KAPIL KUMAR SINHA

B.Arch, M.Tech, Ph.D.

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Punjab, INDIA

RESEARCH INTEREST

Thermal Comfort, Indoor Environment Quality, Energy Efficiency in Buildings, Building Performance, Human Centric Design, Crowd Simulations

RESEARCH PHILOSOPHY

As a researcher committed to interdisciplinary innovation, I approach challenges from multiple vantage points, bridging fields to develop effective, practical solutions. My PhD work in thermal comfort underscored the value of this perspective: when I encountered the unavailability of a suitable sensor to measure skin temperature, I expanded my knowledge beyond my core field, diving into electronics. This learning process enabled me to design and build a low-cost sensing kit tailored precisely to my research needs. I do not hesitate to go cross-discipline, believing that complex problems often require diverse approaches and that a willingness to learn from other fields leads to more robust, creative solutions. Driven by curiosity and a commitment to continuous learning, I bring this holistic approach to every project, confident that integrating insights from varied disciplines yields impactful results.

EDUCATION

PhD Indian Institute of Technology Roorkee, INDIA 2018-2024
Department of Architecture and Planning
Thesis: "Studies on transient thermo-physiological response of passengers in airport terminal buildings."
Advisor: Dr. E. Rajasekar and Dr. Mahua Mukherjee

Visiting Scholar (PhD)
University of Bath, UK June-September 2022
Department of Architecture & Civil Engineering
Topic: "Evaluation of thermo-physiological responses in terminal buildings."
Advisor: Dr. Sukumar Natarajan and Dr. E. Rajasekar

M.Tech Indian Institute of Technology Roorkee, INDIA 2015-2017
Centre for Transportation Systems
Dissertation: "Evaluation of underground metro stations based on thermal comfort"
Advisor: Dr. E. Rajasekar (CGPA :9.06)

B.Arch School of Planning and Architecture Bhopal, INDIA 2010-2015
Architecture (CGPA: 7.16)

EXPERIENCE

Chandigarh University
University Institute of Architecture, Chandigarh — July 2024 to present
Assistant Professor

School of Planning and Architecture
Department of Architecture — October 2023 to April 2024
Assistant Professor (on contract)

Indian Institute of Technology Roorkee, DAP — December 2020 to June 2021
Senior Research Fellow — October 2021 to January 2022
Worked on a research project funded by DST, GoI
"Smart performance roadmap for airport terminal buildings in India"

- *Tasked with creating a thermo-physiological model for passengers.*
- *Created an energy model for the airport terminal building.*
- *Developed an occupancy-based control algorithm for HVAC systems in the terminal building.*
- *Prepared the final report, authored a white paper, and produced a short video on the project.*

Indian Institute of Technology Roorkee, DAP — September 2017 to May 2020
Junior Research Fellow
Worked on research project funded by DST, GoI
"Smart performance roadmap for airport terminal buildings in India"

- *Developed a model for managing passenger flow at the airport.*
- *Carried out passenger surveys and environmental measurements.*
- *Coordinated project meetings with stakeholders, including AAI and CDAC.*
- *Conducted experimental studies on human subjects in climate-controlled chambers*

HONORS AND AWARDS

CREST Bursary — 2022
Research stay at the University of Bath, UK

World Architecture Festival — 2014
Finalist, Student Charrette at Singapore

IGBC Student Design Competition — 2013
Third Position, organized by Indian Green Building Council

INTERNSHIP

Larsen & Toubro Limited, Construction Division, Hyderabad May to June, 2016
Trainee Architect

- Preparation of working drawing and BOQs
- Design activities in metro station

Shilanyas Design Consultants, Ahmedabad January to June, 2014
Trainee Architect

- Construction Drawing, BOQs
- Co-ordination with consultants and engineers

PROFESSIONAL AFFILIATIONS

Council of Architect, India (CA/2016/75300) Registered Architect (2016-present)

LIST OF PUBLICATIONS

Scopus Indexed Journals

[1] K. Sinha, N. Ali, E. Rajasekar, Evaluating the dynamics of occupancy heat gains in a mid-sized airport terminal through agent-based modelling, Build. Environ. 204 (2021). https://doi.org/10.1016/j.buildenv.2021.108147.

