Sethurao Gururaja

Mobile Number: +91-8892963238 Email: bitsguru45@gmail.com LinkedIn: www.linkedin.com/in/gururajas2023/
Webpage/Portfolio: https://www.sethuraogururaja.com

Brief Overview: A highly motivated researcher specializing in AI/ML-driven predictive modeling and machine adaptation for manufacturing systems. I hold a Ph.D. from BITS Pilani, Hyderabad, where I developed intelligent solutions for real-time failure prediction and adaptive process control using machine learning and sensor integration. My work includes three patents (1 published, 2 filed) and multiple research excellence awards. I have developed AI-based real-time monitoring systems and reinforcement learning models for failure detection and process optimization, making significant contributions to smart manufacturing and predictive maintenance.

Education:

- Ph.D. in AI/ML for Manufacturing (BITS-Pilani, Hyderabad) – 9.00 CGPA (82.50%) (2024) – Thesis Submitted
- M.Tech in Machine Design (UBDTCE, Davangere) – 80% (2016)
- B.E. in Mechanical Engineering (PES College of Engineering) – 92.80% (9.28 CGPA) (2014) – IV Rank in the Dept.

Professional Experience:

1. Research Scholar in the department of mechanical engineering at BITS-Pilani, Hyderabad campus from Nov 2020.
2. Assistant Professor at Vidyavardhaka College of Engineering, Mysuru, from July 2016 to November 2020.
3. Project Assistant under "Prof. Somashekhar S Hiremath" in "Precision Engineering and Instrumentation Lab (PEIL), IIT-Madras" in the micro-machining area from June 2015 to July 2016.

Patents and Copyrights:

1. An Indian patent titled "Contact Detection Method for Enhanced Precision in Mechanical Micromilling Operations" has been filed. The application number is, 202411096126.
2. An Indian patent titled "Automated Impact System for Estimating Modal Parameters of Static and Rotating Structures" has been drafted and the patent is in discussion with our legal team for filing.
3. An Indian patent titled "A Novel Method for Farm Level Processing of Tomatoes" have been published on 04.09.2020 in the Patent Office Journal No. 36/2020, pp. 37147 (App No.202041036344A). We are waiting for the official evaluation for granting.

Areas of Interest:

Micromachining, Dynamic Stability Modelling, Cutting Tool Dynamics, Applications of AI/ML in Micromachining, IoT enabled Manufacturing, Digital Manufacturing, Structural Condition Monitoring.

Technical Skills:

AutoCAD (Proficient), SolidWorks (Proficient), Hypermesh (Proficient), Abaqus (Proficient), ANSYS- APDL and Fluent (Proficient), C++ (Novice), Python (Proficient), MATLAB – Signal and Image Processing (Proficient), FORTRAN (Novice), GT Suite (Novice).

Professional Internship:

1. Ongoing internship from Finlatics, Mumbai on machine learning.
2. Completed a year-long internship in IIT-Madras under Prof. Somashekhar S Hiremath in PEIL Lab from June 2015 to June 2016.

Ph.D. Dissertation and Contributions:

- Research Focus: Developing machine learning-based predictive models for dynamic stability analysis and surface form error estimation in high-speed micromilling of thin-walled Ti6Al4V structures.
- Industry Relevance: Addressed machining challenges in aerospace, biomedical, and electronics industries, including reduced stiffness, chatter vibrations, and dimensional inaccuracies.
- Experimental Analysis:
  - Conducted experimental modal analysis (EMA) to determine the dynamic properties of the cutting tool and workpiece.
  - Employed bifurcation analysis to identify Flip and Hopf bifurcations affecting the machining behavior.
- Machine Learning & AI Integration:
  - Developed a multi-sensor fusion-based deep learning framework integrating vibration and audio signals for real-time chatter detection, achieving 95.31% accuracy.
  - Implemented a stacking-based ensemble machine learning model (SVR, DTR, RFR, ANN) for surface form error prediction, achieving less than 10% prediction error.

- Industrial Application: Developed a web-based interface for real-time process monitoring, enabling AI-driven manufacturing optimization, chatter mitigation, and precision machining enhancements.

