Sameer D. Meshram

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Research Interest

- Mechanics of thin film materials and applications
- Characterization of materials
- Metal/ceramic/polymer/carbon – nano/macro composites
- Advanced/sustainable manufacturing
- Artificial intelligence in manufacturing, material science, quality
- Engineering innovation in health

Education

University of Washington **Seattle, WA**
College of Engineering
M.S. in Mechanical Engineering (non-thesis), 3.85/4.00 2019
Advisor: Prof. Junlan Wang
Principal Project(s): Mechanics of additively manufactured metal lattice structures, Mechanics of metal-ceramic multilayer thin films.

University of Mumbai (Bombay) **Mumbai, MH**
Sardar Patel College of Engineering (autonomous)
B.Tech in Mechanical Engineering, 3.74/4.00 2016
Advisor: Prof. Nilesh R. Raykar
Principal Project: Design and fabrication of experimental set-up for study of vibrations in academia through computer vision.

Work Experience

Indian Institute of Technology – Delhi **New Delhi, DL**
Research and Development Engineer Feb. 2022 – present
Medical technology innovation in collaboration with Indian Council of Medical Research (ICMR).

Katerra Inc. **Seattle, WA**
Mechanical Design and Process Development Engineer Aug. 2019 – Jul. 2020
Katerra is a vertically integrated construction company with a mission of increasing 'manufacturing' efficiency in construction.

Mechanical design & process engineering subject matter expert at central operations R&D for cold formed steel (CFS) & engineered wood manufactured building platforms, assemblies, products. Development of high-volume manufacturing semi-automated lines. Teams: new product introduction (NPI), advanced manufacturing engineering (AME).

Sibel Health Inc. **Evanston, IL**

Product Design and Process Development Engineer Jun. 2019 – Oct. 2019, Aug. 2020

Advanced vital signs monitoring for company out of Prof. John Roger's research group at Northwestern University.

Development of wireless vital signs monitoring platform for neonates and adults. Design and manufacturing of Silicone PCB enclosures, design of injection molded parts, development of lifecycle test set-ups (bending, stretching, twisting), benchmarking of material alternatives, technical documentation, FDA design compliance, et cetera.

University of Washington **Seattle, WA**

Graduate Research Assistant Oct. 2017 – Jun. 2019

Laboratory for Nanomechanics of Complex Material Systems: Study of metal-ceramic multi-layer nano-composites using physical vapor deposition – DC magnetron sputtering. Use of characterization techniques such as x-ray diffraction (XRD), nanoindentation, profilometry, microscopy, et cetera. Determination of fracture toughness of Silicon through nanoindentation.

Boeing Advanced Research Center (BARC): Development of Ti-6Al-4V lattice structures for energy absorption applications in aircraft.

University of Washington **Seattle, WA**

Teaching Assistant & Grader Jan. 2018 – Mar. 2019

Helped develop curriculum, homework, exams and held office hours for ME 355: Introduction to Manufacturing Processes which is a 4-credit hour class. This class involves both lecture and laboratory sessions covering a wide range of topics such as CNC machining, injection molding, powder metallurgy, forging, et cetera.

Tesla Inc. **Palo Alto, CA**

Materials Engineering Intern Jun. 2018 – Sep. 2018

Residual torque and ultrasonic clamp load measurement to characterize fastener joint relaxation. Highly accelerated life (vibration) testing (HALT) of bolted joints.

Supporting Tesla Model 3 production ramp and process improvement in general assembly for record Q2 2018 output.

Design/modification of fasteners (cold formed, injection molded) to reduce installation time & effort in accordance with DFMA principles. High volume part technical drawings (using ASME Y14.5, ISO 4759, etc.)

Design of experiments (DOE) for reliability testing and validation of internal thread repair inserts.

Volkswagen Pvt. Ltd. **Pune, MH**
Graduate Intern, Motorsport Nov. 2016 – May 2017
Design, manufacturing, and integration of over 80 new design and cost critical components including wing assemblies, seat rails, seat brackets, battery brackets, tooling, jigs & fixtures, etc. in CATIA V5 for the Ameo Cup Car 2017.
Optimization of previously designed components and performing failure analysis case studies. Development of inventory keeping and part numbering system.

Larsen & Toubro **Mumbai, MH**
Undergraduate Intern (ad-hoc), Hydrocarbon/heavy engineering Dec. 2013 – Jan. 2014
Weld bead destructive (tensile, compressive, Izod, Charpy) and non-destructive (dye penetrant, ultrasonic, radiography) testing for offshore compliance in accordance with AWS and ASTM standards. Development of welding procedure specification (WPS) and process quality requirement (PQR) for critical applications like pressure vessels, high sea structures, etc.

