



**University of Nottingham**  
UK | CHINA | MALAYSIA



**山东大学**  
SHANDONG UNIVERSITY

## UNNC – SDU Doctoral Training Partnership (Green Energy and Resources strand)

It's essential that you have contacted the [UNNC](#) and/or [SDU](#) supervisors before applying.

Formal applications should follow the instructions in '[How to apply](#)' section.

### Research areas

1. Green energy and low/zero carbon engineering & science
2. Recycling of solid wastes as green materials and value-added products

### Available PhD topics (updating)

<b>PhD topic</b>	<b>Hydrogen-powered, zero-carbon energy system for data centres</b>
<b>SDUGER Supervisor</b>	<a href="#">Professor Yanhua Lai</a> <a href="#">Professor Hongxia Zhao</a>
<b>UNNC Supervisor(s)</b>	<a href="#">Prof. Yong Shi</a>
<b>Short introduction &amp; description of the PhD project</b>	This doctoral research focuses on a hydrogen-powered, zero-carbon energy system for data centers. The study will establish a system architecture encompassing on-site/off-grid green hydrogen production, storage, distribution, and efficient power generation/heat supply. It will prioritize exploring the deep integration of hydrogen with variable renewable energy, intelligent dispatch based on workload and computing demand forecasting, and the coupling mechanism between waste heat recovery and hydrogen utilization. The research aims to address core challenges such as ensuring high-reliability power supply, providing high-energy-density long-duration storage, and achieving round-the-clock zero-carbon operation for data centers. The ultimate goal is to develop a resilient, efficient, and economically feasible zero-carbon energy solution for high-energy-consumption digital infrastructure, providing critical support for the green transition of the digital economy.
<b>Contact points</b>	Informal inquiries may be addressed to Professor Hongxia Zhao ( <a href="mailto:hongxia.zhao@sdu.edu.cn">hongxia.zhao@sdu.edu.cn</a> ) and Yong Shi ( <a href="mailto:Yong.Shi@nottingham.edu.cn">Yong.Shi@nottingham.edu.cn</a> ).
<b>PhD topic</b>	<b>Collaborative UAV Swarm Inspection and Intelligent Geological Hazard Risk Assessment for Linear Infrastructures</b>
<b>SDUGER Supervisor</b>	Ji-Peng Wang
<b>UNNC Supervisor(s)</b>	<a href="#">Juan Wang</a>

<p><b>Short introduction &amp; description of the PhD project</b></p>	<p>Linear infrastructures such as railways, highways, pipelines, and transmission corridors are highly vulnerable to geological hazards, including landslides, debris flows, ground subsidence, and slope failures, especially under the influence of climate change and extreme weather events. Traditional inspection and risk assessment methods are often labor-intensive, time-consuming, and limited in both spatial and temporal resolution.</p> <p>This PhD project aims to develop a novel framework for collaborative inspection and intelligent risk assessment of geological hazards along linear infrastructure using unmanned aerial vehicle (UAV) swarms. The research will focus on multi-UAV cooperative sensing, adaptive path planning, and real-time data fusion to achieve efficient, high-resolution, and large-scale monitoring. By integrating remote sensing, computer vision, and artificial intelligence, the project will establish methods for the automatic extraction of terrain and deformation features, identification of hazard precursors, and quantitative evaluation of geological risk.</p> <p>The expected outcomes include new theories and algorithms for UAV swarm collaboration in complex terrains, intelligent models for geological hazard recognition and early warning, and a prototype system for smart inspection of linear infrastructure. The project will contribute to safer and more resilient infrastructure systems and provide innovative tools for disaster prevention and mitigation in mountainous and hazard-prone regions.</p>
<p><b>Contact points</b></p>	<p>Informal inquiries may be addressed to Prof. Ji-Peng Wang (<a href="mailto:ji-peng.wang@sdu.edu.cn">ji-peng.wang@sdu.edu.cn</a>) and Prof. Juan Wang (<a href="mailto:juan.wang@nottingham.edu.cn">juan.wang@nottingham.edu.cn</a>).</p>
<p><b>PhD topic</b></p>	<p><b>Rapid Micro-Focus CT-Based 3D Reconstruction and Intelligent Analysis of Microstructural Evolution in Multiphase Geomaterials</b></p>
<p><b>SDUGER Supervisor</b></p>	<p>Prof. Ji-Peng Wang</p>
<p><b>UNNC Supervisor(s)</b></p>	<p><a href="#">Prof. Juan Wang</a></p>
<p><b>Short introduction &amp; description of the PhD project</b></p>	<p>Multiphase geomaterials, such as unsaturated soils, frozen soils, and cemented or bio-treated soils, exhibit complex microstructures whose evolution governs their macroscopic mechanical, hydraulic, and durability behaviors. However, conventional experimental techniques are often unable to capture the three-dimensional, dynamic, and multiscale nature of these microstructural changes. Micro-focus X-ray computed tomography (micro-CT) provides a powerful non-destructive tool for visualizing internal structures, yet challenges remain in rapid imaging, high-fidelity 3D reconstruction, phase segmentation, and intelligent interpretation of large-volume datasets.</p> <p>This PhD project aims to develop advanced methods for rapid micro-focus CT-based three-dimensional reconstruction and intelligent analysis of microstructural evolution in multiphase geomaterials. The research will focus on high-efficiency imaging workflows, robust reconstruction and denoising algorithms, automated phase identification (e.g., solid particles, pores, water, ice, cementation products), and AI-driven quantitative characterization of microstructural features. By coupling micro-CT observations with physical and mechanical experiments, the project will establish links between microstructural evolution and macroscopic behavior under processes such as wetting–drying, freeze–thaw, loading, and chemical or bio-mediated treatment.</p> <p>The expected outcomes include a fast and reliable micro-CT analysis framework, intelligent algorithms for microstructure recognition and evolution tracking, and new insights into the mechanisms governing multiphase geomaterial behavior. The project will provide a methodological foundation for next-generation</p>