[2] A. Thampan, K. Sinha, B.R. Gurjar, E. Rajasekar, Functional efficiency in airport terminals: A review on Overall and Stratified Service Quality, J. Air Transp. Manag. 87 (2020). https://doi.org/10.1016/j.jairtraman.2020.101837.

[3] K. Sinha, E. Rajasekar, Thermal comfort evaluation of an underground metro station in New Delhi using agent-based modelling, Build. Environ. 177 (2020). https://doi.org/10.1016/j.buildenv.2020.106924.

International Conference

[4] K. Sinha, N. Ali, E. Rajasekar, An Agent-based dynamic occupancy schedule model for prediction of HVAC energy demand in an airport terminal building, in: Proc. 16th Conf. Int. Build. Perform. Simul. Assoc. Build. Simul., Rome, 2019: pp. 2063–2070. http://www.ibpsa.org/proceedings/BS2019/BS2019_211133.pdf.

[5] K. Sinha, E. Rajasekar, Assessment of transient thermal comfort characteristics in an underground metro station, in: Proc. 10th Wind. Conf. Rethink. Comf., NCEUB, Windsor, 2018: pp. 1186–1201. https://windsorconference.com/wp-content/uploads/2018/05/W18_PROCEEDINGS.pdf.

PATENT

K. Sinha, G. Subramanian, S. Krishnan, E. Rajasekar, DEVICE AND METHOD FOR HUMAN THERMAL STRESS ASSESSMENT USING WEARABLE KIT [Patent No. 566975]

INVITED LECTURE PRESENTATION

- Delivered lecture on "Application of agent-based modelling for thermal comfort and energy efficiency studies in airport terminal buildings" at Anylogic Indian User Conference 2019, Bangalore, INDIA

LANGUAGES

English: Advanced Reading, Writing and Speaking

Hindi: Native

SKILLS

Programming: Python

Applications: AutoCAD, BIM (Revit, ArchiCAD), Building Energy Modelling (EnergyPlus), AnyLogic, Thermal Modelling (TAITherm), Statistical Applications (Origin Pro, SPSS, Minitab), Parametric Modelling (Rhino-Grashopper), AI Tools (Midjourney), Adobe Suite (Photoshop, Illustrator, Indesign) and Video Editing (After Effect, Premier Pro)

Hardware: Arduino and Raspberry Prototyping, Nodered Integration, 3d Printing, VR developments

RESEARCH VISION

My research has been focused on transient thermal comfort since 2016. I have continued exploring this field of transient thermal comfort through different projects, studying thermal comfort in underground metro stations and airport terminal buildings. My research has been focused on the Thermo-physiological approach for studying thermal comfort. I have started my work on transient comfort from field studies in the metro stations, which involves environmental monitoring and passenger comfort responses. The study evolved, and I have started considering the physiological aspects. As part of the investigation of thermal comfort in airport terminal building, human physiological measurement was carried out at the terminal building, followed by the laboratory experiments for more flexibility of measurement of physiological variables such as skin temperature, core temperature, heart rate and metabolic rates. I have been working on the human and environment thermal interaction in this process and have studied the radiative, convective, evaporative and respiratory heat exchanges in transient conditions. Also, as a part of a small exercise, I have explored the roles of thermoreceptors in thermal comfort through simulation and analytical studies. I am interested in exploring the local thermal comfort of different body parts and personalized thermal comfort.

OTHER

Photography, Amateur astronomy

REFERENCES

Dr. E. Rajasekar, Professor (Doctoral Supervisor)
Department of Architecture and Planning
Indian Institute of Technology Roorkee, Roorkee, India
erajas@gmail.com

Dr. Mahua Mukherjee, Head and Professor (Doctoral Co-Supervisor)
Department of Architecture and Planning
Indian Institute of Technology Roorkee, Roorkee, India
mahua.mukherjee@ar.iitr.ac.in

Prof. Geetanjali Kapoor, Professor (Professional Referee)
University Institute of Architecture, Chandigarh University, Mohali, India
ar.geetanjalikapoor@gmail.com