Curriculum Vitae

Name: Omprakash Surname: Ramalingam Rethnam Email: <u>204040004@iitb.ac.in</u> Cellphone: +91-9443118325 Landline: 0431-2512047 Address: Plot No 24, 1st Street, Prakash Nagar, Malaikoil, Trichy–620013.

Academic Record

Jan 2021 to present – Indian Institute of Technology Bombay

- Doctor of Philosophy– Construction Technology and Management
 - Present Grade (CPI): 9.18/10
- Awardee of the prestigious Prime Minister Research Fellowship (PMRF), Jan 2021 Jan 2025, funded by Government of India

Jul 2016 to May 2018 – Indian Institute of Technology Madras

- Masters in Technology Construction Technology and Management
- Final Grade: 9.46/10
- Published one international journal in Life Cycle cost of 1MW solar PV power plant in BEPAM journal, an emerald publication
- Published one conference paper on using solar energy for operating waste water treatment plants in World Construction conference, Colombo, 2018 Srilanka and won the prestigious BEPAM Highly commended paper award

Jul 2010 to May 2014 - College of Engineering Guindy, Anna University Chennai.

- Bachelor of Engineering Mechanical Engineering
- Final Grade: 8.59/10 secured First Class with distinction
- > Secured 'S' grade (highest grade) in Heat and Mass transfer in Semester Examination.

Jun 2009 to Mar 2010 - RSK Higher Secondary School, Kailasapuram, Trichy

- Specialization: Physics, Chemistry, Computer Science and Mathematics
- Final Mark: 97% (1162/1200), Tamil Nadu State Board-secured cent percent in Mathematics
- Jun 2007 to Mar 2008 RSK Higher Secondary School, Kailasapuram, Trichy
 - > Specialization: Mathematics, Science, Social Science
 - Final Mark: 92% (460/500), Central Board

Research/Teaching Experience

Jan 2021 to present – Indian Institute of Technology Bombay

Prime Minister Research Fellow (Construction Technology and Management | Dept. of Civil Engineering)

- Presently working in the domain of "Urban/Community Building Energy Modelling' under the supervision of Prof. Albert Thomas
- Worked as inhouse Teaching Assistant preparing teaching contents, examination assessments, conducting hands-on sessions for courses, "Construction Technology and Personnel Management" and "Construction Planning and Control" that are offered as full-semester courses at the Indian Institute of Technology Bombay
- Completed 10 hours of teaching commitment, including content creation, under the Prime Minister Research Fellowship scheme for handling the guest lecture titled 'Introduction to Rhino and Grasshopper for energy modeling' in Indian Institute of Technology Bombay for the civil engineering graduates
- Provided 17 hours online guest lecture crash-course series in SONA, College of Arts and Science, under the topic 'Python programming' for the students doing their Bachelor's in Computer Application
- Provided 4 hours online session on the topic of 'Agent based Modeling' for the civil engineering students, from Pillai HOC College of Engineering & Technology

Academic Awards and recognition

Mar 2023: Awarded the first "R Subramanian Fellowship" award from the Glazing Society of India with Tripti Singh Rajput for the research proposal submitted- the award was given for the research proposal submitted to improve the energy performance of glazing using building energy simulation and optimization. Amount Awarded: INR 0.2 million (\$ 2,403)

Dec 2020 – Selected as the awardee of the prestigious "Prime Minister Research Fellowship" for the cycle Dec 2020 – Dec 2024, funded by Government of India - the scheme seeks to attract the best talent pool of the country into research, thereby realizing the vision of development through innovation https://dec2021.pmrf.in/ July 2018 – Highly commended paper award –7th World Construction Conference presenting "Feasibility of using solar energy to operate waste-water treatment plants" organized by Ceylon Institute of Builders, Srilanka & Department of Building Economics, University of Moratuwa, Srilanka

July 2016 – Selected for the most distinguished "Build India Scholarship" for the cycle July 2016 - May 2018, funded by Larsen & Toubro Limited for doing Masters in Construction Technology and Management at Indian Institute of Technology Madras

https://www.Intecc.com/build-india-scholarship/

Apr 2014 – First prize – Paper Presentation on "Self-Inflated Tires" - presented at Pinnacle, A national level technical symposium for Mechanical Engineers, organized by Department of Mechanical Engineering, College of Engineering Guindy.