Technical Skills

- **CAD**: Catia, Solidworks, PTC Creo
- **Analysis**: Ansys, Abaqus; scanning electron microscopy, x-ray diffraction, profilometry, hardness testing, non-destructive testing - ultrasonic, radiography, dye penetrant, universal testing machine (UTM), fatigue testing, experimental stress analysis, digital image correlation (DIC).
- **Programming**: C/C++, Python, JavaScript, MATLAB, Mathematica, HTML/CSS, LaTeX
- **Manufacturing**: Stick/Tig/Mig welding, CNC/manual lathe & milling, sheet metal fabrication (laser/water jet cutting), carbon fiber composite manufacturing, injection molding, compression molding, 3D polymer/metal printing, DC magnetron sputtering (PVD), cold forming (steel), high volume wood working, et cetera.

Awards and Honors

- Graduate studies fellowship, State of MH, India 2017-2019
- Cognizant best outgoing student award, SPCE, University of Mumbai 2016
- Best paper presentation award, SPCE, University of Mumbai 2016
- Scholarship for undergraduate education, State of MH, India 2012-2016
- Scholarship for higher education (top 1% in state), State of MH, India 2012
- St. Mary's Nayak science scholarship (rank #1) 2010

Journal Publications

1. **S. Meshram**, S. Valvi, and N. Raykar
A cost-effective microcontroller-based sensor for dual-axis solar tracking.
Renewable Energy and Power Quality, 14:650-656, 2016. doi.org/10.24084/repqj14.420

Conference Papers

2. **S. Meshram**, S. Valvi, and N. Raykar
A cost-effective microcontroller-based sensor for dual-axis solar tracking.
Proceedings of the 14th International Conference on Renewable Energy and Power Quality, Madrid, Spain, 2016.

1. **S. Meshram**, and N. Raykar
Vision based approach to experimental study of 1DOF vibrations in academia.
Proceedings of the International Conference on Advances in Engineering, Science, and Management, Agra, India, 2015.

Select STEM Projects

13. **Endurance Testing Set-ups for Medical Devices**
Advisor: Prof. Steve Xu, Ha Uk Chung; Northwestern University, Sibel Inc. 2020
Development of endurance testing set-ups for flexible printed circuit board medical devices. Development of acceptance criterion and quantitative quality control processes.

12. **Process Development for Deposition of Titanium Nitride Ceramic Coatings**
Advisor: Prof. Junlan Wang; University of Washington 2019
Extensive literature review on nature inspired metal-ceramic multilayer materials. Deposition of TiN by ultra-high vacuum DC magnetron sputtering (PVD) on glass. Characterization through optical microscopy, XRD, nanoindentation, et cetera.

11. **Fracture Toughness ($\mathbf{K_{IC}}$) Characterization of Silicon Wafers**
Advisor: Prof. Junlan Wang; University of Washington 2019
Development of experimental method to determine fracture toughness of brittle materials like Si(1,0,0) through nanoindentation.

10. **Design of Commercial Aircraft Empennage Repair Structure**
Advisor: Matthew Christie; The Boeing Company, University of Washington 2019
Design of a repair considering time, cost, manufacturability, structural, thermal, and ergonomic factors for a high velocity impact damage on airplane skin.

9. **Development of Additively Manufactured Lattice Structures**
Advisor: Prof. Ramulu Mamidala, Prof. Dwayne Arola, Mitchell Mellor, Prof. Junlan Wang; The Boeing Company, University of Washington 2018
Development of 3D printed Ti-6Al-4V metal lattices for energy absorption applications in aircraft crush cartridges.

8. **Design of Li-ion Battery Pack**
Advisor: Prof. Corie Cobb; University of Washington 2018
Power, energy, chemistry, and form factor considerations for design of a 2-wheeler Li-ion battery pack.

7. **Audio Separation Using Principal Component Analysis (PCA)**
Advisor: Prof. Ashley Emery; University of Washington 2018
Audio separation of mixed signal through implementation of variational mode decomposition and principal component analysis (PCA) in Matlab.

6. **Development of Experimental Set-up for Study of Vibrations in Academia**
Advisor: Prof. Nilesh Raykar; University of Mumbai 2016
Development of a cost-effective, vision based experimental set-up for vibration study of one, two and continuous degree of freedom systems (single, double pendulum, fixed-fixed type string). Comparison of experimental data with theoretical simulations. Funding: TEQIP, Ministry of Education, India.

