Raghav Gnanasambandam

Virginia Tech, Blacksburg, VA

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EDUCATION

Virginia Tech, Blacksburg, VA 2019 - Present

Ph.D. in Industrial and Systems Engineering

- Advisor: *Prof. Zhenyu (James) Kong*
- Dissertation: *Optimizing Process Parameters in Metal Additive Manufacturing with Scarce Data*
- Graduate Certificate: *Future Professoriate Certificate*

Indian Institute of Technology (IIT) Madras, Chennai, India 2014 - 2019

Dual Degree (B.Tech & M.Tech) in Mechanical Engineering

- Specialization: *Intelligent Manufacturing*
- Thesis: *Machine Vision-Based Surface Characterization & Roughness Prediction of Machined Surfaces*
- Minor: *Materials Science*

RESEARCH INTERESTS

- **Methodology:** *Bayesian Learning; Physics-informed Machine Learning; Partial Differential Equations.*
- **Applications:** *Advanced Manufacturing; Laser Powder Bed Fusion; Cyber Physical Systems.*

HONORS & AWARDS

- **Outstanding PhD Student** of the Year, ISE at Virginia Tech 2023
- Travel Awards, ISE at Virginia Tech 2022-2023
- Grado Department of Industrial and Systems Engineering Fellowship, Virginia Tech 2019-2020
- Undergraduate Scholarship, NLC India Ltd. 2014-2019

ACHIEVEMENTS

- **Winner**, IISE QCRE ProcessMiner Industrial Data Challenge 2023
- **Winner**, IISE QCRE ProcessMiner Industrial Data Challenge 2022
- **Winner**, INFORMS DMDA Workshop Poster Competition 2022
- **Finalist**, INFORMS QSR Data Challenge 2022

JOURNAL PUBLICATIONS

Under Review/Revision

1. **R. Gnanasambandam**, B. Shen, J. Chung, X. Yue, and Z.J. Kong. "Self-scalable Tanh (Stan): Multi-scale Solutions for Physics-Informed Neural Networks". Revision Submitted (March 2023). *IEEE Transactions on Pattern Analysis and Machine Intelligence*. DOI:10.48550/arXiv.2204.12589.

   - **Winner**, IISE QCRE ProcessMiner Data Challenge Competition 2022

   - **Winner**, INFORMS DMDA Workshop Poster Competition 2022

2. **R. Gnanasambandam**, B. Shen, A.C.C. Law, X. Yue, and Z.J. Kong. "Deep Gaussian Process for Enhanced Bayesian Optimization and its Application in Additive Manufacturing". Revision Submitted (June 2023). *IISE Transactions*. DOI:10.36227/techrxiv.23548143.v1.

Published/Accepted

1. B. Shen, **R. Gnanasambandam**, R. Wang, and Z.J. Kong. "Multi-task Gaussian Process Upper Confidence Bound for Hyperparameter Tuning and its Application for Simulation Studies of Additive Manufacturing." *IISE Transactions* 55.5 (2023): 496-508. DOI: 10.1080/24725854.2022.2039813.
2. V. Akhil, **R. Gnanasambandam**, N. Arunachalam, and D.S. Srinivas. "Image Data-Based Surface Texture Characterization and Prediction Using Machine Learning Approaches for Additive Manufacturing." *J. Comput. Inf. Sci. Eng.* 20.2 (2020): JCISE-19-1222. DOI: 10.1115/1.4045719.
3. V. Akhil, N. Arunachalam, **R. Gnanasambandam**, and D.S. Srinivas. "Surface Texture Characterization of Selective Laser Melted Ti-6Al-4V Components using Fractal Dimension and Lacunarity Analysis." *Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture* (2020). DOI: 10.1177/0954405420971081.

Pre-Submission

1. **R. Gnanasambandam**, J. Chung, Y. Zhang, C. Li, M. Marena, N.R. Jordan, B. Shen, and Z.J. Kong. "A Holistic Data Analytics Framework for Laser Powder Bed Fusion".
2. J. Chung, **R. Gnanasambandam**, Y. Zhang, Z.J. Kong, and B. Shen. ""Automatic Thresholding by Reconstruction Error in Unsupervised Anomaly Detection in Automotive Industry".
   - **Finalist**, INFORMS QSR Data Challenge 2022