Research Proposals (Collaborated and bagged)

Title of the Proposal: " A Data-driven Simulation-based Machine Learning Optimization SML-Opt Framework for Net Zero Energy Building Retrofits"

Lead Pl(s): Dr. Albert Thomas (Indian Institute of Technology Bombay, India), Dr. Elie Azar (Carleton University, Canada)

Funding Source: DST, Government of India and IC-Impacts, Canada

Duration: 2 years (2023-2025)

Amount Awarded: INR 12 million (\$ 1,44,187)

Status: Funded

My Role: Collaborated closely with Dr. Albert Thomas and Dr. Elie Azar in formulating and co-authoring a significant portion of the research proposal, contributing to the conceptual framework, literature review, and research design. Played a pivotal role in securing \$1,44,187 in funding for the project through grant application support and budget development. Coordinated international research partnerships with faculty members from Canadian university, facilitating data sharing and collaborative analysis

https://dst.gov.in/sites/default/files/Announcement%20of%20results%2C%20India%20Canada%20call-2022.pdf

Title of the Proposal: "Development of SIMecc-Opt framework for optimizing glazing parameters enhancing residential building thermal comfort and energy performance at minimum life cycle cost" **Award winners:** Omprakash Ramalingam Rethnam and Tripti Singh Rajput

Lead PI(s): Dr. Albert Thomas (Indian Institute of Technology Bombay, India)

Funding Source: Glazing Society of India (GSI)

Duration: 2 years (2023-2025)

Amount Awarded: INR 0.2 million (\$ 2,403)

Status: Funded

My Role: Won the first "R Subramanian Fellowship" award from the Glazing Society of India for recognizing the contributions so far and for researching further through the proposal on the use of energy efficient glass in the building industry. Authored the proposal along with Tripti Singh Rajput from within the SIM lab contributing to the conceptual framework literature review, and research design, grant application support and budget development <u>https://shorturl.at/cloHK</u>.

Submitted Research Proposals (Collaborated and Results awaiting)

Title of the Proposal: "Developing an open-source data-driven Multi-Agent Platform for Environment and Energy Optimization (MAPEO) toward intelligent indoor thermal comfort management"

Lead PI(s): Dr. Albert Thomas (Indian Institute of Technology Bombay, India), Dr. Ashrant Aryal (Texas A&M University, U.S.)

Funding Source: DST, Government of India

Duration: 3 years (2023-2026)

Budget proposed: INR 18 million (\$ 216,175)

Status: Awaiting results

My Role: Collaborated closely with Dr. Albert Thomas and Dr. Ashrant Aryal in in formulating and co-authoring a significant portion of the research proposal to the conceptual framework, literature review, research design, grant application support and budget development.

Submitted Research Proposals (Collaborated and Not funded)

Title of the Proposal: "Integrated framework for optimizing the net energy consumption of the building community at the least life cycle cost utilizing passive building retrofits and renewable energy shared within building community premises"

Lead Pl(s): Dr. Albert Thomas (Indian Institute of Technology Bombay, India), Dr. Rakesh Kumar Mishra (Indian Institute of Technology (BHU) Varanasi Funding Source: DST, Government of India Duration: 2 years (2023-2025) Budget proposed: INR 5 million (\$ 60,048)

Status: Awaiting results

My Role: Collaborated closely with Dr. Albert Thomas and Dr. Rakesh Kumar Mishra in in formulating and coauthoring a significant portion of the research proposal, contributing to the conceptual framework, literature review, research design, grant application support and budget development. Coordinated inter-institute research partnerships with faculty members and research scholars from Indian Institute of Technology (BHU) Varanasi , facilitating data sharing and collaborative analysis.

Title of the Proposal: "Development of a Plastic Cash Converter Machine utilizing the power of Artificial Intelligence to create financial incentives for recycling scrap plastic": The machine will employ AI and machine learning to detect plastic types. It incentivizes users by awarding points for recycling. Optical sensors and intelligent algorithms enable efficient sorting and processing of plastic waste, revolutionizing the recycling process.

