Kaki Ramesh

Specialize in Industrial Automation
BITS Pilani, Hyderabad Campus

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LinkedIn Profile

Education

- **Purdue University** *2024 – Present*
  Visiting Scholar, West Lafayette
- **BITS Pilani, Hyderabad Campus** *2020 - Present*
  Ph.D, Hyderabad
- **VNR Vignan Jyothi Institute of Engineering and Technology** *2020*
  Master of Technology, Hyderabad.
- **St, Martins Engineering College** *2018*
  Bachelor of Technology, Hyderabad.
- **Govt. Polytechnic College, Narsapur** *2014*
  Diploma, Hyderabad

Experience

- **Visiting Scholar, Purdue University** *2024 – Present*
  Augmented Reality assembly tasks using simulation software
  - Addressing industrial challenges by resolving assembly area issues. Creating a versatile system to provide real-time guidance and instructions for assembly tasks. The process begins with workspace simulation, Analysis on HCI & Robotics and then the developed model is integrated into augmented reality platforms.
- **Nexa Digital Engineering Services** *Jan - Apr* 2024
  Process extraction from PID Drawings
- **Senior Research Fellow, BITS Pilani, Hyderabad Campus** *Oct 2022-Present*
  Artificial Intelligence-based Assembly Areas Inspection (Quality Assurance) detection
  - I led a groundbreaking R&D project in aerospace assembly component alignment. Our integrated image acquisition system harmonized deep learning, image processing, and machine learning for precise object detection and data segmentation. I converted pixel measurements into real-world dimensions for comprehensive analysis, showcasing innovation and precision.
- **Junior Research Fellow, BITS Pilani, Hyderabad Campus** *Oct 2020-Sep 2022*
  Computer Vision-based Assembly Components Features Identification
  - Led the development of a high-quality image acquisition system to capture assembly component images, overcoming challenges like shadow and reflection. Achieved 100% accurate component classification with deep learning and conducted precise dimension calculations. Demonstrated a research-driven approach to real-world mechanical component analysis.

Projects

- **Machine Vision-Based Automatic Assembly Component Feature Identification, Position Identification, and Alignment Systems in Assembly Area for Aerospace and Automobile Vehicles** *Oct 2020 – July 2024*
  Automated identification of assembly components, their positions, and alignments using computer vision. Overcame challenges like shadows and reflections for accurate assembly component identification.
  - Tools & technologies used: Computer Vision, Deep Learning, CNN, ResNet50, YOLOv5, Image Processing, OpenCV, Python, pytorch, TensorFlow, TensorBoard, Ultralytics, GUI, Django, MongoDB, RaspberryPI.
  - Designed image acquisition setups, curated datasets, employed deep learning techniques, and developed image processing algorithms. Also contributed to system optimization and documentation.
- **Visualization experiment and machine learning modeling for falling-film systems** *Feb - Mar 2022*
  Explored flow characteristics in falling-film columns above horizontal tubes using machine learning and image processing to understand fluid dynamics.
  - Tools & technologies used: Computer Vision, Machine Learning, Regression algorithms, Image Processing, OpenCV, Python, Excel, High-Speed Camera, Data Analysis Tools.
- **Thermal conductivity prediction of titania-water nanofluid: A case study using different machine learning algorithms** *Sep-Oct 2021*
  Predicted thermal conductivity of a titania-water nanofluid using five machine learning algorithms, including the introduction of nanoparticle shape as a parameter.
  - Tools & technologies used: Machine Learning, Neural Network, Regression algorithms, Python, Statistical

Analysis, Data Preprocessing, Excel.

- **Machine Learning Approach for Surface Defects Identification of Shielded Metal Arc Welding**

Jan 2019-May 2020

Captured images of shielded metal arc welding (SMAW) weldments, applied advanced image processing techniques, and built machine learning models to classify surface defects.

– Tools & technologies used: Machine Learning, Neural Networks, Image Processing, OpenCV, Python, Statistical Analysis, Data Preprocessing.

