SAJJAN POKHREL (Google Scholar)
Oak Ridge, Tennessee
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Education

Ph.D.in Mining Engineering 03/2024
The University of British Columbia, Vancouver, Canada
Advisor: Seyed Ali Ghoreishi Madiseh Lab: Advanced Mine Energy Systems
Dissertation: Evaluation of coaxial heat exchanger for geothermal heat and power.

Master of Science in Renewable and Clean Energy Engineering 12/2017
Wright State University, Ohio, USA GPA: 3.8/4.0
Advisor: James Menart
Thesis: Computational modeling of a cross flow turbine.

Bachelor of Mechanical Engineering 12/2013
Tribhuvan University, Institute of Engineering, Kathmandu, Nepal GPA: 3.7/4.0

Research Interest

Energy Systems, Geothermal energy, Thermal energy storage, Renewables, Geothermal heat pumps, Thermal and fluid sciences, Computational Fluid Dynamics (CFD), Energy Transition, Energy policy

Professional experience

Postdoctoral research associate 07/2024 - present
Oak Ridge National Lab (ORNL) Oak Ridge, Tennessee

- Field scale experimental analysis of a novel Underground Thermal Battery for geothermal energy extraction and Thermal Energy Storage
- Development of numerical model to extract geothermal energy from underground abandoned mines
- Prototype development and testing of a novel heat-pump water heater for domestic hot water heating
- Life cycle analysis of drilling in conventional and enhanced geothermal power generation
- Proposal writing for several Department of Energy (DOE) Funding Opportunity Announcement (FOA)

Freelancer 03/2024 - 06/2024
Upwork Remote/online

- Worked with three clients in product development of a patty pan and a novel Thermal Energy Storage technology (sand battery)
- Offered graduate thesis consulting.

Graduate research assistant 09/2018 - 02/2024
The University of British Columbia Vancouver, Canada

- Performed experimental and numerical analysis of a field-scale geothermal system.
- Conducted modeling of porous and permeable rock for geothermal energy extraction.
- Developed dynamic numerical tool to evaluate the performance of solar-geothermal system.
- Designed geothermal heat pump system for a Canadian first nations community building.
- Executed techno-economic analysis of a solar-PV underground mine cooling system.

Transdisciplinary research fellow - climate emergency and justice 09/2022 - 08/2023
Metro Vancouver Vancouver, Canada

- Collaboratively designed a research project for Metro Vancouver's de-carbonization strategy with a team of eight PhD students, faculties, and external stakeholders.
- Applied trans-disciplinary approaches, integrating knowledge, and methods in project co-design.
- Facilitated interactions and meetings among cohort members, faculty, and external stakeholders.
- Interviewed diverse stakeholders to evaluate Non-Road Engines (NREs) de-carbonization pathways.
- Developed a reproducible work-flow and generated NREs emission inventory in this region.
- Recommended policy insights based on emission trends, technology availability, and stake-holders' opinions.

Visiting research fellow 02/2020 - 05/2020
International Research Organization for Advanced Science and Technology Kumamoto, Japan

- Studied performance of the geothermal power generation system from a 500m drill hole.

MITACS accelerate research intern 08/2020 - 04/2021
Project MANITOU Sudbury, Canada

- Designed a Solar-Geothermal heating system for a residential unit of 816 apartments.

MITACS accelerate research intern 07/2018 - 01/2019
FLSmidth Vancouver, Canada

- Investigated complex turbulent two-phase flow in a mechanical flotation cell.

Graduate research assistant 07/2015 - 12/2017
Wright State University Ohio, USA

- Evaluated experimental and numerical analysis of a cross-flow low-head hydro turbine.

