

UK in Space & UCLan Space: capabilities and ambitions

Professor Robert Walsh, Jeremiah Horrocks Institute School of Natural Sciences Dr Komali Kantamaneni, School of Engineering

UK in Space & UCLan Space

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Academic lead, UCLan Space

UK Space Agency's Science Programme Advisory Committee (SPAC)

STFC Innovation Panel

Royal Astronomical Society Annie Maunder Medal 2021

IAU UK National Outreach Coordinator

> Corona from Space SDO AIA 17.1 nm T = 600,000 K

Sounding Rocket Programme: High Resolution Coronal Imager 2012, 2014, 2017 Marshall Grazing Incidence X-ray Spectrometer 2021



SR Partners:

NASA MSFC UCLan Harvard CFA



UK space industry income by segment and activity, 2018/19





The European leader in commercial small satellite launch

What is UCLan Space?

Strategic decision to bring together space-related activity across the institution.

- Research and development opportunities.
- Requirement for highly skilled, degree level graduates.
- Support for SME engagement into space sector.
- Public awareness and engagement with space.



Computing

Big data Visualization

> Image recognition

Astronomy & Astrophysics

Ground & space-based Computer observations modelling

> Space Weather

Engineering Tribotechnology Aerospace Climate change & disaster

Med-Tech

management

Health Sciences

> Physiology Psychology of stress

Public policy and Public Engagement with Science

NASA

Rocketry

Graphene

SUN installation

Arts, Culture, Heritage

UCLan Space across the institution SWIMMR: Space Weather Instrumentation, Measurement Modelling and Risk initiative, a four-year Strategic Priorities Fund prog to improve the UK's capabilities for space weather monitoring and prediction. First graphene-enhanced composite material in near-space (UKSA small innovation award)



University of Central Lancashire







JOST Institute for Tribotechnology

Worked with ESR Technology, who with the support of the European Space Agency (ESA), operates the **European Space Tribology Laboratory (ESTL**), Europe's focus for expertise in space tribology.









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Why Space?

The opportunity for Health and Life Science Innovation





European Space Agency

The European Space Agency and the University of Central Lancashire have finalised ESA_Lab@UCLan, a collaboration agreement focusing on the investigation of public value.

Working closely with ESA colleagues, UCLan is investigating how "public value" can be understood and how it can be made a useful tool to explain the effects ESA has for Member States as well as society as a whole.



Disaster risk is defined as the potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability and capacity.

Open Access Article

Monitoring of Multi-Aspect Drought Severity and Socio-Economic Status in the Semi-Arid Regions of Eastern Tamil Nadu, India

by (2) Venkatesh Ravichandran ¹ ⊡, 2, Komali Kantamaneni^{2,*} ⊡ ©, (2) Thilagaraj Perlasamy ³ ⊡, (2) Priyadarsi D. Roy ⁴ ⊠ ©, (2) Jothiramalingam Kililvalavan ³ ⊡, (2) Sajimol Sundar ⁵ ⊡ ©, (2) Lakshumanan Chokkalingam ⁵ ⊡ and (2) Masilamani Palanisamy ³ ⊡

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Introduction About Me

Dr. Komali Kantamaneni

Senior Research Fellow Coastal Scientist & Environmentalist Faculty of Science and Technology University of Central Lancashire -UK

Research Interests

- 1. Coastal Vulnerability /Engineering
- 2. Climate Change
- 3. Disasters and Natural Hazards
- 4. Disaster Risk Reduction
- 5. Water Infrastructure
- 6. GIS Mapping





Dr Komali Kantamaneni

Senior Research Fellow

RESEARCH AND PUBLICATIONS CONTACT

Komali Kantamaneni is a coastal scientist, Her research focuses mainly on coastal vulnerability, natural disasters, natural hazards, climate change, water infrastructure and CIS mapping.

Funded projects

1. GCRF (Global Challenges Research Fund) Project -2018-2021-Principal Investigator (Completed)

 British council project - multidimensional evaluation of climate vulnerability in urban areas: examining heat island effect and coastal flooding in Guangzhou city, China.
 Principal Investigator – Current

3. British council project - evaluation of the coastal vulnerability of **Indonesia** to climate change and marine plastic waste- **Principal Investigator – Current**

4. UCLan seedcorn funding project- Assessing combined physical and social riverine vulnerability of the **Ganges, India- Principal Investigator – Current**

 British council project – Assessment of combined physical and social coastal vulnerability of a Quang Nam Province, Vietnam- Deputy Principal Investigator – Current

 British council project - assessment of the climate change impact on worker thermal comfort and energy consumption inside Egyptian MSMEs.
 Co- Investigator - Current

Coastal vulnerability assessment New methodology and mapping tools

UK- Physical Coastal Vulnerability

UK- Economic Coastal Vulnerability

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UK -Combined Coastal Vulnerability





Coastal statistics - UK

£22 billion worth of coastal vulnerability

>100,000 people are at risk

50,000 coastal properties are at risk



Great Yarmouth, Skegness and Aberystwyth are highly vulnerable

Un Excepted Results

<u>GCRF project results – The Conversation results</u>



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COVID-19 Arts + Culture Business + Economy Cities Education Environment + Energy Health + Medicine Politics + Society Science + Technology



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The devastating effects of climate change on the natural environment are already well known. Temperatures are increasing. The frequency of extreme weather events is on the up. Sea levels are rising. But the social and cultural effects of the climate crisis are discussed less often. Is the climate crisis already changing societal



Impact on Policy on Decision Making

Visited House of Representatives – Philippines



Dr. Komali Kantamaneni @KomaliKantaman1 · 26 Jun 2019 GCRF Project – June-2019, India

Up-close discussion on fishing communities with Andhra Pradesh Animal Husbandry, Fisheries & Marketing Minister- Mopidevi Venkata Ramana Rao: policy and decision maker.

