

I am Sourav Kumar, a PhD Scholar in the Department of Mechanical Engineering at the Indian Institute of Technology Madras (IIT Madras), India. My research interests lie in renewable and sustainable energy technologies, with a particular focus on solar energy applications, concentrated photovoltaic thermal systems, energy storage, and next-generation fuels. My doctoral research focuses on solar energy, specifically on photovoltaic technologies for cogeneration applications. My research work has resulted in a journal publication in Energy Conversion and Management and a conference proceeding presented at IEEE PVSC 2024. And, some research articles are communicated. I am particularly interested in interdisciplinary academic research that addresses real-world energy challenges and bridges the gap between fundamental research and practical, product-oriented solutions. My research experience combines numerical modelling, simulation, experimental investigation, and techno-economic analysis. I have strong expertise in SolTrace for optical analysis, SolidWorks for geometric modelling, ANSYS Fluent for thermal and fluid-flow analysis, and MATLAB/Simulink for electrical modelling and system analysis. I also have experience with COMSOL Multiphysics and Tonatiuh software. In addition to numerical research, I have gained substantial hands-on experimental experience through the design and performance analysis of a concentrated photovoltaic-thermal (CPVT) system. I have further applied my numerical and experimental expertise to an industry-scale project involving the technical and economic assessment of a 5 MW solar photovoltaic power plant, where I evaluated performance degradation and proposed solutions to restore and improve the plant's operational performance. My broader research objective is to develop efficient, sustainable, and practically deployable energy technologies that can contribute to the transition toward cleaner energy systems.