Sreearravind M

PhD | Assistant Professor | Materials Scientist & Computational Researcher

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PROFESSIONAL SUMMARY

PhD-qualified Mechanical Engineer and Assistant Professor specialising in fatigue behaviour, microstructural characterisation, and advanced processing of aluminium alloys. Experienced in experimental research (LCF, tensile, wear, XRD, SEM), computational workflows (Python-based data pipelines, SQL schema design, ML integration), and academic instruction. Currently developing the Manufacturing Data Intelligence Platform (MDIP), a domain-specific SaaS system for MSME manufacturing quality and fatigue data management, combining relational database architecture with AI/ML-assisted analysis. Research outputs span peer-reviewed journals, book chapters, conference papers, and an active Indian patent.

RESEARCH EXPERTISE

- Low Cycle Fatigue (LCF) behaviour of aluminium alloys (6063 series)
- Severe plastic deformation via Equal Channel Angular Processing (ECAP)
- Deep Cryogenic Treatment (DCT) and heat treatment effects on microstructure
- Microstructural characterisation: grain refinement, intermetallic particle analysis, fractography
- Aluminium matrix composites (graphene oxide reinforcement via powder metallurgy)
- Dissimilar material welding: MIAB welding, plasma arc welding, fatigue characterisation of welds
- Mechanical property evaluation: tensile, hardness (Vickers), wear (tribology), fatigue life
- Fatigue failure mechanism analysis and S-N curve construction
- Material qualification frameworks for industrial fatigue design

COMPUTATIONAL & TECHNICAL SKILLS

Languages & Scripting	Python (data pipelines, automation, scripting) · SQL (schema design, relational queries)
Data & ML	Pandas, NumPy (data wrangling) · Scikit-learn (ML model integration) · RAG pipeline concepts (AI-assisted materials retrieval) · Streamlit (interactive dashboard / UI development)
Version Control & DevOps	Git / GitHub (version control, repository management)
CAD & Simulation	ANSYS (FEA, structural simulation) · Deform3D (metal forming simulation) · AutoCAD, CREO, SolidWorks
Characterisation Software	XRD data analysis · SEM/FE-SEM imaging and interpretation · Optical microscopy image analysis

Experimental Equipment

Servo-hydraulic Fatigue Testing Machine (LCF, strain-controlled) · Universal Tensile Testing Machine · Vickers Microhardness Tester · Pin-on-Disc Wear / Tribology Testing Machine · Optical Metallurgical Microscope · Scanning Electron Microscope (SEM) / Field Emission SEM (FE-SEM) · X-Ray Diffractometer (XRD)

STARTUP & INNOVATION

Manufacturing Data Intelligence Platform (MDIP) (MDIP) — Founder & Principal Architect 2023 – Present

J.J. College of Engineering and Technology, Tiruchirappalli · Applied for institutional incubation and startup funding

Predecessor: Fatigue Data Intelligence Platform (FDIP) — vertical fatigue database platform; presented to industry-academia review panel.

MDIP is a domain-specific SaaS platform designed to digitise, structure, and analyse manufacturing quality and fatigue data for Tamil Nadu's MSME sector. Built on a freemium model with a 5-layer system architecture, multi-tenant PostgreSQL schema, ML/RAG pipeline for fatigue life prediction, and a Streamlit-based dashboard for MSME-accessible reporting.

- Designed 5-layer system architecture: data ingestion → relational DB → ML/RAG engine → API layer → dashboard UI
- Multi-tenant PostgreSQL schema supporting tensile, fatigue, hardness, surface roughness, and microstructure data
- Tiered business model: freemium MSME entry → premium analytics → OEM supply chain integration
- Predecessor FDIP presented to industry-academia panel (TCS-SASTRA); received strategic feedback on market segmentation and competitive differentiation
- Addresses WEF 2025-identified MSME digital maturity gap in quality data infrastructure

ACADEMIC & RESEARCH EXPERIENCE

Assistant Professor 2025 – Present

Department of Mechanical Engineering, J.J. College of Engineering and Technology, Tiruchirappalli, India

- Teaching undergraduate courses in mechanical engineering, manufacturing, and materials science
- Supervising student projects in computational materials and data-driven manufacturing
- Developing MDIP startup platform with institutional support

Research Scholar (Doctoral Researcher) 2018 – 2025

School of Mechanical Engineering, SASTRA Deemed University, Thanjavur, India

- Doctoral research on LCF behaviour of Al 6063 alloy under HT, DCT, and ECAP processing routes
- Conducted mechanical testing (fatigue, tensile, Vickers hardness, wear) and microstructural analysis (XRD, SEM, FE-SEM, optical microscopy)
- Fractographic analysis to characterise fatigue failure modes under varying strain amplitudes and cyclic frequencies
- Co-supervised undergraduate and postgraduate project students in metallurgical testing and data interpretation

Teaching Assistant / Lab Instructor 2018 – 2024

School of Mechanical Engineering, SASTRA Deemed University, Thanjavur, India

Courses: Basic Mechanical Engineering · CAD/CAM Laboratory · Metallurgy Laboratory · Dynamics Laboratory · Manufacturing Practices Laboratory

ACADEMIC QUALIFICATIONS

Ph.D. in Mechanical Engineering June 2018 – February 2025

SASTRA Deemed University, Thanjavur, India

Thesis: Enhancing Low Cycle Fatigue Properties of Aluminium 6063 Alloy via Heat Treatment, Deep Cryogenic Treatment, and Equal Channel Angular Processing

M.Tech in Advanced Manufacturing June 2016 – May 2018

SASTRA Deemed University, Thanjavur, India

Thesis: Fabrication and Property Evaluation of Graphene Oxide-Reinforced Aluminium Matrix Composites via Powder Metallurgy

