Aravind Jayasankar, Ph.D.

Materials scientist | Mechanical engineer | Computational modeller | 3D printing | Product development
Status: Canadian PR | **Email**: jaravindkumar88@gmail.com | **Phone:** +14383765760 | LinkedIn

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With a strong academic and research background in mechanical engineering and material science, I possess the expertise to deliver projects in developing digital solutions in the field of medical technology, additive manufacturing and structural mechanics. Demonstrated innovation with filed patents and publications. Worked and experienced the cultural synergies across Asia, Asia-Pacific, SE-Asia, Europe and North-America. Collaborated with industrial partners in commercialising academic research technologies.

Skill Sets

Technical skills: 3D printing, Printer optimization, ABAQUS, HYPERMESH, SIMSCALE, Python, Rhino-Grasshopper, Solidworks, 3D printers/slicers, MATLAB, Mathematica, MeshLab, Nano-indentation, Instron, Dynamic mechanical analyzers, ImageJ, Raspberry Pi, .
Soft skills: Productization, Predictive analysis, Production upscaling, Project/Product ideation and management, Technical writing, Cross-functional collaboration, Team management.

Achievements

♦ Filed a patent within a year: Led the simulation and design team, in developing channel embedded deformable plastic. Roles: Product ideation, PLM, proof of concept and prototype
♦ Recognized by Hewlett Packard for delivering the best project conceptualization and PLM at HP's prestigious conference held in Singapore
♦ Received grant to establish cross-functional collaboration between Max Planck Institute (Germany), Harvard University (USA) and AMOLF (The Netherlands) in the domain of 3D printing, soft-robotics and bioinspired composites.
♦ Successfully secured three department scholarships from University of Auckland
♦ Awarded Ph.D. with distinction, ranking in the top 10% of the graduating class of Max Planck Institute

Work experience

Consultant **Philomec** **Aug 2023 - Present**
♦ Develop digital software solutions for orthopaedic surgeons, assisting in surgery planning and predicting postoperative behaviour of surgical implants.
♦ Develop digital twin models and FEA simulations in accordance with ASME VV-40 quality framework.
♦ Create, validate and verify the postoperative performance of the implants and the postoperative gait of the patients.

Research fellow **McGill University, Canada** **Feb 2022 - Aug 2023**
Full-time contract with 40 hrs/week
♦ Developed digital twin, multiscale, finite element and 3D print models of biocomposite, achieving a 30% increase in prediction accuracy for material-structural FEA mechanics (ABAQUS).
♦ Spearheaded a research initiative investigating the impact of composite microstructure on bending mechanics and gas exchange.
♦ Led cross-functional teams comprising mechanical engineers, biologists, and material scientists, enabling seamless transfer of critical technical information and fostering a collaborative and efficient work environment.

Research fellow **Singapore University of Technology and Design** **Oct 2020 - Dec 2021**

Full-time contract with 40 hrs/week

♦ Incorporated DFM for CAE/CAD models for 3D printing process using eco-sustainable composite (Cellulose fibers), increasing production efficiency by 85% - Application: Architecture and aerospace.

♦ Experimentally characterised and successfully predicted the thermal shrinkage and material behaviour using FEA modelling and machine learning - increased prediction accuracy to 90%

♦ Implemented an end-to-end feedback system for 3D printing by integrating an automated IR 3D scanner with a Mitsubishi robotic printer

♦ Incorporated FEA-ML predictive algorithms for optimized process optimization Increased the prediction time of thermal shrinkage and accuracy

Research fellow **HP-NTU Digital Manufacturing Lab, Singapore** **Sep 2019 - Oct 2021**

Full-time contract with 40 hrs/week

♦ Led the product & technology development of self assembling mechanism for 3D printed fracture cast (thermoplastic); patent published in 2022 (WO2022177571A1)

♦ Headed design and FEA thermal/structural simulation team to model/fabricate 3D printed plastic composites (embedded with fluidic heat channels) for medical devices ♦ Developed a plan for product design by incorporating the principles of Design for Manufacturing (DFM)

♦ Acted as an industry liaison, conducted learning and development workshops in predictive mechanics and parametric modelling algorithms

Ph.D. Researcher **Max Planck Institute, Germany** **Oct 2015 - Apr 2019**

Full-time contract with 40 hrs/week

♦ Developed and designed an engineering composite material inspired from bio-inspired tessellated structures; with high stiffness-to-flexibility ratio which has application in knee implant

♦ Created parametric CAD models using Rhino-Grasshopper and performed FEA simulations; Successfully designed and developed 3D printed prototypes

♦ Successfully conducted nano-scale structural characterization using highly coveted synchrotron facility at DESY-Hamburg

Visiting Researcher **Harvard University, USA** **Jul - Oct 2015**

Full-time contract with 40 hrs/week

Project: Finite Element Modeling of 2D and 3D Tessellations.

Developed high-throughput, semi-automatic parametric CAD algorithms - FEA Models for mechanical analysis; Ph.D. collaboration

Research assistant **University of Auckland, New Zealand** **Jan 2014 - Mar 2015**

Full-time contract with 40 hrs/week

♦ Successfully Ideated, designed (Solidworks) and fabricated fixators for orthopaedic knee implants; bone growth and performance evaluated by computational structural mechanics (ABAQUS-FEA)

♦ Developed MATLAB modules and worked as a teaching assistant for Bachelor's students

Education

Ph.D. - Materials Science - Max Planck Institute - Germany. **2016 - 2019**

Thesis topic: Structural Analysis and FEA modelling of interlocking tessellations and tilings.

Master's in Engineering Science - University of Auckland, N.Zealand. **2014 - 2015**

Thesis topic: Design, fabrication and FEA validation of prosthetic knee implants.

Bachelor's - Electronics Engineering - Anna University, India. **2005 - 2009**

Thesis topic: Robotic prosthetic limb