Teaching experience

Lecturer - Full time 12/2013 - 07/2015
Kantipur City College Kathmandu, Nepal

Undergraduate courses	Course description
Thermodynamics (I)	Laws of thermodynamics, thermodynamic cycles, heat transfer
Applied Mechanics	Kinetics, Kinematics, plane motion, Lagrangian dynamics
Fluid Mechanics	Fluid statics and kinematics, fluid flow equations, dimensional analysis

- **Responsibilities:** Generated lesson plans, prepared assignments, presented lectures and tutorials, conducted laboratory, graded and evaluated student's progress

Graduate Teaching Assistant - Part time
The University of British Columbia Vancouver, Canada

- **Modeling and simulation** Fall 2020 and Fall 2021

  Course description: Methods for determining the behavior of large-scale industrial systems
  Responsibilities: Instructed and assisted students in the lab, graded assignments, exams, and projects

- **Mine water management** Winter 2020 and Winter 2022

  Course description: Integrated water resource management and long-term stewardship
  Responsibilities: Evaluated assignments, assisted with term project

Publications

Pokhrel, Sajjan, Agus P. Sasmito, Atsushi Sainoki, et al. "Field-scale experimental and numerical analysis of a downhole coaxial heat exchanger for geothermal energy production." *Renewable Energy* 182 (2022): 521-535.

Pokhrel, Sajjan, Leyla Amiri, Sébastien Poncet, et al. "Renewable heating solutions for buildings; a techno-economic comparative study of sewage heat recovery and solar borehole thermal energy storage system." *Energy and Buildings* 259 (2022): 111892.

Pokhrel, Sajjan, Amiri, L., Poncet, S., and Ghoreishi-Madiseh, S. A. (2023). Reduced order 1+ 3D numerical model for evaluating the performance of solar borehole thermal energy storage systems. *Journal of Energy Storage*, 66, 107503

Pokhrel, Sajjan, Leyla Amiri, Ahmad Zueter, et al. "Thermal performance evaluation of integrated solar-geothermal system; a semi-conjugate reduced order numerical model." *Applied Energy* 303 (2021): 117676.

Pokhrel, Sajjan, Ali Fahrettin Kuyuk, Hosein Kalantari,et al. "Techno-economic trade-off between battery storage and ice thermal energy storage for application in renewable mine cooling system." *Applied Sciences* 10, no. 17 (2020): 6022.

Ana Polgar, Jiaming Chen, **Pokhrel, Sajjan**, et al. "Cultivating the Soil: Collaboratively Shaping Transdisciplinary Research with Stakeholders" (Journal of Integrative Environmental Sciences - under review)

Sara Sultan, ..., **Pokhrel, Sajjan**, et al. "Active and Passive Phase Change Thermal Energy Storage in Buildings: System Configurations and Performance Review" (Energy and Buildings - under review)

Pokhrel, Sajjan, Xiaobing Liu, et al. "Performance comparison of conventional and a novel underground thermal battery for geothermal energy extraction and thermal energy storage in geothermal heat pump applications" (working paper)

Conference proceedings

Pokhrel, Sajjan, Leyla Amiri, Sébastien Poncet, et al. "A Sustainable Heating Solution for Multifamily Residential Buildings in Cold Climates." 2021. *9th International Renewable and Sustainable Energy Conference (IRSEC*).

Pokhrel, Sajjan, Agus P. Sasmito, Atsushi Sainoki, et al. " Field-scale experimental and numerical analyses of a downhole Coaxial heat exchanger." 2021. *15th international conference on heat transfer, fluid mechanics and thermodynamics (HEFAT).*

Pokhrel, Sajjan, Leyla Amiri, Ahmad Zueter, et al. "Evaluation of an solar-borehole thermal energy storage system for residential heating applications." 2020. *International Conference on Applied Energy (ICAE).*

Kalantari, Hosein,**S. Pokhrel**, Amin Shadi, et al. "Numerical study of mine water heat recovery system using coupled heat exchanger units." 2019. *International Conference on Applied Energy (ICAE).*

Pokhrel, Sajjan, Srijan Rajbamshi, Saroj Bhattarai, et al. "Prospects of bagasse cogeneration in sugar industries of Nepal." 2014. *Rentech Symposium Compendium.*