Projects Handled:

- Manufacturing of Thin-walled Ti structures for Bio-medical applications – Nov 2020 to Dec 2024.
- Dynamic stability modelling of high speed micromilling of Ti6Al4V alloys – Jan 2021 – Dec 2024.
- Cutting tool dynamics of tungsten carbide end mills for machining titanium and nickel alloys – April 2021 – Dec 2024.
- Development of cloud-based platform for real-time stability prediction with minimum human interaction – April 2022 – April 2023.
- Study on the Effect of Turbulence Models on the Solutions of Orifice Flow - UG Project.
- Design and Development of Abrasive Flow Finishing Setup for Machining Internal Features – PG Project.
- Identification of damage in additive manufactured components using image processing technique (CNN and Statistical Analysis) – Oct 2021 to Mar 2022
- Prediction of stable process parameters for milling of hard to machine alloys like Ni and Ti based alloys using machine learning (PCA, SVM, DTW, VMD) – Jan 2021 to Aug 2021
- Implemented transfer learning approach using multi-sensor data to identify chatter in real-time milling of IN-718 with 96% accuracy in prediction (Data Mining) – April 2023 to Oct 2023
- Audio signal-based support vector classifier have been developed with 92% accuracy for instability identification in high-speed machining of Ti6Al4V – Dec 2023 to June 2024

Selected Publications: (updated as on 18.2.25)

H-index:03, Citations: 43, Scopus author Id: 57218256360 and Orcid Id: 0000-0002-2535-7247

1. Sethurao **Gururaja**, Sachin Alya, and Kundan K. Singh, " Study on improving surface integrity for additively manufactured Inconel 718 via high-speed micromilling", *Materials and Manufacturing Processes*, pp.1–18. **[SCIe, Q1, IF:4.4] - Link**
2. Sethurao **Gururaja**, Kundan K. Singh, "Development of Smart Manufacturing Framework for Micromilling of Thin-walled Ti6Al4V", *Journal of Machining Science and Technology*, pp.1–30. **[SCIe, Q1, IF:2.7] - Link**
3. **Gururaja**, Sethurao., Rahul, A., Nandam, S.R., Kundan, K.S., "Parametric evaluation of chip formation in peripheral milling of single crystal Ni-based superalloy', *International Journal of Advanced Manufacturing Technology*, 2024, pp. 1-21, **[SCIe, Q1, IF:3.4]** - **Link**
4. Sethurao **Gururaja**, Kundan K. Singh, "Bifurcation analysis for instability detection in high-speed micromilling of thin-walled Ti6Al4V structure", *CIRP Journal of Manufacturing Science and Technology*, Volume 49, 2024, pp. 150-166, **[SCIe, Q1, IF:4.8] - Link**

Academic Achievements:

1. "**Excellence in Research**" award at the industry day & doctoral research symposium held on 20th April 2024 at **BITS-Pilani, Hyderabad campus**.
2. Won **200$** amount as a **student award in WCMNM-2021**, held at **IIT-Bombay**.
3. Received a **Project Grant worth 8000/- Rs from Karnataka State Council for Science & Technology** in 2017.
4. Won **best paper award** in the National Conference held at AIT, Chikkamagalur in 2016.
5. I graduated bachelor's degree with an **IV Rank** from **PES College of Engineering, Mandya**.

Referees:

1. Dr. Kundan K Singh
   Assistant Professor at BITS-Pilani
   ksingh@hyderabad.bits-pilani.ac.in
   (+91)-9892813888

2. Dr. Rinku K Mittal
   Assistant Professor at IIT- Guwahati
   rkmittal@iitg.ac.in
   (+91)-361-258-3576

3. Prof. Sabareesh G R
   Associate Professor at BITS-Pilani
   sabareesh@hyderabad.bits-pilani.ac.in;
   (+91)-8185919590

4. Prof. B Sadashivegowda
   Principal, Vidyavardhaka College of Engineering, Mysuru
   principal@vvce.ac.in
   (+91)-99456-50016; (+91)-821-4276-225