NAKUL D GHATE

[] **Mechanical Engineering student and Research Associate**

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PROFESSIONAL EXPERIENCE

World conference of micro and nano manufacturing

Hotel Remisens

Sept 2018 — Portoroz, Slovenia

- Ongoinged my research paper on **'Simulation of LSM for Biomedical Applications'** at the annual meeting on Micro and nanomanufacturing
- Emphasized on the importance of numerical modelling in governing the surface characteristics and biocompatibility of Titanium alloy
- Established connection with Experts working in similar fields of manufacturing and built my own network of researchers

Solidification of falling droplet in viscous medium

Ecole Polytechnique Montreal

May 2018–Jul 2018 — Montreal, Quebec, Canada

- Developed a numerical model to predict the solidification of falling droplet in a viscous medium on a flat plate at cryogenic temperature
- Applied Lattice Boltzmann approach in MATLAB to determine the temporal variation of scalar temperature and velocity fields

RESEARCH PROJECTS

Additive Manufacturing

IIT Bombay

May 2017–July 2017 — IIT Bombay, Mumbai, India

- Designed a bench-top 4-axis CNC system for Direct metal deposition
- Simulated and developing a suitable laser system with collimation optics
- Currently developing a novel method for fabrication of functionally graded porous structures using Voronoi cell metnhod

Laser Surface Modification (LSM)

IIT Bombay

Aug 2017–Dec 2017 — IIT Bombay, Mumbai, India

- Performed numerical and experimental investigation of LSM on TI-64
- Simulated the surface topological response of the alloy subjected to the change in process variables ; spot size, scan speed and beam overlap
- Numerically solved the complete meltpool dynamics and captured the underlying physics of the process by developing CFD program in MATLAB

Laser welding of dissimilar metals

N2 Bay, IIT Bombay

Dec 2018–Ongoing — IIT Bombay, Mumbai, India

- Researching on efficient joining of thin sheets of copper with Duplex stainless steel (DSS) and study the role of various process variables
- Developed a dedicated fixture for laser welding to apply and examine the effects of interfacial force at the junction of copper and DSS

EDUCATION

M.Tech, Computer Integrated Manufacturing

IIT Bombay

India, May 2020

B.Tech, Mechanical Engineering

IIT Bombay

India, 2019

PUBLICATIONS

Journal Articles

- Aarush Sood, Nakul Ghate et Amber Shrivastava (2019). "Joint formation mechanism in friction stir welding". In : *(unpublished)*.
- Ghate, Nakul et Amber Shrivastava (2019). "Numerical investigation of surface topology evolution during laser surface modification of Ti-6Al-4V". In : *(unpublished)*.
- – (2018). "Numerical and experimental investigation of laser surface modification on Ti-6Al-4V for Biomedical applications". In : *WCMNM*.

CONFERENCES

- World Congress on micro and nano manufactuing (WCMNM) (2018)

PROFESSIONAL SKILLS

Computation : CFD | FEM | LP & ML | Lattice method | Automation control

Software Proficiency : MATLAB | SRIM | ImageJ | Abaqus | LabVIEW | ANSYS | Solidworks | SIMULNK | Adams

Programming : C/C++ | Python | HTML | CSS | PHP | FORTRAN | Wireshark

Soft skills : Machine operation | Patience | collaborative | leadership | networking | Problem solving | flexible | optimistic

Anodization of Ti-64

N2 Bay, IIT Bombay

Dec 2018–Ongoing IIT Bombay, Mumbai, India

- Researching on creation of long nanotubular arrays on titanium alloy to increase porosity and reduce stiffness of dental and ortho implants
- Studying the effects of nature of chemical reagents, electrical parameters and role played by ambient conditions during anodization

ACADEMIC PROJECTS

Numerical simulation of Direct Laser metal deposition

Course Guide : Prof. Ramesh Singh *Jan 2019-Ongoing*

- Developing methodology of powder deposition during cladding and LBAM
- Simulating powder deposition, temperature field and residual stresses using finite element analysis

Novel technologies in Additive Manufacturing

Course Guide : Prof. Ram Kumar Singh *Sept-Nov 2018*

- Designed a diode laser setup equipped with collimation optics, fiber delivery and air cooling system
- Developed the overall system under USD 5000, reduced setup cost to one third of commercial lasers

Finite element analysis of FIB

Course Guide : Prof. Rakesh Mote *Sept-Nov 2018*

- Developed a FEM code to compute displacement fields of a cantilevered end Molybdenum micro-wire bombarded by Gallium ions during FIB

Two dimensional casting simulation of pure Al alloy

Course Guide : Prof. Shyamprasad Karagadde *Sept-Nov 2018*

- Developed a CFD code to simulate bi-directional solidification and fluid flow during aluminum casting

Path control of Automated Underwater vehicle (AUV)

Course Guide : Prof. Shashikant Sukumar *Jan 2018–Mar 2018*

- Devised Adaptive controller to overcome discrepancies in Non-linear dynamic model
- Implemented the algorithm on AUV over 6 DOF achieving asymptotic convergence of tracking error

Tool wear Analysis in micro EDM

Course Guide : Prof. Ramesh Singh *Jan 2018–Mar 2018*

- Performed experimental and numerical investigation on tool wear analysis of Mo tool during milling

Multiclient chatroom

Course Guide : Prof. Bernard Menezes *Feb 2018–Mar 2018*

- A non graphical chat interface allowing multiple clients to share data

Automatic Taping device

Industry project : TE Connectivity *Sept 2017–Dec 2017*

- Designing an automated taping device for the wire setup used in cars
- Modelled wire response against taping force and RPM of rotating device

Hospital Management system

Course Guide : Prof. Ganesh Ramakrishnan *Feb 2017–Mar 2017*

- An I/O stream based system to improvise security and administration

Matrix manipulator in C++

Self project *Dec 2015–Jan 2016*

- Developed a multi-dimensional matrix based linear equation solver system

Polynomial reciprocator in C++

Course Guide : Prof. Varsha Apte *Sept 2015–Nov 2015*

- Programmed a computational engine based on object oriented programming

LIFE PHILOSOPHY

"Give the ones you love wings to fly, roots to come back and reasons to stay"

MOST PROUD OF

Hardwork I put
to make things seem achievable which were otherwise not

Ability to make life long friends
who made me walk through the most difficult times

Loyalty
I showed towards myself and my decisions despite the hard moments

CERTIFICATIONS

Undergraduate research award (2017)

Performing Arts Special mention (2016)

EXTRA-CURRICULARS

- Teaching Assistant at IIT Bombay in Mechanical Engineering and Mathematics
- Department Academic Mentor at IITB
- Consecutive gold medals in Cricket
- Former coordinater in Techfest | Asia's largest technical festival

REFEREES

Prof. Amber Shrivastava, P.H.D., Professor, Mechanical Engineering
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Prof. Jean-Yves Trepanier, P.H.D., Professor, Mechanical Engineering
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Dr. Ramesh Singh, Ph.D, Professor, Mechanical Engineering
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LANGUAGES

English
Hindi
Sanskrit