Lead Pl(s): Omprakash Ramalingam Rethnam (Indian Institute of Technology Bombay, India) **Funding Source:** Institute of Eminence, Indian Institute of Technology Bombay, India **Duration:** 1 year (2023-2024)

Budget proposed: INR 1.1 million (\$ 13,208)

Status: Not Funded

My Role: Formulating and co-authoring a significant portion of the research proposal, contributing to the conceptual framework, literature review, and research design. Coordinated with undergrad students within campus to create a conceptual model of the machine, providing the solution and value preposition, customer validation, competitive analysis, target, and revenue model, with scheduled milestones.

Title of the Proposal: "Improving the energy and thermal performance of the slum building stock using fabric solar PV integrated IOT systems".

Lead PI(s): Omprakash Ramalingam Rethnam (Indian Institute of Technology Bombay, India)
Funding Source: Tinkerers Laboratory, Indian Institute of Technology Bombay, India
Duration: 1 year (2022-2023)
Budget proposed: INR 0.31 million (\$ 3,721)
Status: Not Funded

My Role: in formulating and co-authoring a significant portion of the research proposal, contributing to the conceptual framework, literature review, and research design.

Title of the Proposal: ""Development of a digital twin-based building monitoring framework to redesign the office working environment to suit COVID restrictions".

Lead Pl(s): Dr. Albert Thomas (Indian Institute of Technology Bombay, India)

Funding Source: ASEAN-India Science, Technology & Innovation Cooperation, Government of India Duration: 2 years (2022-2024)

Budget proposed: INR 1.5 million (\$ 17,934)

Status: Not Funded

My Role: Collaborated closely with Dr. Albert Thomas in in formulating and co-authoring a significant portion of the research proposal, contributing to the conceptual framework, literature review, and research design. Coordinated international research partnerships with faculty members from universities from South East Asian Nations (The University of Danang - University of Science and Technology Danang, Vietnam, and Universiti Teknologi Malaysia), facilitating data sharing and collaborative analysis.

Title of the Proposal: "Decarbonizing the building sector to realize 2070 net-zero emission goals through an exploratory analysis based on development of a community-based building energy retrofit framework tool using a coupled UBEM and machine learning approach "

Lead PI(s): Dr. Albert Thomas (Indian Institute of Technology Bombay, India)

Funding Source: DST, Government of India

Duration: 3 years (2022-2025)

Budget proposed: INR 5.5 million (\$ 66,085)

Status: Not Funded

My Role: Collaborated closely with Dr. Albert Thomas in in formulating and co-authoring a significant portion of the research proposal, contributing to the conceptual framework, literature review, and research design.

Journal Publications

Ramalingam Rethnam, O., and Thomas, A. Forthcoming. 2024. "A Modeling-based Decision Support System for Enabling Mass Net-Zero Energy Retrofit of Building Communities in Developing Countries." Journal of Architectural Engineering (ASCE) <u>https://doi.org/10.1061/JAEIED/AEENG-1738</u> **{Q1}**

Ramalingam Rethnam, O., and A. Thomas. 2023. "A Community Building Energy Modelling – Life Cycle Cost Analysis Framework to Design and Operate Net Zero Energy Communities." Sustainable Production and Consumption., 39 (May): 382–398. (SE: Road to Net-Zero). <u>https://doi.org/10.1016/j.spc.2023.04.022</u> **{Q1}**

Ramalingam Rethnam, O., and A. Thomas. 2023. "Urban Building Energy Modelling-Based Framework To Analyze The Effectiveness of the Community-Wide Implementation of National Energy Conservation Codes." Smart and Sustainable Built Environment. <u>https://doi.org/10.1108/SASBE-09-2022-0210</u> **{Q1}**

Ramalingam Rethnam, O., Palaniappan, S., and Ashokkumar, V. 2020, "Life cycle cost analysis of 1MW power generation using roof-top solar PV panels", Built Environment Project and Asset Management, Vol. 10 No. 1, pp. 124-139. <u>https://doi.org/10.1108/BEPAM-12-2018-0161</u> **{Q1}**

Ramalingam Rethnam, O., Daksh Bansal and Thomas, A. 2024. "Enhancing Community Building Energy Modeling Inputs through Satellite Imagery and Digital Photography Using Geospatial and Computer Vision Techniques." Energy and Buildings **{Q1}** (under review)

