Mukesh Ray, PhD

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About Me

Mukesh Ray is an architect and urban planner with expertise spanning computational geography, spatial analytics, and sustainable urban development. As a Lecturer and Course Director at the University of Technology Sydney's Faculty of Design and Society, he advances research in Urban Analytics, Spatial Analysis (GIS), and Urban Projects, bridging theoretical frameworks with practical applications in contemporary urban challenges.

His research encompasses the strategic application of computational geographic information systems (GIS), remote sensing technologies, and advanced data science methodologies for large-scale urban growth modelling, comprehensive environmental assessment, demographic analysis, urban heat mitigation, and desertification analysis. His scholarly work is particularly focused on developing evidence-based planning strategies that address the complex dynamics of sustainable urban development, with special emphasis on rapid urbanisation patterns, rural-urban interface transformations, and large-scale land use transitions that define 21st-century metropolitan development.

Mukesh has over a decade of academic experience in India and Australia,. His academic credentials include a PhD from the University of Technology Sydney, a Master's degree in Urban and Rural Planning from the Indian Institute of Technology (IIT) Roorkee, and international research experience as a DAAD Scholar at Technische Universität Darmstadt, Germany. His undergraduation in architecture from Visvesvaraya National Institute of Technology (VNIT) provides a comprehensive understanding of the built environment that enriches his interdisciplinary approach to urban planning and design.

Keywords: #UrbanPlanning #GIS #RemoteSensing #DataScience #UrbanGrowthModelling #SpatialAnalytics #UrbanAnalytics

Education

1. **University of Technology Sydney (UTS)** — Sydney, Australia
   PhD, School of Built Environment — Thesis: Analysing and predicting the geospatial transformation of the rural–urban fringe of Delhi Region in India — *Mar 2018 – Aug 2023*
2. **Indian Institute of Technology (IIT) Roorkee** — Roorkee, India
   Master of Urban and Rural Planning — *2011 – 2013*
3. **Technical University of Darmstadt (DAAD Scholar)** — Darmstadt, Germany
   Exchange student for Master's dissertation (fully funded) — *2012 – 2013*
4. **Visvesvaraya National Institute of Technology (VNIT) Nagpur** — Nagpur, India
   Bachelor of Architecture — *2006 – 2011*

Work Experience

1. **University of Technology Sydney (UTS)** — Sydney, Australia
   Course Director — Master of Urban Planning & Master of Urban Design (Online) — *Aug 2024 – Present*
   Lead curriculum, accreditation preparation, and industry engagement across online planning and design programs.
2. **University of Technology Sydney (UTS)** — Sydney, Australia
   Lecturer, School of Built Environment — *Oct 2021 – Present*
   Teach Spatial Analysis (GIS), Urban Analytics, Urban Design Fundamentals, and Major/Minor Project (Planning Research).
   Supervise HDR projects on street-greenery carbon sequestration and sustainable urban transformation.
3. **University of Technology Sydney (UTS)** — Sydney, Australia
   Sessional Lecturer (Casual Academic) — *Mar 2019 – Sep 2021*
4. **G. D. Goenka University** — Gurgaon, India
   Assistant Professor, School of Architecture & Planning — *Aug 2015 – Feb 2018*
   Curriculum development; subject coordination; workshops; conferences.
5. **Arch10 Design Consultants** — Gurgaon, India
   Architect–Urban Planner — *Jun 2014 – Jun 2015*

Residential, commercial, and PEBs; master planning; landscape design; business development.

6. **Lovely Professional University (LPU)** Punjab, India
Assistant Professor, School of Architecture & Design *Aug 2013 – May 2014*
Lectures, curriculum development, International Student Committee in–charge; workshops; conferences.

Selected Projects

1. **Scaling Up Urban Nature: Lessons from Australia on Community-Driven, Equitable Climate Solutions in Land Use Planning** | Lincoln Institute of Land Policy (USA) 2024 – 2025
The objective of this research is to draw lessons from Australia on how land use planning policies can support scaling up community-driven nature-based solutions in cities and support the global aim of designing equitable land-based climate change mitigation strategies that maximise social and environmental benefits to local communities.

