG spatial metrics?
3. What are the appropriate decision support tools and related machine learning methods required to understand high dimensionality multi-objective modelled SDG spatial metrics for future sustainable urban planning?

The research will build upon existing work within the Geospatial Engineering research group which has established expertise on urban development modelling (Ford et al, 2019) and spatial multi-objective decision support (Caparros-Midwood et al, 2019). The successful candidate will be able to utilise, modify and enhance the open source model UDM (Urban Development Model; Ford et al, 2019) as well as software for spatial multi-objective optimisation. The PhD will have access to extensive computing resources via School of Engineering visualisation and decision support GPU hardware capability.

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References (optional):

Ford A, Barr S, Dawson R, Virgo J, Batty M, Hall J. [A multi-scale urban integrated assessment framework for climate change studies: A flooding application](https://eprint.ncl.ac.uk/255576). Computers, Environment, and Urban Systems 2019, **75**, 229-243.

Caparros-Midwood D, Dawson R, Barr S. [Low Carbon, Low Risk, Low Density: Resolving choices about sustainable development in cities](https://eprint.ncl.ac.uk/256075). Cities 2019, **89**, 252-267.

Application enquires:

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<https://www.ncl.ac.uk/engineering/staff/profile/stuartbarr.html>

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bioinformatics

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developmental biology

ecology

ecotoxicology

entomology

environmental biology

evolution

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human genetics

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design

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interior design

music

music technology

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theatre studies

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econometrics

financial economics

macroeconomics

microeconomics

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primary education

secondary education

special needs education

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Engineering

acoustics engineering

aerospace engineering

atomic engineering

automotive engineering

bioengineering

biomedical engineering

chemical engineering

civil engineering

communications engineering

control systems

cybernetics

dynamics

electrical engineering

electronic engineering

energy technologies

environmental engineering

fluid mechanics

gas engineering

geotechnical engineering

integrated engineering

manufacturing engineering

marine engineering

mechanical engineering

mechanics

mechatronics

nanotechnology

offshore engineering

petroleum engineering

robotics

solid mechanics

structural engineering

structural mechanics

systems engineering

thermodynamics

other

Environmental Sciences

climate science

hydrology

marine sciences

meteorology

pollution

soil science

other

Finance

actuarial science

banking

financial management

insurance

investment

taxation

other

Food Sciences

food hygiene

food production

other

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archaeological science

forensic science

other

Geography

agricultural geography

cultural geography

economic geography

environmental geography

geographical information systems gis

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human geography

marine geography

physical geography

political geography

remote sensing

social geography

transport geography

urban geography

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applied geology

geochemistry

geophysics

geoscience

geotechnology

hydrogeology

marine geology

palaeontology

seismology

volcanology

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american history

ancient history

archaeology

asian history

australasian history

british and irish history

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european history

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history

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history of religions

history of science

medieval history

military history

modern history

russian history

social history

world history

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information systems

librarianship

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african studies

american studies

asian studies

australasian studies

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danish

dutch

english language

english literature

european studies

finnish

french

german

italian

japanese

middle eastern studies

norwegian

portuguese

russian

spanish

swedish

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Law

criminal law

commercial law

contract law

property law

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Linguistics & Classics

ancient greek

celtic studies

classics

latin

linguistics

other

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ceramics

glass

metallurgy

polymers

textiles

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applied mathematics

applied statistics

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data analysis

engineering mathematics

mathematical modelling

medical statistics

operational research

probability

pure mathematics

statistics

stochastic processes

other

Medicine

anatomy

audiology

biomechanics

cardiology

complementary medicine

dentistry

endocrinology

epidemiology

neural engineering

neurology

nutrition

ophthalmology

optometry

pathology

pharmacology

pharmacy

physiology

physiotherapy

podiatry

radiology

speech science

tissue engineering

toxicology

other

Nursing & Health

adult nursing

community nursing

counselling

dental nursing

environmental health

health informatics

medical nursing

mental health nursing

midwifery

occupational health

occupational therapy

paediatric nursing

paramedical science

surgical nursing

other

Philosophy

ethics

metaphysics

philosophy of science

other

Physics

acoustics

astronomy

astrophysics

chemical physics

computational physics

electromagnetism

environmental physics

experimental physics

medical physics

nuclear physics

optical physics

particle physics

quantum mechanics

solid state physics

space science

theoretical physics

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government

international relations

politics

public policy

other

Psychology

child psychology

clinical psychology

community psychology

counselling psychology

developmental psychology

educational psychology

forensic psychology

health psychology

neuropsychology

occupational psychology

organisational psychology

psychotherapy

sport psychology

other

Sociology

criminology

disability studies

gender studies

socio economics

social work

other

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sport coaching

sport development

sport performance

sport technology

sport therapy

other

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divinity

religious studies

theology

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Veterinary Sciences

animal welfare

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veterinary nursing

veterinary nutrition

veterinary pathology

other