@SolentResearch @solentuni @osamasmkhan @GCRF @SolentUniInt





Met Legazpi city (Philippines) Mayor to give our recommendations

UCLan Engineering Innovation Centre

CONTRACTOR OF THE OWNER OF THE OWNER

Digitalisation - AR/Cyber/Data Additive Manufacturing Drones Zone - Flight Control Energy - Net Zero Fire Engineering Innovation Clinic Health

UCLan Space : UG, PG, CPD

Programmes include;

- UG Aerospace degree- adapt, extend, complement a "space flavour"
- Physical Sciences (astronomy, instruments, materials)
- Computing (Big data)
- Law, Business (public value), Psychology
- PG and Masters
- CPD for introduction to space science
- Engage with Space HEI to Industry Partner



UK RSO and UK Space Agency (UKSA)

- COP27 UKSA supported UNOOSA to produce e-book entitled "INTERNATIONAL EFFORTS USING SPACE FOR CLIMATE ACTION" - a strategic mapping exercise on existing international efforts using space technologies and applications to support climate adaptation, mitigation, monitoring and resilience.
- UKSA International Team UKSA will be taking over leadership for the International Charter
 Space and Major Disasters in April 2023 and will be hosting Board Members in Edinburgh.
- UK National Centre for Earth Observation (NCEO) discussion. Strategic plan to:
- Raise awareness amongst and increase involvement of UK researchers in UN-SPIDER activity.
- Access and promote use of space-based resources for disaster management and emergency response management.



UK in Space & UCLan Space

- UK play a role in UN-SPIDER
- UCLan has initial key multidisciplinary areas of capability across institution.



Targeted skills drive for UG/PG/CPD.
International Charter 2023

UCLan Space: Additional slides

UCLan engagement in space (1/5)

Area	POC/Team	Partnerships, collaborations, funding	More info
Sounding rocket flight and instrumentation	Prof. R. Walsh Prof. D. Ansell	NASA Marshall Space Flight Center, Harvard-Smithsonian CFA	Instrumental software; EUV camera; integral to launch team; four launches to date- next 2023, 2024.
Space weather - Solar Energetic Particles (SEPs)	Prof. S. Dalla	STFC, NERC, Met Office	Models of SEPs applied to Space Weather forecasting. Part of SWARM (SWIMMR Aviation Risk Modelling) project for nowcasting - forecasting of SEP radiation risk.

UCLan engagement in space (2/5)

Area	POC/Team	Partnerships, collaborations, funding	More info
Analysis of datasets from space-based instrumentation (Astrophysics)	Jeremiah Horrocks Institute	Many international partners; STFC, EU	Collaborations on HST, SDO, HiC, Kepler, Herschel, XMM-Newton, Hinode, TESS; 35 members; ground-based (SALT, SKA, ELT etc)
Graphene-enhanced composites	Prof. R. Walsh Prof. D. Ansell	Haydale, NWAA, UKSA, UoM GEIC	UKSA small award for initial high altitude balloon studies on integrity of GEMs in a near-space environment

UCLan engagement in space (3/5)

Area	POC/Team	Partnerships, collaborations, funding	More info
Tribological analysis of space mechanisms	Prof. I. Sherrington, Dr. K. Syres	European Space Tribology Laboratory (ESTL)	Effects of launch vibration on the friction performance and condition of bearings; degradation processes for space lubricants; ionic fluids as a lubricant for space mechanisms.
Wearable robotics/exoskeletons	Dr. M. Dickinson	Tinus Olson	Exo-suit performance to offer load and control assistance in varying gravity environments and assisting training protocols to regain neuromuscular control of deconditioned muscles.
Effects of micro- and hypo-gravity on musculoskeletal control	Prof. J. Richards	Delsys (USA) Rosetrees Trust Granada University	Insight into why muscles not only weaken in space but also exhibit poorer motor control after prolonged exposure to low gravity environments.

UCLan engagement in space (4/5)

Area	POC/Team	Partnerships, collaborations, funding	More info
Public value of space	Dr R. Wylie	ESA	ESA_LAB partnership including addressing public value and their activities.
Human factors for space travel	Dr. J. Marsh, Dr. S. Robinson	Lulea University of Technology, Sweden	Response to environments devoid of external and social stimulation; efficacy with which travelers can monitor internal physiological and cognitive states; team dynamics.
Disaster management and risk reduction; Climate change and natural hazards; Coastal science and prediction models	Komali Kantamaneni	UN- UNOOSA UN SPIDER	Working with UNOOSA/UN-SPIDER (Dr. Shirish Ravan) on disaster risk reduction, disaster management, and associated subjects.

UCLan engagement in space (5/5)

Area	POC/Team	Partnerships, collaborations, funding	More info
STFC UCLan National Strategic project: SUN	Prof. R. Walsh	STFC, Arts Council England, Artist Alex Rinsler	Two-year STFC supported science/art project for public engagement with space science that will tour the UK and abroad- see <u>www.seethesun.org</u> .
Public engagement with space science	Prof. R. Walsh, JHI	STFC, Royal Astronomical Society, IAU, Royal Institution, Ogden Trust	Two observatories RI-UCLan Young Scientist Centre EIC outreach space Lancashire Science Festival