B.E. in Automobile Engineering August 2012 – May 2016

Government College of Engineering (formerly IRTT), Erode, India

Thesis: Fuel Efficiency Enhancement in Multi-Cylinder Diesel Engines via Cylinder Deactivation Technology

PUBLICATIONS & RESEARCH CONTRIBUTIONS

Journal Articles (11)

[J1] Sreearravind M, Ravisankar B, Ramesh Kumar S. (2024). Low Cycle Fatigue Behaviour of Aluminium 6063 Alloy Processed by Equal Channel Angular Pressing (ECAP) at 90° and 120° Channel Angles. Materials Today Communications, 42, 111401. DOI

[J2] Sreearravind M & Subramanian R K. (2023). Experimental investigation on the low cycle fatigue performance and fractographic analysis of deep cryogenic treated 6063 aluminium alloy. Structures, 58, 105588. DOI

[J3] Kumar S R & Sreearravind M. (2022). Influence of Si Content on Fatigue Life for Heat Treated Cast Al-Si-Mg Alloy Using Different Quenching Technique. Silicon, 14(3), 977–987. DOI

[J4] Ramesh Kumar S & Sreearravind M. (2022). Assessment of Magnetically Impelled Arc Butt Welded Dissimilar Boiler Graded Steel Tubes: SAE213 T11 and SAE213 T91. Journal of Materials Engineering and Performance, 31(3), 1846–1856. DOI

[J5] Ramesh Kumar S, Sreearravind M, et al. (2020). Low Cycle Fatigue behavior of heat treated EN-47 Spring Steel. Materials Today: Proceedings, 22, 2191–2198. DOI

[J6] Sreearravind M, Ramesh Kumar S, RaviShankar B & Senthil Kumar S. (2020). Low cycle fatigue behavior of aluminium 6063 alloy under the cyclic frequency of 0.2 Hz. Materials Today: Proceedings, 27, 2376–2380. DOI

[J7] Kumar S R, Kumaran S S, Ramesh G, Sreearravind M & Venkateswarlu D. (2019). Effect of Soaking Time on Evolution of Microstructure and Hardness during Annealing of EN-47 Spring Steel. Materials Science Forum, 969, 427–432. DOI

[J8] Kumaran S S, Sreearravind M, et al. (2019). Experimental Analysis of SA213 Tube to SA387 Tube Plate Welding by Using Close Fit Technique. Materials Science Forum, 969, 570–575. DOI

[J9] Sreearravind M, Kumar S R, Kumaran S S & Venkateswarlu D. (2019). Effect of Mechanical Properties and Corrosion Behaviour of Martensitic Stainless Steel 410 1.6mm Butt Welded by Plasma Arc Welding. Materials Science Forum, 969, 601–606. DOI

[J10] Kumar S R, Kumaran S S, Sreearravind M & Venkateswarlu D. (2019). Effect of Microstructure and Mechanical Properties of Austenitic Stainless Steel 1.6mm Butt Welded by Plasma Arc Welding. Materials Science Forum, 969, 619–624. DOI

[J11] Kumar S R, Kumaran S S, Ramesh G, Sreearravind M & Venkateswarlu D. (2019). X-Ray Diffraction and Microstructure Analysis of EN47 Spring Steel at Various Soaking Period of Time. Materials Science Forum, 969, 104–109. DOI

Book Chapters (3)

[B1] Ramesh Kumar S, Ramesh G, Sreearravind M & Senthil T. (2024). Reutilization of Waste Polymeric Materials for 3D Printing Applications. In: From Waste to Wealth. Springer, Singapore. DOI

[B2] Sreearravind M, Kumar S R & Ahilan C. (2022). Fatigue Characterization and Fractographic Analysis of Aluminium 6063 Alloy. In: Handbook of Research on Advancements in the Processing, Characterization, and Application of Lightweight Materials (pp. 176–194). IGI Global.

[B3] Kumar Subramanian R, Kumar Srirangan A & Sreearravind M. (2020). Severely Plastic Deformed Magnesium Based Alloys. In: Magnesium - The Wonder Element for Engineering/Biomedical Applications. IntechOpen. DOI

Conference Papers (1)

[C1] Sreearravind M, Peddavarapu S & Raghuraman S. (2018). Microstructural investigation of aluminum-graphene nano platelets composites prepared by powder metallurgy. AIP Conference Proceedings, 1952(1), 020103. DOI

PATENT

An Apparatus for Artefact Knitting

Application No. 202341047769 · Intellectual Property India · Filed: 15 July 2023

Inventors: Ramesh Kumar S, Santhosh Kumar S & Sreearravind M

A plate welding fixture assembly with integrated magnets for improved alignment and stability in Magnetically Impelled Arc Butt (MIAB) welding applications.

CONFERENCE PRESENTATIONS

- Low Cycle Fatigue Behaviour of Al 6063 alloy at 0.2 Hz — ICMMM 2019, NIT Trichy (June 2019)
- Low Cycle Fatigue Behaviour of Heat Treated EN-47 Spring Steel — ICMMM 2019, VIT Vellore (July 2019)

- Fatigue Life Analysis for HT Al 6063 at Different Quench Media — IMME 2019, NIT Trichy (Nov 2019)
- Fatigue Fracture in Reinforcing Bar at Constant Strain Amplitude of 0.8% — ICEET 2020, PITS Thanjavur (March 2020)

PROFESSIONAL PROFILES

Google Scholar	https://scholar.google.com/citations?user=bBqX3swAAAAJ&hl;=en
GitHub	https://github.com/sreearravind
LinkedIn	https://www.linkedin.com/in/sreearravind-m-ph-d-7079b472/
ORCID	https://orcid.org/0000-0002-5981-4821
Personal Website	https://sreearravind.github.io/sreearravind-site/