Ramalingam Rethnam, O., and Thomas, A. 2024. "A physics-informed deep learning-based Urban Building Thermal Comfort Modeling and Prediction framework for identifying thermally vulnerable building stock." Smart and Sustainable Built Environment **{Q1}** (under review)

Markarian, E., Qiblawi, S., Krishnan, S., Divakaran, A., **Ramalingam Rethnam, O.,** Thomas, A., and Azar, E. 2024. "Informing building retrofits at low computational costs: a multi2 objective optimization using machine learning surrogates of building performance simulation models." Journal of Building Performance Simulation **{Q1}** (under review)

Conference Publications

Gonuguntla, B., Rajput, T.S., **Ramalingam Rethnam, O.**, and A. Thomas. 2024. "An efficient decision-support tool for urban building energy modeling in developing nations, leveraging satellite imagery and machine learning techniques" 2024 European Conference on Computing in Construction, July 14th to 17th, 2024, Crete, Greece. <u>Accepted and to be presented</u>

Krishnan, S., Divakaran, A., **Ramalingam Rethnam, O.,** Markarian, E., Thomas, A., and Elie, A. 2024. " An efficient decision-support tool for urban building energy modeling in developing nations, leveraging satellite imagery and machine learning techniques" 2024 European Conference on Computing in Construction, July 14th to 17th, 2024, Crete, Greece. <u>Accepted and to be presented</u>

Bansal, D., **Ramalingam Rethnam, O.** and A. Thomas. 2024. " An efficient decision-support tool for urban building energy modeling in developing nations, leveraging satellite imagery and machine learning techniques" SimBuild IBPSA Conference May 21st to 23rd, 2024, Denver, Colorado. <u>Accepted and to be presented</u>

Ramalingam Rethnam, O., and Thomas, A. 2023. "A Customizable Community-Building-Energy-Modeling Decision Support System (CCBEM-DSS) for Net-Zero Planning in Developing Countries." 2023 Winter Simulation Conference (WSC), San Antonio, TX pp. 3166-3177, doi: 10.1109/WSC60868.2023.10407443 https://ieeexplore.ieee.org/document/10407443

Ramalingam Rethnam, O., and A. Thomas. 2022. "A Community-Based Urban Building Energy Modeling Framework for Transitioning towards Zero Energy Building Communities in Developing Countries." Proc. uSIM 2022 International Building Performance Simulation Association Conference. Novemb. 25th, Scotland, United Kingdom, 1–9. <u>https://publications.ibpsa.org/proceedings/usim/2022/papers/usim2022_p103.pdf</u>

Ramalingam Rethnam, O., Palaniappan, S., and Pandian Ganesh Kumar. 2018, "Techno-economic feasibility of using solar energy for operating sewage treatment plants", 7th World Construction Symposium on "Built Asset Sustainability: Rethinking Design, Construction, and Operations", Building Economics and Management Research Unit (BEMRU), pp. 527-536 (Link to read through the publication: https://ciobwcs.com/downloads/WCS2018-Proceedings.pdf

July 2023: Drone Pilot License issued by the Directorate General of Civil Aviation (DGCA- Certificate No. PC072300004EV to operate small-sized rotorcraft (2 kg - 25 kg), valid for a ten-year duration

Membership in Professional Organizations

Active member of ASCE (American Society of Civil Engineers) - Member Number:000012320621

Joint-organized a webinar titled "Precast in Mass Construction of Real Estate and Infrastructure Projects" presented by Dr. Mustafa Mashal, American Society of Civil Engineers-Indian Section Western Region (ASCE-ISWR)

Software Skills

- Grasshopper-Rhino (Honeybee, Ladybug, Dragonfly)
- Integrated Environmental Solutions (IES): Virtual Environment (VE)
- Integrated Environmental Solutions (IES): Intelligent Community Design (ICD)
- City Energy Analyst
- > EUReCA Python Urban Building Energy Modeling tool
- > Design Builder
- Quantum GIS
- Optimization using GAMS
- > UAV photogrammetry processing using WebODM
- UAV flying (Drone Pilot License holder for flying small-sized rotorcraft: 2 kg–25 kg, from the Directorate General of Civil Aviation, India)
- Computer vision-based object detection using YOLO
- > Optimal sizing of hybrid renewable energy systems with Homer
- Agent Based Modeling using Netlogo
- Bentley SewerGems
- Bentley WaterGems
- Primavera Construction planning
- Autodesk Rivet
- Autodesk Navisworks
- ➢ MS Office 2010
- Autodesk Auto CAD 2015
- Python 3.18 (TensorFlow, YOLO)
- ≻ HTML
- > CSS