	experimental geomechanics and contribute to the design of advanced ground improvement and hazard mitigation technologies.
<b>Contact points</b>	Informal inquiries may be addressed to Prof Ji-Peng Wang ( <a href="mailto:ji-peng.wang@sdu.edu.cn">ji-peng.wang@sdu.edu.cn</a> ) and Prof. Juan Wang ( <a href="mailto:juan.wang@nottingham.edu.cn">juan.wang@nottingham.edu.cn</a> ).

### Other potential supervisors

UNNC		
Profile	Research Area(s)	Email
<a href="#">Dr Kok Hoong Wong</a>	Green energy and low/zero carbon engineering & science; Recycling of solid wastes as green materials and value-added products	<a href="mailto:kok-hoong.wong@nottingham.edu.cn">kok-hoong.wong@nottingham.edu.cn</a>
<a href="#">Dr. Mengxia Xu</a>	Green energy and low/zero carbon engineering & science; Recycling of solid wastes as green materials and value-added products	<a href="mailto:mengxia.xu@nottingham.edu.cn">mengxia.xu@nottingham.edu.cn</a>
<a href="#">Dr. Ruslan Melentiev</a>	Recycling of solid wastes as green materials and value-added products	<a href="mailto:Ruslan.melentiev@nottingham.edu.cn">Ruslan.melentiev@nottingham.edu.cn</a>
<a href="#">Prof. Bo Li</a>	Green energy and low/zero carbon engineering & science; Recycling of solid wastes as green materials and value-added products	<a href="mailto:bo.li@nottingham.edu.cn">bo.li@nottingham.edu.cn</a>
<a href="#">Dr. Amin Farrokh Abadi</a>	Green energy and low/zero carbon engineering & science	<a href="mailto:Amin-Farrokh.Abadi@nottingham.edu.cn">Amin-Farrokh.Abadi@nottingham.edu.cn</a>
<a href="#">Dr. Guang Li</a>	Green energy and low/zero carbon engineering & science; Recycling of solid wastes as green materials and value-added products	<a href="mailto:guang.li@nottingham.edu.cn">guang.li@nottingham.edu.cn</a>
<a href="#">Dr. Sayed Reza Shoja Razavi</a>	Green energy and low/zero carbon engineering & science	<a href="mailto:Sayed-Reza.Shoja-Razavi@nottingham.edu.cn">Sayed-Reza.Shoja-Razavi@nottingham.edu.cn</a>
<a href="#">Dr. Tengwen Long</a>	Green energy and low/zero carbon engineering & science	<a href="mailto:Tengwen.long@nottingham.edu.cn">Tengwen.long@nottingham.edu.cn</a>
SDU		
Profile	Research Area(s)	Email
<a href="#">Prof. WANG Ziliang</a>	Green energy and low/zero carbon engineering & science	<a href="mailto:zwang2022@sdu.edu.cn">zwang2022@sdu.edu.cn</a>
<a href="#">Prof. WANG Wenlong</a>	Green energy and low/zero carbon engineering & science; Recycling of solid wastes as green materials and value-added products	<a href="mailto:wwenlong@sdu.edu.cn">wwenlong@sdu.edu.cn</a>
<a href="#">Dr. WANG Xujiang</a>	Green energy and low/zero carbon engineering & science; Recycling of solid wastes as green materials and value-added products	<a href="mailto:x.wang@sdu.edu.cn">x.wang@sdu.edu.cn</a>
<a href="#">Prof. Weiyong Yu</a>	Green energy and low/zero carbon engineering & science	<a href="mailto:yuyw@sdu.edu.cn">yuyw@sdu.edu.cn</a>

<a href="#">Prof. Lei Liu</a>	Green energy and low/zero carbon engineering & science; Recycling of solid wastes as green materials and value-added products	<a href="mailto:leiliu@sdu.edu.cn">leiliu@sdu.edu.cn</a>
-------------------------------	--	--