

ROSHMI SEN

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RESEARCH INTERESTS

District Cooling, Life Cycle Analysis of Buildings, Multi-objective Optimization in Buildings, Energy Efficient Building Envelopes, Housing for Urban Poor, Green Buildings, Low Exergy Cooling in Tropics

EDUCATION

- Doctor of Philosophy 2021
- Master in City Planning (MCP) 2011
Indian Institute of Technology Kharagpur, India
- Bachelor of Architecture (B Arch) (First Class) 2009
Jadavpur University, Kolkata, India

EXPERIENCE

Assistant Professor-II (TENURE TRACK) (May 2018-present)

- *National Institute of Technology Rourkela, Department of Planning and Architecture, As full time PhD candidate at IIT Kharagpur (July 2012- April 2018)*
- *Indian Institute of Technology Kharagpur, Department of Architecture and Regional Planning*
Research Experience

-wrote a research proposal during span of my doctoral studies which investigated upon the energy efficiency in affordable housing schemes in housing unit and housing cluster levels, funded by the *Housing and Urban Development Corporation of India (HUDCO)*, with a research grant amount of INR 2,100,000 /- (March 2014-March 2016)

-was a *Visiting Student Research Collaborator at the CHAOS lab at the Andlinger Centre for Energy and Environment, Princeton University* between December 2016 and September 2017- worked on low-exergy cooling systems applicable to mass housing in India

Teaching Experience

-worked as teaching assistant in 2nd and 5th year Architecture Design Studios, Housing and Community Planning course for 3rd year Undergraduate students, Planning Workshop Studio for graduate students

Practicing Architect-Urban Planner (August 2011-July 2012)

- *M/s Haven Architects, A/6 New Raipur Road, Kolkata 700084*
-Prepared Development Planning Report on “Comprehensive Rejuvenation Plan for Rabindra Sarobar” under National Lake Conservation Plan by Ministry of Environment and Forests; scope of work also included primary field surveys, formulating policy guidelines, designing for adaptive reuse of defunct buildings, presentations to client (City Development Authority)

Freelance Architect-Planner (June 2011-July 2012)

Design and preparation of municipal sanctioning and working drawings of a three storied residential cum commercial mixed used building at Kalaikunda, Kharagpur (4500 sqm built up)

Internship experiences

Deutsche Gesellschaft für Internationale Zusammenarbeit - Advisory Services in Environmental Management (GIZ-ASEM), New Delhi -110017

Summer Intern (May 2010-July 2010)

Development Consultants Private Limited (DCPL), 24 Park Street, Kolkata 700016

Trainee Architect (July 2007-December 2007)

COURSES TAUGHT

At NIT Rourkela, Undergraduate-

Architectural Design VIII (PA412), Advanced Building Construction Studio (PA431), Climate Responsive Architecture (PA2801), Non Graphic Computer Application (PA1901), Advanced Building Materials (PA4301), Interior Design (PA3109), Advanced Structural Systems (PA5401), Building Construction Sessional-I (PA1302), Estimation Costing and Specification Theory (PA3906), Estimation Costing and Specification Sessional (PA3904), Academic Portfolio (PA4901)
Postgraduate (currently offered to PhD students)-
Environmental Planning (PA6405), Sustainable Development (PA6400)

STUDENT MENTORSHIPS

At NIT Rourkela, B Arch

2019-“National Academy of Administration, Parchmarhi- a green rated building” by Harsha Reddy; “NetZEB Nature Interpretation Center and Museum” by Dhananjay Naik, 2019
2020- “Tourism Hub and Demonstration Center at Bishnupur” by Abhishek Das; “School for Deaf and Mute”, by Jyothika Bhukiya
2021- “Center for self-employment for rural women and provision of education at Balasore” by Swarup Kumar; “Sports complex in Vijayawada” by Chaparala Naveen Kumar
2022- “Maritime Museum in Kolkata” by Shradha Sio
2023- “NetZero Business Hotel” by Naga Sai Lokesh; “Agricultural Hub” by Metta Bhaskara Rao