Community/Voluntary service

June 2022 to present

- Website lead coordinator of CTaM department (IIT Bombay), handling the official CTaM department website using tools like GitHub, Win SCP, Atom, which has 80+ students enrolled (<u>https://www.civil.iitb.ac.in/~ctam/</u>).
- Strategized Plan of Action every week to update the Official department Website.
- Working in a team of 3+ coordinators, ensuring smooth operation of the updated website for entire CTaM department.

Jan 2021 to present

- Organized an online free career guidance workshop called Career Reach catering mainly to the students who are in their 11th and 12th class, connecting top experts from the fields of Engineering, Medicine, Civil Services, Arts & Science, Computer Science & Information Technology to share their insights and learnings (<u>http://surl.li/ckiwb</u>)
- A special handy career path finder module was developed and published for school students to help students decide career opportunities that best suit their personality traits
- Published free job opportunity updates for variety of job seekers through online platform (<u>http://surl.li/ckixa</u>)

Professional Experience

Jun 2018 to May 2020 - Larsen and Toubro Construction, Contracts department Assistant Manager (Mechanical) (Waste-Water Business Unit).

Involved in complete bid preparation starting from preparation of Tender information sheet, checking for the significant clauses of the contract, technical bid preparation, and Electro-Mechanical estimations, risk review document preparation up to bid submission.

- > Involved in Validating every process/mechanical equipment offers, which comprises of the below:
 - <u>Electro-mechanical equipment's</u>: Submersible Centrifugal pumps, Horizontal centrifugal/split casing pumps, aeration blowers, mechanical course/fine screen, Sluice gate, SBR systems, chlorination system, conventional/vortex grit mechanism, UV systems, Hydro-pneumatic surge arresting pressure vessels, Centrifuge, Clarifiers, thickeners, dosing systems.
 - <u>Valves</u>: Gate valves, butterfly valves, non-return valves, knife gate valves, ball valves
 - <u>Pipes & Fittings</u>: Ductile iron/Cast iron/Mild steel/Stainless steel pipes & fittings.
- Checking through all the technical deliverables from various departments for bid submission.
- Interaction with International/Local suppliers for getting the quote and involved in Techno-commercial comparison for every equipment for arriving the estimate.
- Involved in Business development to prepare technical documents with commercial backup educating prospective clients for new tender release.
- Involved in back-to-back interactions with different disciplines from Design, Operations & Management, Supply chain management, Operations creating interfaces for smooth transition of project
- Preparation of technical presentations to refresh young minds coming into the corporate brushing through the basics of critical mechanical equipment's
- Shown special interest in the field of renewable and sustainable construction which led to think about using solar PV panels to run the sewage treatment plant which extended to conference and publication level

Jun 2014 to May 2018 - Larsen and Toubro Construction, Engineering Design and Research Centre – Senior Design Engineer- Mechanical, Utility & In-plant Piping (Waste-Water Business Unit).

- > Designed Sewerage Network using Bentley SewerGems for Guntur Zone II.
- > Designed Sewerage and Raw water/Clear water pumping stations for On-going/tender jobs.
- > Involved in the selection of pumps based on the hydraulics and application.
- > Supplemental in the design and subsequent client approval of General Arrangement drawings of pumping station including Layout and In-plant piping for Sewage treatment plant, Rampur operating job.
- Played a pivotal role right from designing of Sewerage network up to the design of Treated Effluent pumping station within the Sewage Treatment plant during tender stage of Pali project operating in Rajasthan
- > Prepared Process and Instrumentation diagrams for Pumping stations.
- Raised Purchase Requisition for Submersible pump, End Suction pump, Horizontal Split casing pump, Vertical turbine pump, Mechanical & Manual Screens, Sluice Gate, Sluice Valve, Non-return valve, Manually/Electrically operated hoist/Crane, pipes and fittings for Pumping stations/Sewage Treatment plants
- Technically reviewed vendor offers for the Electro-Mechanical items within Pumping stations/STP and cleared after the Vendor's Compliance over the queries raised for getting final Approval from Client before procurement

Responsibilities undertaken

Sep 2023 to present – Mentor to the project associates for the live project funded by DST, Government of India and IC-Impacts, Canada titled, " A Data-driven Simulation-based Machine Learning Optimization SML-Opt Framework for Net Zero Energy Building Retrofits."