Pokhrel, Sajjan, Xiaobing Liu, et al. "Field Test of a Novel Underground Thermal Battery for Ground Source Heat Pump Application", 2025. *Stanford Geothermal Workshop* - scheduled and abstract accepted

Pokhrel, Sajjan, Xiaobing Liu, et al. "Opportunities and Challenges for Heat Extraction from Abandoned Mines with Ground Source Heat Pump for Space Conditioning Applications", 2025. *IGSHPA Annual Conference* - scheduled and abstract submitted

Navin Kumar, Kyle Gluesenkamp, Bo Shen, **Pokhrel, Sajjan**, et al. Plug-and-play Modular 120-volts low-GWP Residential Heat Pump Water Heater, 2024. Hot Water Forum (HWF) - scheduled and abstract submitted

Invited Presentations

"Renewable Heating Solution for Buildings: Thermal Energy Storage Technology", Clean Energy Research Group (CERG), Fall 2024 series, Simon Fraser University, November 15, 2024

"Analysis of coaxial borehole heat exchanger for geothermal energy extraction and storage", National Renewable Energy Laboratory (NREL - Geothermal Group). March 6, 2024

"Analysis of co-axial borehole heat exchanger for geothermal heat and power", Argonne National Laboratory (Electrification and Infrastructure Group), January 25, 2023

"Analysis of co-axial borehole heat exchanger for geothermal heat and power", University of Calgary (Geo Energi Group), January 4, 2024

"Analysis of co-axial borehole heat exchanger for geothermal heat and power", Testor Group, Cornell University, June 07, 2023

Software and tools

Language: Python, R, MATLAB, C
Software: ANSYS Fluent, ICEM CFD, OpenFOAM, SolidWorks, RETScreen, eQuest

Awards, Scholarships, and Fellowships

Visiting research fellowship - International Research Organization for Advanced Science and Technology (IROAST) 02/2021 - 05/2021
Fellowship of ¥ 450,000 to conduct research on closed-loop geothermal system

Collaborative Ph.D. fellowship 2022 - 2023
Fellowship of CAD 25,000 for a year to conduct transdisciplinary research on climate emergency

MITACS accelerate research award 2021 - 2022
Fellowship of CAD 30,000 for 8 months to conduct research on Solar-BTES system

MITACS accelerate research award 2018 - 2019
Fellowship of CAD 18,000 for 5 months to conduct research on mechanical flotation cell

Five graduate student awards - UBC 2020 - 2023
Awarded for peer reviewed journal publications as a lead author (each CAD 1800)

Graduate research fellowship - Wright State University 2015 - 2017
Full tuition waiver and stipend of USD 10,000/year for two academic years

Merit based scholarship 2009 - 2013
Full tuition waiver for undergraduate study from Government of Nepal

Mahatma Gandhi Scholarship 2006 - 2007
Two years of scholarship for high school study from Government of India based on academic excellence

Grant Writing Involvement

Connected Communities 2.0 (DE-FOA-0003136) ($ 6.5 million)

Lab call - High Temperature Heat Pump - Reservoir Thermal Energy Storage (HTHP-RTES) ($1.5 million)

Strategic Partnership Project (SPP) Proposal (AC05-00OR22725) ($ 400,000)

Qatar National Research Fund ($ 1.5 million)

MITACS accelerate research grant (CAD 30,000)

NSERC mobilize grant (CAD 700,000)

Community services

Vice-President (elected) - Oak Ridge Postdoc Association (ORPA)

Founding Treasurer - Nayagaun Ambulance Service Trust (NAST)

Professional Affiliations

ASHRAE (SPC 233 - Guest member)

Geothermal Resource Council (GRC)

Canadian Institute of Mining (CIM)

Students mentored

Saloha Aboud (class of 2023)

Mankanwar Singh (class of 2023)

Youssef Elhagrasy (class of 2023)

Media exposure

What on Earth (CBC radio) - Revolutionizing climate education in universities

Peer reviewer service

Applied energy

Transactions of the Canadian Society for Mechanical Engineering

Processes

International Ground Source Heat Pump Association (IGSHPA)

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