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:

Professor Stuart Barr

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

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PhD Disciplines & Subject areas

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[ ]  agricultural sciences

[ ]  agricultural technology

[ ]  arable farming

[ ]  livestock farming

[ ]  forestry & arboriculture

[ ]  other

Anthropology

[ ]  biological anthropology

[ ]  social anthropology

[ ]  other

Architecture, Building & Planning

[ ]  architecture

[x]  built environment

[ ]  construction management

[ ]  landscape architecture

[ ]  rural planning

[ ]  surveying

[x]  urban planning

[ ]  other

Biological Sciences

[ ]  bacteriology

[ ]  behavioural biology

[ ]  biochemistry

[ ]  biodiversity

[ ]  bioinformatics

[ ]  biophysics

[ ]  biotechnology

[ ]  cancer biology

[ ]  cell biology

[ ]  developmental biology

[ ]  ecology

[ ]  ecotoxicology

[ ]  entomology

[ ]  environmental biology

[ ]  evolution

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[ ]  molecular biology

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[ ]  plant biology

[ ]  plant cell biology

[ ]  reproductive biology

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[ ]  systematic biology

[ ]  virology

[ ]  zoology

[ ]  other

Business & Management

[ ]  accounting

[ ]  business

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[ ]  education management

[ ]  event management

[ ]  hospitality

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[ ]  marketing

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[ ]  tourism

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Chemistry

[ ]  analytical chemistry

[ ]  applied chemistry

[ ]  computational chemistry

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Communication & Media Studies

[ ]  broadcast media

[ ]  digital media

[ ]  journalism

[ ]  print media

[ ]  production

[ ]  public relations

[ ]  publishing

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Computer Science

[ ]  artificial intelligence

[ ]  computer architectures

[ ]  computer vision

[ ]  computer graphics

[ ]  cyber security

[x]  data science

[ ]  human computer interaction

[ ]  internet of things

[ ]  machine learning

[ ]  networks

[ ]  quantum computing

[ ]  software engineering

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Creative Arts & Design

[ ]  animation

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[ ]  crafts

[ ]  creative writing

[ ]  dance

[ ]  design

[ ]  drama

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[ ]  film studies

[ ]  fine art

[ ]  graphic design

[ ]  interior design

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[ ]  music technology

[ ]  photography

[ ]  theatre studies

[ ]  other

Economics

[ ]  econometrics

[ ]  financial economics

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[ ]  political economics

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Education

[ ]  further education

[ ]  higher education

[ ]  nursery education

[ ]  primary education

[ ]  secondary education

[ ]  special needs education

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Engineering

[ ]  acoustics engineering

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[ ]  biomedical engineering

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[ ]  civil engineering

[ ]  communications engineering

[ ]  control systems

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[ ]  energy technologies

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[ ]  marine engineering

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[ ]  petroleum engineering

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[ ]  solid mechanics

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[ ]  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

Forensic and Archaeological Sciences

[ ]  archaeological science

[ ]  forensic science

[ ]  other

Geography

[ ]  agricultural geography

[ ]  cultural geography

[ ]  economic geography

[ ]  environmental geography

[ ]  geographical information systems gis

[ ]  historical geography

[ ]  human geography

[ ]  marine geography

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[ ]  political geography

[ ]  remote sensing

[ ]  social geography

[ ]  transport geography

[ ]  urban geography

[ ]  other

Geology

[ ]  applied geology

[ ]  geochemistry

[ ]  geophysics

[ ]  geoscience

[ ]  geotechnology

[ ]  hydrogeology

[ ]  marine geology

[ ]  palaeontology

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[ ]  volcanology

[ ]  other

History & Archaeology

[ ]  african history

[ ]  american history

[ ]  ancient history

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[ ]  asian history

[ ]  australasian history

[ ]  british and irish history

[ ]  economic history

[ ]  european history

[ ]  heritage studies

[ ]  history

[ ]  history of art

[ ]  history of religions

[ ]  history of science

[ ]  medieval history

[ ]  military history

[ ]  modern history

[ ]  russian history

[ ]  social history

[ ]  world history

[ ]  other

Information Services

[ ]  information security

[ ]  information systems

[ ]  librarianship

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Languages, Literature & Culture

[ ]  african studies

[ ]  american studies

[ ]  asian studies

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[ ]  chinese

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[ ]  english language

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Law

[ ]  criminal law

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[ ]  other

Linguistics & Classics

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[ ]  celtic studies

[ ]  classics

[ ]  latin

[ ]  linguistics

[ ]  other

Materials Science

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[ ]  metallurgy

[ ]  polymers

[ ]  textiles

[ ]  other

Mathematics

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[ ]  applied statistics

[ ]  computational mathematics

[ ]  data analysis

[ ]  engineering mathematics

[ ]  mathematical modelling

[ ]  medical statistics

[ ]  operational research

[ ]  probability

[ ]  pure mathematics

[ ]  statistics

[ ]  stochastic processes

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Medicine

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[ ]  cardiology

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[ ]  endocrinology

[ ]  epidemiology

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[ ]  neurology

[ ]  nutrition

[ ]  ophthalmology

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[ ]  physiotherapy

[ ]  podiatry

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[ ]  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

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Politics & Government

[ ]  development studies

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[ ]  international relations

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Psychology

[ ]  child psychology

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[ ]  counselling psychology

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Sociology

[ ]  criminology

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[ ]  social work

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Sport & Exercise Science

[ ]  sport coaching

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[ ]  sport technology

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Theology & Religious Studies

[ ]  divinity

[ ]  religious studies

[ ]  theology

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Veterinary Sciences

[ ]  animal welfare

[ ]  veterinary dentistry

[ ]  veterinary medicine

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