PRABHAT RANJAN

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EDUCATION

Indian Institute of Technology Bombay *Jul' 16 - Present*
Dual Degree (B.Tech + M.Tech) in *Energy Science & Engineering*
Master's Thesis in *Development of Solar Dryer for Agricultural Produce with Integrated Heat Storage*
Minor in *Bioscience and Bioengineering*

Overall CGPA: 8.94 out of 10

Aalto University *Jan' 20 - Jun' 20*
Guest Master's in *Advanced Energy Solutions* - Semester Exchange
Overall GPA: 4.13 out of 5

RESEARCH EXPERIENCE

Integrated Heat Sotarge Solar Dryer for Agricultural Produce *Jul' 20 - Present*
Master's Thesis — Guide : Prof. Shireesh B. Kedare *IIT Bombay*

Introduction: The current project aims at developing small scale passive crop drying solution to combat the issues of crop loss and low quality product with Open Sun Drying (OSD). The Project also aims to minimise the effect of environmental factor through integrating Phase Change Materials (PCMs) for more heating inertia. It also looks to make the product economically viable in current market with both conventional dryers and OSD.

- Performed extensive literature survey, identifying shortcommings in Technologies & Methelodies
- Integrating PCM in solar dryer - extending drying time by atleast 2 hours at low solar radiation
- Developing a phenomenological model, for the dryer, to analatically obtain the dryer parameters
- Mapped the spatial variation of 150+ crops throughout India with GIS in R, using NSSO Data

Development of Building heating simulation Algorithms *May' 19 - Jul' 19*
Research Internship — Guide : Prof. Jean-Jacques Roux *INSA, Lyon*

Introduction: The project involves development of algorithms for building heating simulations. It requires substituting the heat components of building with its electrical equivalen. The electrical equivalend circuit is then solved using circuit theory to reduce the heating channels of whole building into few components. This reduction is then repeated for several buildings and these are aggrigated to reduce the component size even further to predict the energy load of of several buildings.

- Developed several models for different insulation configurations to replace it with electrical equivalent.
- Integrated solar irradiance factor for both 2 and 3 dimensions designs to produce a generalised algorithm

MAJOR PROJECTS

Project Solarise *Aug' 17 - Aug' 18*
Design Engineer — Team Shunya *IIT Bombay*

Introduction: The project involves designing construction and shipment of a fully furnished two storey building with a non-positive energy consumption. The project tackles the issue of mass housing with the idea of modularity and repeatability in design to exploit economy of scales. This Project was showcased at Solar Decathlon China in 2018 (SDC18) where it won the Best participation award.

- Worked as a design engineer in civil division, collaborating with a team of 65+ members.
- Involved in construction process throughout the process, constructed, deconstructed shipped and re-constructed the house. Part of contingent reprepresenting India in Solar Decathlon China 2018.

- Underwent construction training at **Armstrong Pvt. Ltd.** and **Don Bosco Maritime University**
- Involved in various several sponsorship deals and agreements with industrial partners.
- Documented the whole **construction process** and **design procedures** for the SDC2018 committee.

Project LEAF *Aug' 18 - Dec' 19*
Project Manager — Team Shunya *IIT Bombay*

Introduction: Project LEAF is the third project by Team Shunya after Project H naught (2014) & Project Solarise (2018). This project focuses on the vertical growth of Tier-2 cities with a flat topography. This project involves building a sustainable, net-energy +ve rettrofittable house design to be mounted over existing structure, saving the valuable land resource, while reducing the energy intensity of overall struction. The projct conceptualised a deplyoable design, to be deployed at the site quickly saving valuable construction time. This project was pitched for Solar Decathlon Europe 2021 (SDE21).

- Headed the team as the Project Manager in a core group to conceptualise and design the current project
- Redesigned the complete team structure and spearheaded the recruitment process for new members
- Worked with the Architecture division to design modular housing units with flexible spaces
- Develped the proposal, Budget, Market appeal and Buisness case for Project LEAF - pitched for SDE21

KEY COURSE PROJECTS

Study of Watershed Development *Jul' 19 - Nov' 19*
Introduction to Water Science and Policy — Guide : Prof. N. C. Narayanan

- Extensively studied the chronological history of watershed development programs in India
- Presented the evolution of Watershed development based on various committee and policy reports
- Analysed several case studies to critique the government perspective on watershed development

Semi Autonomous Bot for cleaning Stagnant Water bodies *Jul' 19 - Nov' 19*
Innovation Lab — Guides : Prof. S. Doolla & Prof. S. Srinivas

- Designed and fabricated a remote controlled bot for trapping suspended particles from water bodies
- Presented the prototype at open house exhibition in the Department of Energy Science and Engieering

Study of WECC Load Flow Model *Jan' 18 - May' 18*
Electrical Energy Systems — Guide : Prof. Zakir H. Rather

- Studied the WECC load flow modelling to simulate interconnected Bulk Power system
- Used DigSILENT PowerFactory to model a small scale power system with a PV and Grid

Study of Marine Plastic Pollution *Jan' 18 - May' 18*
Environmental Management — Guide : Prof. Munish Chandel

- Identified types of plastic waste in ocean and its effects on aquatic and human life
- Presented different policies, programs and innovative solutions for the issue of marine plastic

