NURALI VIRANI

Lead Scientist, Machine Learning
GE Research

Education

- B. Tech. in Manufacturing Science (2011), Indian Institute of Technology (IIT) Kharagpur
  (Area: Robotics)
- M. Tech. in Industrial Engineering (2011), Indian Institute of Technology (IIT) Kharagpur
  (Area: Optimization)
- M. S. in Mechanical Engineering (2015), Pennsylvania State University
  (Area: Time-series analysis and sensor fusion)
- M. S. in Electrical Engineering (2016), Pennsylvania State University
  (Area: Game theory and robotics)
- Ph. D. in Mechanical Engineering (2017), Pennsylvania State University
  (Area: Data-driven modeling and learning-based control)

Previous Positions

- Machine Learning Researcher, GE Research, Apr'17-Apr'19
- Graduate Research Assistant, Penn State University, Jan'12-Mar'17
- Research Intern, Bosch Research and Technology Center, Pittsburgh, May'14 – Aug'14
- Research Intern, Bosch Research and Technology Center, Pittsburgh, May'13 – Jul'13
- Graduate Teaching Assistant, Penn State University, Aug'11-Dec'11

Brief Biography

Dr. Nurali Virani is a Lead Scientist in the Machine Learning team at GE Research. He is a multidisciplinary researcher with a strong academic and research background in machine learning, statistical modeling, optimization theory, control theory, sensor fusion, signal processing, motion planning, and mechatronics. He has worked on several projects including: 1) AI-driven control of wind farms, 2) AI-driven safe control of power generation gas turbine units, and 3) characterizing robustness of ML models to attacks and noise. He was also a member in GE team on the DARPA ASKE program to automatically create computational graphs from semantic knowledge graphs curated from code, documentation, and publications with human-in-the-loop. His current research interest is in making AI aware of its competence and to improve its competence and robustness via continuous learning (Humble AI) as well as making AI consistent with human knowledge. He was awarded GE Global Research CTO Technology Award (5 Under 5) for Outstanding Research in 2018 as well as 2019 Rudolph Kalman Best Paper Award by ASME.

Prior to joining GE, he was a research assistant at Penn State where his research was primarily funded by U. S. Air Force Office of Science and Research. As a part of Networked Robotics and Systems Lab, he worked on game theory and robust optimization for robust adaptive motion planning as his MS thesis in Electrical Engineering. In Penn State, he was key researcher on "Intelligent Sensor Fusion for Fault Detection" project from U. S. Office of Naval Research and "Sensor Array Fusion for Border-Crossing Target Detection and Classification" from U. S. Army Research Office. He was awarded a silver medal for academic excellence, when he graduated from Indian Institute of Technology in 2011. Dr. Virani has 35 peer-reviewed publications as well as 3 patents.

Selected Patents

1. Crapo, A.W., **Virani, N.** and Mulwad, V., General Electric Co, 2020. Method and system for principled approach to scientific knowledge representation, extraction, curation, and utilization. U.S. Patent Application 16/791,617.
2. Piche, S.W., Pickard, F.F., Petro, R.N., Liu, Y. and **Virani, N.,** General Electric Co, 2020. Control and tuning of gas turbine combustion. U.S. Patent 10,626,817.
3. Evans, S.C., Delport, S.S.L., Davoust, S., **Virani, N.** and Shartzer, S.B., General Electric Co, 2020. Method for controlling operation of a wind turbine. U.S. Patent 10,605,228.
4. **Virani, N.** and Srivastav, A., General Electric Co, 2020. Method and system for competence monitoring and continuous learning for control. U.S. Patent Application 16/222,279.

Selected Publications

1. **Virani, N.**, Yang, Z., and Iyer, N., Justification-Based Reliability in Machine Learning. In AAAI Conference on Artificial Intelligence, 2020.
2. Sarkar, S., Sarkar, S., **Virani, N.,** Ray, A. and Yasar, M., 2014. Sensor fusion for fault detection and classification in distributed physical processes. Frontiers in Robotics and AI, 1, p.16.
3. **Virani, N.**, Phoha, S. and Ray, A., Learning from Multiple Imperfect Instructors in Sensor Networks, IEEE Transactions on Neural Networks and Learning Systems, 99, pp.1–7, 2018.
4. **Virani, N.** and Zhu, M., Robust adaptive motion planning in the presence of dynamic obstacles, 2016 American Control Conference (ACC), pp. 2104–2109, IEEE, July 2016.
5. **Virani, N.**, Lee, J.W., Phoha, S. and Ray, A., Learning Context-Aware Measurement Models, 2015 American Control Conference (ACC), pp. 4491–4496, IEEE, *Best Presentation in Session (Machine Learning) Award*, July 2015.
6. **Virani, N.**, Jha, D.K., Yuan, Z., Shekhawat, I. and Ray, A., Imitation of Demonstrations using Bayesian Filtering with Nonparametric Data-Driven Models, Journal of Dynamic Systems, Measurement, and Control, 140(3), p.030906, 2018. *ASME Rudolph Kalman Best Paper Award.*

Awards

- 2019 Rudolph Kalman Best Paper Award, ASME
- GE Global Research CTO Technology Award for Outstanding Research (5 Under 5), 2018
- GE Impact Awards (1 in 2020, 1 in 2019, 2 in 2018)
- 3 GE Above & Beyond Awards in 2017
- Best Student Paper Award at 2016 ACM SIGKDD Workshop on Machine Learning for Prognostics and Health Monitoring
- Aga Khan Foundation International Scholarship 2011–2013
- Aga Khan Youth Award for Excellence 2013 for Outstanding Special Achievements
- Institute Silver Medal from IIT Kharagpur 2011
- Prof. G. S. Sanyal Cup from IIT Kharagpur for Best Outgoing Student in Technology 2011