

Skills

- **Areas:** Thermodynamics, Fluid Dynamics, Heat Transfer, Numerical Methods, Modelling and Simulation
- **Computing:** Matlab/Simulink, EcosimPro, C, C++, Julia, UNICOS, WinCC OA, AutoCAD, Git
- **Languages:** English, Hindi

Education

- **PhD**, Mechanical Engineering, **University of Manchester**, 2016 – 2020, Thesis: “*Process modelling and dynamic simulations of CO₂ cooling systems based on two-phase pumped loops*”
- **M.S.**, Mechanical Engineering, **University of Maryland, College Park**, 2013-2015, Thesis: “*Dynamic modeling of vapor compression systems for residential heat pump applications with alternative low-GWP refrigerants*”
- **B.Engg.**, Mechanical Engineering, **Manipal Institute of Technology**, 2007-2011, Thesis: “*Research and development of a CO₂ cooling system for the CMS Pixel detector*”

Experience

CERN, 2021-present

Senior Fellow

- Maintaining system technical documentation and part lists
- Simulations of failure modes for Phase 2 cooling systems and risk analyses

CERN / University of Manchester, 2016-present

Cooperation Associate/ Doctoral student

- Developed a dynamic simulation tool being used for the design of future Silicon detector cooling systems.
- The tool is being used to help scale previous cooling systems to an order of magnitude larger scale, and to develop control logic for the next-generation CO₂ cooling systems.

University of Maryland, College Park, 2013–2015

Graduate Research Assistant

- Simulated and validated the steady-state and dynamic performance when replacing high Global Warming Potential (GWP) refrigerants with low GWP alternatives in residential heat pumps.
- Simulated the dynamics of a complex flash tank vapour injection residential heat pump and validated results

Mahindra and Mahindra Automotive Ltd., 2011–2013

Assistant Manager

- Simulated the performance of automotive HVAC systems during cool-down tests in wind tunnels.
- Developed a remote-controlled HVAC Electronic Control Unit (ECU) for automotive use including CAN-bus communication. Received an Excellence Award for this project.

Publications

Journal

1. Bhanot, V., Petagna, P., Cioncolini, A., Verlaat, B., “**On the Dynamics of Next Generation Detector Cooling Systems**”, Nuclear Inst. And Methods in Physics Research, A, 2021
2. Bhanot V., Petagna, P., Cioncolini, A., Iacovides, H., “**Development and validation of a simulation tool for next generation detector cooling systems**”, Nuclear Inst. and Methods in Physics Research, A, 2020
3. M. Ghousein, E. Witrant, V. Bhanot and P. Petagna, “**Adaptive Boundary Observer Design for Linear Hyperbolic Systems; Application to Estimation in Heat Exchangers**”, Automatica, vol. 114 (108824), pp. 1-13, 2020
4. Bhanot, V., Dhumane, R., Ling, J., Petagna, P., Cioncolini, A., Aute, V., “**Development of a Numerical Tool for Modelling and Dynamic Simulations of Two-Phase Cooling Systems**”, International Journal of Simulation Modelling, 2019
5. Ling, J., Bhanot, V., Aute, V., Radermacher, R., “**Transient Simulation of Heat Pumps Using Low GWP Refrigerants**”, Science and Technology for the Built Environment (formerly, HVAC&R Research), 2015, DOI:10.1080/23744731.2015.1034044

Conference

1. Bhanot, V. Petagna, P., Cioncolini, A., Ling, J., Aute, V., Iacovides, H., “**Modelling and Simulations of a Flash Tank Vapour Injection Heat Pump in Several Platforms**”, International Conference on Refrigerators and Air Conditioners, Purdue, 2021
2. Bhanot, V., Petagna, P., Cioncolini, A., Iacovides, H., “**Simulation and Validation of a CO₂-Based Pumped Loop Cooling System**”, 8th IIR Conference on Ammonia and CO₂ Refrigeration Technologies, 2019
3. Verlaat, B., Petagna, P., Zwalinski, L., Daguin, J., Giakoumi, D., Bhanot, V., Battistin, M., Hafner, A., Collot, J., Bondoux, D., Postema, P., Tropea et al., “**CO₂ cooling challenges at CERN for the future phase 2 upgrade program**”, International Conference of Refrigeration, Montreal, 2019
4. Bhanot, V., Dhumane, R., Ling, J., Petagna, P., Cioncolini, A., Aute, V., Radermacher, R., “**Comparison of Two Object-Oriented Modelling Platforms for the Dynamic Simulations of a Residential Heat Pump**”, International Conference on Refrigerators and Air Conditioners, Purdue, 2018
5. Bhanot, V., Petagna, P., Cioncolini, A., Iacovides, H., “**Dynamic Modelling of Two-Phase Cooling Systems Using the Object-Oriented Modelling Platform EcosimPro**”, Proceedings of MACE PGR Conference, Manchester, 2018
6. Bhanot, V., Ling, J., Aute, V., Radermacher, R., “**Simulink Based Transient Modeling of a Flash Tank Vapor Injection System and Experimental Validation**”, International Conference on Refrigerators and Air Conditioners, Purdue, 2016
7. Bhanot, V., Bacellar, D., Ling, J., Alabdulkarem, A., Aute, V., Radermacher, R., “**Steady-State and Transient Simulations of a Vapor Compression Cycle Using Simulink**”, International Conference on Refrigerators and Air Conditioners, Purdue, 2014
8. Jha, K., Bhanot, V., and Ryali, V., “**A Simple Model for Calculating Vehicle Thermal Loads**”, SAE Technical Paper 2013-01-0855, 2013, doi: 10.4271/2013-01-0855
9. Bhanot, V., Zwalinski, L., Noite, J., Postema, H., Godlewski, J., Kottig, T., Verlaat, B., “**The CORA CO₂ Cooling Plant**”, Gustav Lorentzen Conference on Natural Refrigerants, Delft, 2012