Matematical modelling of Evolution of Eukaryotes *Aug' 18 - Nov' 18*
Evolutionary Dynamics — Guide: Prof. Supreet Saini

- Studied the process of Endosymbiosis for the evolution of Eukaryotic cells
- Formulated a mathematical mode expalining origin of mitochondria through the Hydrogen hypothesis

INTERNATIONAL EXPOSURE

Aalto University *Jan' 20 - Jun' 20*
Semester Exchange — Master's in Advanced Energy Solution *Espoo, Finland*

- Completed and equivalent of 1100+ hours of course work in various departments of University
- Participated in various industrial visits in Helsinki and Tampere organised by the University
- Attended seveal Finnish language and cultural courses along with several cross cultural events

International Student Energy Summit *Jul' 19*
Delegate — Imperial College *London, UK*

- Attended the global summit consisting of 650+ delegates from 100+ countries around the world, held at Imperial College London, Royal Geographical Society and Natural History Museum, London
- Networked with delegates from 50+ leading companies spanning different sectors and industries and brainstormed solutions for the pressing energy and environmental concerns

Solar Decathlon China *Jul' 18 - Aug' 18*
Participant — Team Shunya *Dezhou, China*

- Represented India at Solar Decathlon, a Building challenge organised by US Department of Energy
- Worked as the English Media manager in the SDC committee for outreach to Non-Chinese Members

INSA Lyon *May' 19 - Jul' 19*
Research Internship - INSA Lyon *Lyon, France*

- Completed a research internship on the development of algorithms for building heat simulation methods at INSA Lyon under the guidance of Prof. Jean-Jacques Roux, Département Génie Civil et Urbanisme

LEADERSHIP AND MENTORING

Project Manager *Aug' 18 - Dec' 19*
Team Shunya *IIT Bombay*

- Spearheaded recruitment of 45+ new team members across 5+ batches from the University
- Planned the next housing project end to end, within a budget of INR 40 mn; Pitched for SDE21
- Headed several technical & managerial team meets with students, faculties and potential sponsors

DAMP Mentor *Apr' 18 - May' 19*
Department Academic Mentorship Prorgam, DESE *IIT Bombay*

- Mentored five sophomore undergraduate students to help them fully realize their academic potential
- Published up-to-date course reviews on the DESE D-AMP blog to help 130+ students of the department
- Underwent a 12-hour training session conducted by Student Wellness Centre, IIT Bombay and TISS

Energy Club Convener *Apr' 17 - May' 18*
Institute Technical Council *IIT Bombay*

- Worked with a team of 5 members to spread awareness about the energy technologies and innovations
- Organized documentary screenings, talks, workshops and Group Discussions for residents of IIT-B

Teaching Assistant *Feb' 18 - May' 18*
Department of Bioscience and Bioengineering *IIT Bombay*

- Conducted weekly tutorial sessions for 35+ first-year students
- Assisted the professor in conducting regular exams and in evaluation procedures

SCHOLASTIC ACHIEVMENTS

- Currently ranked 3rd in the department out of 27 students
- Received the prestigious Charpak Lab Scholarship for research in France from the French Embassy
- Awarded Erasmus+ Global Mobility Scholarship for a semester exchange by the European Union
- Achieved AP grade for academic proficiency in Biology and Innovation by Design

TECHNICAL STRENGTHS

Computer Languages	Prolog, Haskell, AWK, Erlang, Scheme, ML
Protocols & APIs	XML, JSON, SOAP, REST
Databases	MySQL, PostgreSQL, Microsoft SQL
Tools	SVN, Vim, Emacs

KEY COURSES

Analytics and Modelling	Energy Systems Modelling and Analysis, Data Analysis and Interpretation Power Generation and System Planning, Energy Policy Analysis
Electrical Engineering	Distributed Generation and Microgrids, Electrical Energy Systems Electrical Machines, Control and Instrumentation, Power Electronics
Mathematics	Linear Algebra, Calculus, Ordinary Differential Equations
Mechanical Engineering	Transport Phenomena, Thermo-fluid Devices
Environmental Engineering	Environmental management, Energy Resources, Economics and Environment Introduction to Climate Change, Water Resources Management
Biotechnology	Genetic Engineering, Metabolism and Bioenergetics

EXTRA CURRICULAR

Sports

- Team member of Institute Hockey Team for Inter-IIT sports meet *2017 & 2018*
- Won IHL (Institute Hockey League) as Captain *2018*
- Bagged two Silvers in consecutive years in Hockey General Championship as Captian *2018 & 2019*
- Won Gold in Sophie GC (General Championship) as captain *2017*

Mountaineering *Jun' 2017*

- Completed 15 days Mountaineering Adventure Course at Sanasar (Jammu)
- Learned mountaineering skills like Rock Climbing, Rappelling, Zip lining etc.
- Won a prize of the Discipline and overall conductduring the same course

Social Service

- Volunteered for CURED, a Diabetes awareness initiative undertaken by TechFest 2016 *2016*
- Volunteered at Abhyasika (Student-run NGO) : Teaching underprivileged children *Jan' 17 - Oct' 17*

Hobby Projects

- Remote control Bot — XLR8 Competition — Electronics Club, IIT Bombay *2016*
- Line Follower Bot — Electronics Club, IIT Bombay *2016*
- Arduino Powered 8x8 Dancing LED cube *2017*
- Built websites for Energy Club, Team Shunya and several self projects