2. **Granville Smart Precinct Pilot** | UTS × Cumberland Council 2020
This project aimed to develop data-driven, sustainable, and community-focused planning solutions for the Granville Smart Precinct. Extensive analysis of demographic, socio-economic, environmental, and mobility datasets was conducted to identify urban challenges and spatial patterns within the precinct. Advanced GIS tools and data visualization techniques were employed to provide insights that guided strategic decision-making and informed master planning efforts. These insights were critical in proposing innovative urban solutions that align with Cumberland Council's vision for a resilient, smart precinct, fostering sustainable growth and enhancing community well-being.

3. **Residential Energy Analytics** | IKEA x UTS Future Living Lab 2020 – 2021
This project focused on analysing extensive energy datasets gathered from smart sensors in households across Australia to gain insights into residential energy consumption patterns. Data management, validation, analysis, and visualisation to uncover detailed usage trends over a one-year period. The insights generated from this data were instrumental in understanding how households consume energy and informed the development of sustainable living solutions. Aligned with IKEA's mission to encourage energy-efficient and smart living environments, the project provided valuable data-driven recommendations to promote sustainable practices within residential spaces.

4. **Growing Food and Density Together** | Urban Food Systems in Green Spaces 2018
This project explored the potential for integrating urban food production within Sydney's green spaces to support a sustainable, higher-density urban environment. It involved conducting detailed surveys to identify suitable green areas and compiling data to inform the design of rooftop and community gardens. The project aimed to enhance local food security by leveraging underutilised urban spaces for food production, promoting resilience and sustainable practices in urban communities. Through these efforts, the initiative provided a model for integrating food systems within urban planning, demonstrating how cities can balance density with green infrastructure to benefit residents.

Technical Skills

GIS and Remote Sensing: ArcGIS, QGIS, Google Earth Engine, SNAP, TerrSet
Computational Tools: Python, R, Pandas, NumPy, scikit-learn, TensorFlow
Data Visualisation: Tableau, Power BI, Excel
Design: AutoCAD, Revit, SketchUp, Adobe Suite (Photoshop, Illustrator, InDesign)

Awards & Scholarships

1. UTS Course & Subject Performance Commendation 2019, 2022
2. International Research Scholarship (PhD); UTS President's Scholarship (PhD) 2018 – 2021
3. DAAD–IIT Master Sandwich Scholarship, TU Darmstadt (fully funded) 2012 – 2013
4. GATE Scholarship (Govt. of India) for Master's at IIT Roorkee 2011 – 2013

Publications

1. Ray, M., Pant, A., Pradhan, B. *Spatiotemporal Dynamics of Desertification in Rajasthan (1990–2020), India: A Machine Learning and Remote Sensing Approach Using Google Earth Engine.* — Under Review, 2025
2. Ray, M. *Analysing and predicting the geospatial transformation of the rural–urban fringe of Delhi Region in India.* PhD Thesis, University of Technology Sydney. — 2022
3. Ray, M., Ghosh, S., Wilkinson, S. *Evaluating factors influencing the uncontrolled growth of urban–rural belt – a case study of Delhi, India.* Smart and Sustainable Built Environments (SASBE), Sydney, pp. 134–142. — 2018
4. *Health Risk Assessment and Mitigation Due to Infectious Diseases During Mass Gatherings — An Indian Perspective.* Proceedings of the 1st International Conference on Disaster and Risk Management, G. D. Goenka University, Gurgaon, India. — 2016
5. *A critical study and recommendation on accessibility, connectivity and land use of Delhi Metro stations.* Proceedings of the Neo-International Conference on Habitable Environments, LPU, Punjab, India. — 2014

PhD Supervision

1. Hongming Yan — Towards low-carbon green streets: Modelling street–greenery carbon storage and sequestration capacity using computer vision approaches (Co-supervisor).
2. Shawly Shamira — Sustainable Urban Transformation and Urban Vitality Dynamics: Investigating urban transformation and its influences on urban vitality (Co-supervisor).

Membership

1. Planning Institute of Australia (Full Member)
2. Council of Architecture, India

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