

Exponent®
Engineering & Scientific Consulting

Pradeep Ramasubramanian, Ph.D., CFEI

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Professional Profile

Dr. Pradeep Ramasubramanian specializes in providing engineering solutions for the built environment, including issues with plumbing systems, mechanical/HVAC systems, and indoor air quality. His extensive indoor air quality experience includes analyzing indoor particle and aerosol dynamics, as well as the fate and transport of gases. Dr. Ramasubramanian is also a Certified Legionella Water Safety & Management Specialist under ASSE 12080.

Dr. Ramasubramanian's project experience includes:

- Airborne contaminant transport and exposure in the indoor environment including:
  - COVID-laden aerosol transport and exposure in large and small indoor environments
  - Carbon monoxide transport in a variety of indoor settings including fitness centers, parking garages, and residential buildings
  - Gaseous contaminant transport and exposure in aircraft
  - Aerosol fate and transport in hospital operating rooms
  - Excessive condensation formation
- Analysis of HVAC systems including:
  - Variable Refrigerant Flow (VRF) and heat pump systems
  - Dedicated Outside Air Systems (DOAS)
  - Duct routing and seals
  - Dehumidifiers, freezers, water heaters and pumps
  - Heating and air-conditioning load and capacity analysis
- Analysis of failures associated with high rise potable water and waste drain systems
- Investigation of failure modes in firearm accessories contributing to accidental discharges
- Fire, water loss, injury, and construction defect investigations

Dr. Ramasubramanian is keenly interested in quantifying exposure to gas-phase pollutants, coarse and fine particulate matter, as well as virus/bacteria-laden aerosols. Prior to joining Exponent, Dr. Ramasubramanian earned his doctorate in mechanical engineering at Portland State University, where he studied the effectiveness of air pollution mitigation systems on indoor occupants. His research focused on analyzing ozone mitigation mechanisms in the built environment, from in-situ measurements of ozone deposition to urban greenery and green roofs to modelled effectiveness of ozone mitigation methods applied at the breathing zone scale. He has also worked on several projects aimed at assessing the effectiveness of mitigation methods on indoor air in public schools. He has quantified pollutant concentrations using mass spectrometers (PTR-TOF-MS, GC-MS), high-frequency anemometers, high-frequency open-path CO2/H2O analyzers, UV absorption-based ozone monitors, optical particle sizers (OPS) as well as condensation particle counters (CPC).

In addition to his research on air pollution mitigation methods at PSU, Dr. Ramasubramanian contributed his expertise to projects involving multifractal analysis of variable density jets, liquid bridge break-up during zero-g pipetting aboard the space station, and human VOC characterization for improving human trafficking detection. He has also worked as a design engineer with expertise in new product design and development and experience in sheet metal fabrication, injection molding, and PCB/PCA enclosures. He has designed for and tested with firearms and has experience with the various failure modes of firearms. He also has experience in designing and testing wood and natural gas fired ovens and rotisseries for industrial kitchen applications.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Portland State University, 2022

M.S., Mechanical Engineering, Portland State University, 2018

B.S., Mechanical Engineering, California State University, Long Beach, 2013

Scholarships and Awards:

NSF-S-STEM Scholarship – Portland State University 2021

ASHRAE Grant-In-Aid Recipient - ASHRAE 2019

Green-Building Scholarship – Portland State University 2017, 2019

Prior Experience

Graduate Research Assistant – 2016-2022

Product Design Engineer, Crimson Trace Corporation, 2014–2016

Design Engineer, Jade – Beech Ovens Division, 2013–2014

Intern, Boeing BR&T, 2012–2013

Professional Affiliations

ASHRAE (member)

NAFI (member)

ISIAQ (member)

Patents

Issued:

US Patent 29, 573,019: Laser Device, 2016 (Ramasubramanian P, Johnston W)

Applied:

Application Number: 17/459,923 System and Method for a Wearable Air Filtration Device (Ramasubramanian P)

Publications

Ramasubramanian P, Luhung I, Lim SBY, Schuster SC, Starry O, Gall ET. Impact of green and white roofs on air handler filters and indoor ventilation air. Building and Environment 2021; 197:107860.

Viggiano B, Sakradse G, Smith S, Mungin R, Ramasubramanian P, Ringle D, Travis K, Ali N, Solovitz S, Cal RB. Intermittent event evaluation through a multifractal approach for variable density jets. Chaos, Solitons & Fractals 2021; 146:110799

Chin K, Laguerre A, Ramasubramanian P, Pleshakov D, Stephens B, Gall ET. Emerging investigator series: primary emissions, ozone reactivity, and byproduct emissions from building insulation materials. Environmental Science: Processes & Impacts 2019; 21:1255-1267.

Ramasubramanian P, Starry O, Rosenstiel T, Gall ET. Pilot study on the impact of green roofs on ozone levels near building ventilation air supply. Building and Environment 2019; 151:43–53.

Presentations

Ramasubramanian P, Ramey S, Failure analysis and forensic engineering in the built environment. Indoor Air Conference 2024, Honolulu, HI, 2024.

Ramasubramanian P, Luhung I, Lim SBY, Schuster SC, Starry O, Gall, ET. Impacts of rooftop vegetation on HVAC filter loadings and indoor air quality. AAAR Conference, Portland, OR, 2019.

Sakradse G, Smith S, Viggiano B, Ramasubramanian P, Ringle D, Ali N, Solovitz S. Cal RB multi-fractal properties in volcano-inspired variable density round jets. 71st Annual Meeting of the APS Division of Fluid Dynamics, Atlanta, GA, 2018.

Ramasubramanian P, Starry O, Rosenstiel T, Gall, ET. Impact of green roof surfaces on O3 levels near building ventilation supply. Indoor Air Conference, Philadelphia, PA, 2018.

Starry O, Aionne A, Ramasubramanian P, Gall, ET. Shopping center eco-roof as a living laboratory in Portland, OR. Cities Alive Conference, Seattle, WA, 2017.

Additional Education & Training

Professional Training:

ASPE Plumbing Basics Course

ASHRAE HVAC Design Training Level I & II

IAPMO-ASSE 12080 Legionella Water Safety and Management Specialist Certification Training