Technical Skills and Interests

Engineering Tools: AutoCAD, CATIA, CNC Train, Master CAM, FLEXSIM, Automation Studio, Unity, AR
Programming Languages: Python, C/C++ (Basic knowledge of C language)
AI and Machine Learning: Computer Vision, Artificial Intelligence, Machine Learning, Deep Learning, GenAI
Web Development: GUI, Django, GitHub
Databases: MongoDB, SQL, Postgres
Deep Learning Frameworks: Pytorch, Tensorflow, Tensorboard
Computer Vision Tools: OpenCV, Matplotlib
Operating Systems: Linux, Windows, MAC
Cloud Platforms: Microsoft Azure
Version Control: GitHub, GitLab
Software Proficiency: MS-Office Applications (MS Word, MS Powerpoint, MS Excel)

Achievements

- Qualified in GATE 2018
- DIAT Online Certification Course on AI and ML
- NPTEL Course Certification on JOY OF COMPUTING USING PYTHON
- Trained on Hyperform software in Altair HyperWorks at Pune
- Internship in HMT Praga Tools Limited
- Selected by AIRBUS GmbH, Germany, under the scheme of IGSTC Industrial Fellowship
- Selected by PURDUE University, US, under the scheme of Overseas Visiting Doctoral Fellowship

Publications and Patents

Conference Publications [2]

- **Kaki, Ramesh**, Samarth Soni, Sandip Deshmukh, Tathagata Ray, and Chandu Parimi. "A Novel Approach to Generate Dataset for Object Detection in Assembly Lines." DOI: https://www.academia.edu/download/111485969/251.pdf
- **Ramesh, K.**, E. V. Ramana, L. Srikanth, C. Sri Harsha, and N. Kiran Kumar. "Identification of SMAW Surface Weld Defects Using Machine Learning." In Recent Advances in Materials Processing and Characterization: Select Proceedings of ICMPC 2021, pp. 339-350. Singapore: Springer Nature Singapore, 2022. DOI: https://doi.org/10.1007/978-981-19-5347-7_28

Journal Publications [6]

- **Ramesh, Kaki**, Faisel Mushtaq, Sandip Deshmukh, Tathagata Ray, Chandu Parimi, Ali Basem, and Ammar Elsheikh. "An investigation of deep learning approaches for efficient assembly component identification." Beni-Suef University Journal of Basic and Applied Sciences 13, no. 1 (2024): 79. DOI: https://doi.org/10.1186/s43088-024-00537-2
- Jain, Toshit, Faisel Mushtaq, **Kaki Ramesh**, Sandip Deshmukh, Tathagata Ray, Chandu Parimi, Praveen Tandon, and Pramod Kumar Jha. "Development of Machine Vision Approach for Mechanical Component Identification based on its Dimension and Pitch." arXiv preprint arXiv:2310.01995 (2023). DOI: https://doi.org/10.48550/arXiv.2310.01995
- Kandukuri, Prudviraj, **Ramesh Kaki**, Sandip Deshmukh, and Supradeepan Katiresan. "Visualization experiment and machine learning modeling for falling-film systems." Chemical Engineering Research and Design (2023). DOI: https://doi.org/10.1007/978-981-19-5347-7_28
- Mushtaq Faisel, **Kaki Ramesh**, Sandip Deshmukh, Tathagata Ray, Chandu Parimi, Praveen Tandon, and Pramod Kumar Jha. "Nuts&bolts: YOLO-v5 and image processing based component identification system." Engineering Applications of Artificial Intelligence 118 (2023): 105665. DOI: https://doi.org/10.1016/j.engappai.2022.105665
- Sharma , **K. Ramesh**, R. Parameshwaran, and Sandip S. Deshmukh. "Thermal conductivity prediction of titania-water nanofluid: A case study using different machine learning algorithms." Case Studies in Thermal Engineering 30 (2022): 101658. DOI: https://doi.org/10.1016/j.csite.2021.101658
- **K. Ramesh**, K. Ruthvik Reddy, E. V. Ramana & N. Kiran Kumar “Machine Learning Approach for Surface Defects Identification of Shielded Metal Arc Welding” International Journal of Mechanical and Production Engineering Research and Development 10 (2020): 8415-8424

Patents [2]

- "Machine Vision Based Assembly Line Components Identification System" - Published in India (***Patent No. 202111054493***).
- "Assembly Inspection Method and System" - Filed in India (***Patent No. 202211031628***).