

Summary

Mechanical engineering professional with eight years combined experience in the fields of thermodynamics, fluid dynamics, heat transfer, two-phase flow, HVAC systems, numerical simulations, and control systems.

Skills

- Areas of experience: Thermodynamics, Fluid Dynamics, Heat Transfer, Simulations, Scientific Computing, Numerical Methods
- Computing: Matlab/Simulink, EcosimPro, C++, Julia, Git, UNICOS, WinCC OA, AutoCAD, Modelica (basic)
- Languages: English (fluent), Hindi (fluent), French (elementary)

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.Egg. (Mechanical Engineering), Manipal Institute of Technology, 2007-2011, *Thesis: "Research and Development of a CO2 Cooling System for the CMS Pixel Detector"*

Experience

CERN / University of Manchester, 2016-present

Cooperation Associate

- Developed a numerical tool for faster-than-real-time simulations of next generation Silicon detector cooling systems.
- The tool is being used to help design the control logic for the next-generation CO2 cooling systems.
- Completed the UNICOS/WinCC-OA course and used the training to implement the full control logic for a prototype cooling plant.
- Developing a 'virtual commissioning' setup to safely train operators in a simulation of the cooling plant instead of the real system.

University of Maryland, College Park, 2013-2015

Graduate Research Assistant

- Simulated and validated the performance of low Global Warming Potential (GWP) refrigerants in residential heat pumps.
- The validations established the possibility of replacing high-GWP refrigerants with more environmentally-friendly alternatives with minimal hardware intrusions in residential heat pumps.
- Validated the simulations of the dynamics of a complex Flash Tank Vapour Injection system.

Mahindra and Mahindra Automotive Ltd., 2011-2013

Assistant Manager

- Developed a modelling tool for evaluating vehicle heat loads. The model estimated worst-case heating loads for any location on Earth by calculating solar angles, car geometry, passenger thermal loads and psychrometric conditions.
- Validated simulations 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 a company-wide Excellence Award for this project.

CERN, 2011

Internship

- Responsible for operation and maintenance of a laboratory prototype CO2 cooling test bench.
- Conducted steady state simulations for calculating two-phase pressure drop in the evaporator lines for CMS Pixel detector.

Publications

Journal

1. 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
2. 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
3. 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
4. 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