At NIT Rourkela, M Tech

2023- “Feasibility study on energy saving scenarios of a district cooling system in a campus community”, by Aditya Dharka (co-supervision with Mechanical Engineering Department)

At NIT Rourkela, summer interns from other institutes

2019 –Vaidehi (SPA Delhi), Akanksha Bhardwaj (BIT Meshra), Soumya Ranjan Mohanta (SPA Bhopal)

At IIT Kharagpur (as a PhD student)

“An investigation on the urban heat island effect in various housing clustering layouts for affordable housing schemes”- Masters in City Planning project by Shreya Banerjee, 2016 (co-supervision along with PhD advisor)

ADMINISTRATIVE RESPONSIBILITIES

At NIT Rourkela- Professor in-charge (PIC) of Environment lab, PIC Departmental Library, PIC Departmental website, Faculty advisor for Batch of 2021-26.

PATENTS

- Sen, R., Kar, A. and Mondal, N R. (2014) *A Two-Tier Compact Bed cum Workspace Combination Readily Reconfigurable from Bed to Workspace and vice versa*. **Indian Patent Office**. Patent no. 370712 (*granted*)

PROJECT GRANTS AS PRINCIPAL INVESTIGATOR

- TEQIP III seed money/minor research grant (2019), for prototyping *a Two-Tier Compact Bed cum Workspace Combination Readily Reconfigurable from Bed to Workspace and vice versa* (INR200,000)

PUBLICATIONS IN JOURNALS

- Sen, R., Bhattacharya, S. P., and Chattopadhyay, S (2021), ‘Are low-income mass housing envelopes energy efficient and comfortable? A multi-objective evaluation in warm-humid climate’, **Energy and Buildings**, Volume 245, 2021, 111055, ISSN 0378-7788, <https://doi.org/10.1016/j.enbuild.2021.111055>.

- Chattopadhyay, S., Banerjee, S., Sen, R. (2016) "Mapping Low-Carbon Precincts in Residential Neighbourhoods: A comparative case study of the traditional and the modern types." *GSTF Journal of Engineering and Technology (JET)*, Vol.3. No 4 April 2016. DOI: 10.5176/2251-3701_3.4.155
- Sen, R. and Chattopadhyay, S. (2011) "The efficacy of government initiated slum upgrading programs- A critical analysis of Kolkata slums", *Spatio-Economic Development Record*. 18 (6). pp. 157-163
- Sen, R. (2011) "Revitalizing an ethnic community through cultural tourism: The case of the Chinatown of Kolkata, India", *The International Hospitality and Tourism Student Journal* [online] 3 (3). (accessible at <http://www.sturesearch.ch/?p=923>)