Oct 2023 - Website coordinator of CTaM department

Handling the official CTaM department website using tools like GitHub, Win SCP, Atom, which has 80+ students enrolled, Strategized Plan of Action every week to update the Official department Website, Working in a team of 3+ coordinators, ensuring smooth operation of the updated website for entire CTaM department.

Jun 2018 – Estimation lead of Process/Mechanical team for various STP tenders/proposals

Sep 2016 – Design lead of Mechanical, Utility and in-plant piping team for various operating STP projects **Mar 2012 -** Organized a workshop on Ornithopter Design and Fabrication at Kurukshetra (national level technical symposium organized by College of Engineering Guindy under the patronage of UNESCO).

- First of its kind in South India
- Targeted at school students, the workshop witnessed a footfall of well over five hundred, over the course of two days.
- 13 Mar 2012 Concepts pertaining to design basis and fabrication of Ornithopter clearly explained to the students by self. Technical Lecture sessions were succeeded/followed by interactive Q&A sessions.
- 14 Mar 2012 Hands-on training for the participants in making Ornithopter on their own by providing the necessary kits and guidance. Around 50 coordinators and volunteers were deployed for the same.
- Stationery and gifts awarded to the students with outstanding Ornithopter design.

Co-Curricular Industrial Experience

Jul 2013 to December 2013 - Design and fabrication of reactor to extract oil from waste plastic carried out

under Dr. D Mohanlal, Professor & Head R&AC, Department of Mechanical engineering, College of Engineering Guindy.

- Designed SS pipe (pressure vessel) referring ANSI B36.19 and ASME code as standards for pipe Schedule, design of end cap, flange selection based on the working pressure.
- > Utilized PID controller with thyristor drive for temperature control monitored using thermocouple sensor.
- > Employed Nitrogen and exhaust gas flow regulating valves.
- Successfully extracted oil from plastic using the reactor design.

Vocational Training

15 to 20 Feb 2016 - Supervisory Development Program organized by L&T for future executives and managers.

- Batch consisted of 23 members who were nominated from approximately 200 peers.
- Topics covered: functional (eg: Tendering and Contracts, Working Capital Management, Indirect Taxation, etc.) and behavioral (eg: Interpersonal Effectiveness, Negotiation Skills, etc.).

April to June 2015 - Online courses on "Business Communication" and "Business Etiquette" organized by L&T in collaboration with Anytime Learning (ATL) India.

4 to 25 Sep 2014 - Program on Engineering, Technology and Business operations organized at Centre for Technology and Engineering Applications, Mysore.

24 Jun to 6 Jul 2013 - Short – term certificate course in CFD (Computational Fluid dynamics) using ANSYS – FLUENT, organized by AU – FRG institute for CAD/CAM, Anna University Chennai

10 to 22 Jun 2013 - Short – term certificate course in ADAMS (Automated dynamic Analysis of Mechanical Systems), organized by AU – FRG institute for CAD/CAM, Anna university Chennai.

Co-Curricular/Sports- Awards and recognition

March 2023 - Team Championship - Intra department Chess tournament - IIT Bombay

Feb 2015 & Feb 2016 – Champion - Inter-IC Club Chess tournament (for 2 consecutive years) - represented Water and Effluent Treatment IC.

Apr 2013 – Finished fourth / Second Semi-finalists - National level Inter College Team Chess Championship held at SSN College, Chennai. – represented College in the capacity of Team Leader.

Linguistic competency

- Mother Tongue: Tamil
- English: "Very Good" competency
- > Hindi: Certification level (Rashtrabhasha Praveen)

Personal declaration

I hereby declare that all details furnished above are true to the best of my knowledge and belief.

Date: 04th May 2024

Signature: RRo-prekat

LinkedIn profile url: <u>https://www.linkedin.com/in/omprakashrethnnam</u>

Portfolio: https://omprakashrr.owlstown.net/