RESEARCH PROJECTS

- **Office of Naval Research** – Multidisciplinary University Research Initiatives (MURI) 2019-2024
  - Rationalization of Interphase Instabilities During Thermo-Mechanical Gyrations Typical to Metal Additive Manufacturing (AM)
- **IIT Madras & Prisms India Pvt. Ltd.** 2017-2018
  - Automation of Straightness Measurement in Autocollimator with a Vision System

RESEARCH TALKS

- **A Holistic Data Analytics Framework for Laser Powder Bed Fusion**
  - *ICQSR Data Challenge*, Raleigh, NC (Sole Submitter) 2023
- **Sequence-to-Sequence LSTM for Fungal Spores Concentration Prediction**
  - *IISE QCRE ProcessMiner Data Challenge*, New Orleans, LA **(Winner)** 2023
- **Thermal Modeling with Physics-Informed Neural Networks**
  - *IISE QCRE ProcessMiner Data Challenge*, Seattle, WA **(Winner)** 2022
  - *IISE Annual Conference*, Seattle, WA (Invited) 2022
  - *INFORMS DMDA Workshop*, Indianapolis, IN 2022
  - *INFORMS Annual Meeting*, Indianapolis, IN (Invited) 2022
  - *ONR MURI Fifth Year Review*, San Diego, CA 2023
  - *IISE Annual Conference*, New Orleans, LA (Invited) 2023
- **Bayesian Optimization with Stochastic Imputation of Deep Gaussian Process**
  - *INFORMS Annual Meeting*, Anaheim, CA (Invited) 2021
  - *INFORMS Annual Meeting*, Indianapolis, IN (Invited) 2022
  - *IISE Annual Conference*, New Orleans, LA 2023
- **Automatic Gear Shifting Strategy with Artificial Neural Networks**
  - *AI in Manufacturing* Course, IIT Madras, India (Invited) 2019

RESEARCH POSTERS

- **Self-Scalable Tanh for Physics-Informed Neural Networks**
  - *IISE Annual Conference*, Seattle, WA — May 2022
  - *INFORMS DMDA Workshop*, Indianapolis, IN **(Winner)** — October 2022
- **Bayesian Optimization with Stochastic Imputation of Deep Gaussian Process**
  - *IISE Annual Conference*, New Orleans, LA — May 2023

TEACHING EXPERIENCE

- ISE 3004: Industrial Cost Control, GTA, Virginia Tech — Spring 2021
- ISE 3214: Facilities and Logistics, GTA, Virginia Tech — Fall 2019 & 2020
- ISE 2214: Manufacturing Processes Lab (Lab Instructor), GTA, Virginia Tech — Spring 2020
- ME 2400: Measurement, Instrumentation, and Control, GTA, IIT Madras — Spring 2019
- ME 2050: Machine Drawing Practice (Lab Instructor), GTA, IIT Madras — Fall 2018

WORK EXPERIENCE

- **RF Wave Technologies Pvt. Ltd.**, Intern, Chennai, India — Summer 2017

MENTORING EXPERIENCE

- Mentor, Project EduAccess (India) — 2022-2023
- Project Leader at Intl. Networked Team for Engg. Des. & Innov. (MANE 4173, UTRGV) — 2022
- ISE Graduate Student Mentor (Virginia Tech) — 2021-2022

SERVICE

- **Session Chair**, *Data-driven Approaches for CPS*, INFORMS Annual Meeting — 2023
- **VP Operations**, INFORMS Student Chapter, Virginia Tech — 2023-2024
- **Graduate Student Ambassador**, Virginia Tech — 2022-2023
- **Research Poster Judge**, ISE Senior Symposium, Virginia Tech — 2022 & 2023
- **Student Volunteer**, HBCU/MSI Research Summit, Virginia Tech — 2022
- **Student Volunteer**, ISE Senior Symposium, Virginia Tech — 2021
- **Secretary**, Society of Manufacturing Engineers (SME), Virginia Tech — 2020-2021

PEER REVIEW

- IEEE Transactions on Automation Science and Engineering (IEEE-TASE)
- Journal of Intelligent Manufacturing (JIMS)
- IISE Annual Conference (Manufacturing and Design Track)
- Graduate Research Development Program (GRDP) at Virginia Tech

PROFESSIONAL MEMBERSHIPS

- Graduate Academy for Teaching Excellence at Virginia Tech (VT GrATE)
- Institute of Industrial and Systems Engineers (IISE)
- Institute for Operations Research and the Management Sciences (INFORMS)