PUBLICATIONS IN CONFERENCES

- Sen, R., Bandopadhyay, R., Bansal, S., Barman, S and Sio, S. (2022, October 3-6). "De-carbonization and environmental planning roadmap for Rourkela Steel City - a city under transformation". *ISOCARP 2022, Brussels, Belgium*
- Kumar, S. and Sen, R. (2022, August 30-1) *How do urban carbon dioxide emissions, urban scale and population density relate to each other? A literature based discovery*. International Association for Urban Climate (IAUC) virtual poster session, Sydney, Australia.
- Sen, R., Teitelbaum, E., and Meggers, F. "Community cooling infrastructure from waste heat among diverse building types in Rourkela Steel Township, India", *Journal of Physics: Conference Series*, Volume 2069, 8th International Building Physics Conference (IBPC 2021) 25-27 August 2021, Copenhagen, Denmark
- Sen, R., Bhattacharya, S. P., and Chattopadhyay, S. "Comfort-energy nexus in naturally ventilated affordable mass housing with alternative constructions in the developing world", EGU General Assembly 2021, online, 19-30 Apr 2021, EGU21-8003, <https://doi.org/10.5194/egusphere-egu21-8003>, 2021.
- Sen, R. and Chattopadhyay, S. (2021) "Evaluating affordable housing schemes – a conceptual framework for a triple bottom line approach towards sustainability accounting", *Proceedings of International conference on Resilient and Livable City Planning*, Vijayawada, 10-13 February 2021, SPA Vijayawada, pp. 376-378.
- Sen, R., Meggers, F. and Chattopadhyay, S. (2017) "Planning for centralized cooling systems in high density mass housing in tropics – towards smart energy policy in residential communities." *Proceedings of 53rd ISOCARP World Congress*, 23rd-27th October, Portland, USA.
- Banerjee, S., Sen, R. and Chattopadhyay, S. (2016) "A Comparative Study on the Effects of Urban Morphology on the Urban Heat Island Profile in Residential Neighbourhoods: A Case of Kolkata, India." *Proceedings of 32nd PLEA International Conference*, Los Angeles, 11-13th July, Los Angeles, USA. ISBN: 978-0-692-74961-6
- Sen, R., Kandra, S. and Chattopadhyay, S. (2014) "Investigation on the Performance of Alternative Walling Materials in an Affordable Housing Unit situated in Warm Humid Climate." *Proceedings of 30th PLEA International Conference*, vol.1., Ahmedabad, 14-17th Dec. Ahmedabad. CEPT University, Center for Advanced Research in Building Science & Energy pp. 524-531
- Sen, R. (2012) "Metamorphoses of Cities: Issues of urbanization and case study of three significant urban growth centers in India". *International Symposium on Cities under Change*. Kolkata, 17-19 Oct, 2012. Centre for Built Environment
- Chattopadhyay, S. and Sen, R. (2011) "Housing the urban poor and the issues of land: a critical analysis", *Proceedings of 59th National Town and Country Planners' Congress: Land as a resource for urban development*, Chandigarh. 10-12th Feb. New Delhi. ITPI. pp. 284-293

INVITED TALKS

- Cooling your home: How to connect residential buildings to district cooling? (Webinar) - 29.05.2019, as a Member of District Energy in Cities Technical Taskforce, *United Nations Environment Programme (UNEP)*, hosted by Copenhagen Center on Energy Efficiency; available at: <https://www.youtube.com/watch?v=Hbg3Wcy7bQA>

- Integrating Radiant Heating and Cooling in Built Environment Design - 28.10.2022, Bhubaneswar, URJAVARAN 2022-23: Dialogues in Sustainable HVAC and Architecture, *Indian Society of Heating Refrigeration and Air conditioning Engineers (ISHRAE)*, hosted by ISHRAE Bhubaneswar chapter

PEER REVIEW ACTIVITIES

- Peer reviewer for International Building Performance Simulation Association (IBPSA) conference 2017, 2019

AWARDS AND HONOURS

- **Fulbright Nehru Doctoral Research Fellowship (FNDRF)** (December 2016-August 2017)
- **UPP Scholar Award** (declined), (2012)
Admission to funded PhD program in Department of Urban Planning and Policy (UPP), College of Urban Planning and Public Affairs (CUPPA), University of Illinois at Chicago [not availed]
- **GATE scholar**, [All India Rank 6] (2009)
Graduate Aptitude Test in Engineering (GATE) is a highly competitive examination, which opens admission for postgraduate and doctoral programs in Indian Engineering colleges and institutes

MEMBERSHIP IN PROFESSIONAL SOCIETIES

- Member, Council of Architecture, India
- Member, Indian Institute of Architects (IIA)
- Member, International Association for Building Performance Simulation (IBPSA), India
- Member, Institute of Town Planners (ITPI), India
- Member, Indian Society of Heating, Refrigeration and Air Conditioning (ISHRAE)
- Member, International Association for Urban Climate (IAUC)

PERSONAL SKILLS AND COMPETENCES

Languages: English, Bengali, Hindi

Computer Skills: Programming –Matlab, Simulation – DesignBuilder and EnergyPlus, Derob-LTH, Others- Autodesk AutoCAD, Adobe Photoshop, Google Sketchup, Microsoft Office

Leadership Activities: Research Scholars' Representative for the Research Scholars community of the Department of Architecture and Regional Planning at IIT Kharagpur (2014-15), Member of ISHRAE Chapter Working Committee of Bhubaneswar Chapter (2023-24)

Artistic Skills: Photography: Acceptances in national and international photo contests,

Painting: Acceptance in national photo exhibition held in Academy of Fine Arts, Kolkata in Dec2013.

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