5. **BAJA Society of Automotive Engineers (SAE)**
Advisor: Prof. Nilesh Raykar, Prof. Sudhakar Umale; SPCE Racing 2016
Yearlong group project consisting of design, fabrication and testing of an All-Terrain Vehicle (ATV). The competition tests the ATV for manufacturability, acceleration, fuel efficiency, maneuverability, gradability, endurance, marketability, etc.
Contribution: Design & fabrication of uprights, determination of steering geometry, selection of bearings, brake calipers, discs, rims, etc. Simulation of static and dynamic tests on chassis, knuckles, brake pedals, steering column, engine mounts, etc.

4. **A Cost-effective Microcontroller-based Sensor for Dual-axis Solar Tracking**
Advisor: Prof. Nilesh Raykar, Prof. Sharad Valvi; University of Mumbai 2016
Designed and fabricated a microcontroller based dual-axis sun tracking sensor with a closed loop control algorithm. It employed an organic photovoltaic (OPV) cell provided by Technical University of Denmark (DTU) as a primary sensor, two DC analog servo motors and an ATmega328P based microcontroller.

3. **Design of Electric Overhead Travelling (EOT) Crane**
Advisor: Prof. Nilesh Raykar; University of Mumbai 2016

Designed a 7-ton safe working load, 24-meter span (double girder) EOT crane based on IS 13834 (ISO 4301) and IS 3177 in scope of girders, trolley, rope drum, rope, wheels, snatch block, hook, and selection of gear-box(s). CAD models and assemblies built in CATIA/Solidworks of these parts were validated in ANSYS/Hypermesh.

2. **StethoCardiogram**
Advisors: Guy Satat, Prof. Ramesh Raskar; Massachusetts Inst. of Tech., IIT-B 2015
StethoCardiogram is a standalone-handheld device which measures and analyzes ECG (electrical) and acoustic heartbeat signals. The device detected heart murmurs that provide valuable information in the diagnosis of cardiac diseases. The design was compact, cost effective and portable for use targeted at developing and under-developed countries.
Contribution: Developing program for acquisition, processing, and storage of electrocardiogram signal. Designing of 3D printed case for initial prototypes and packaging of electrical, mechanical components.

1. **Formula Student SAE**
Advisor: Prof. Nilesh Raykar, Prof. Sudhakar Umale; University of Mumbai 2014, 2015
Designed & fabricate a formula student car to be evaluated based on design, cost, fuel-efficiency, speed, endurance, marketability & manufacturability in an intercollegiate national competition.
Contribution: Design and manufacturing of tubular space frame steel chassis (AISI1018/4130), determination of suspension geometry and aerodynamic flow analysis of vehicle nose, downforce panels.

Participations, Representations and Attendances (Technical)

- Poster presentation, Mechanical engineering visit day, UW Seattle 2019
- Poster presentation, Joint center for deployment & research in earth abundant materials (JCDREAMS), Washington State University, Everett 2018
- Project presentation, Boeing advanced research center (BARC) Future of Flight, Mukilteo 2018
- Team co-lead, Virtual BAJA & BAJA SAE main event, NATRiP, Pithampur 2016
- Researcher, ReDx MIT health technology workshop, IIT Bombay 2015
- Race engineer, Formula student, SPCE Racing, Chennai 2015
- Attended, 6th SciPy India conference, IIT Bombay 2014
- Attended, 1st SciLab India conference, IIT Bombay 2014
- Participated, Technical education quality improvement workshop, IIT Bombay 2014
- Attended, Viwanda, 2nd Conference on manuf. competence, VJTI Mumbai 2013

Service, Participations and Representations (Non-Technical)

- Finance senator, Graduate & Professional Student Senate (GPSS), UW Seattle 2019
- Senator, Associated Students of the U. of Washington (ASUW) 24th Senate 2017
- Pro-bono teacher's aide, Mumbai Mahalaxmi Public School 2016
- Calculus course typist, PEOI through United Nations Volunteers 2016
- Volunteer, Red Cross Blood Bank 2015
- Magazine secretary, Sardar Patel College of Engineering Student Council 2015
- Pro-bono disability services writer, St. Mary's School 2009

Trainings

4. **Air India Limited** **Mumbai, MH**
Trainee, Base maintenance division for B747 & B787 2015
3. **Reliance Infrastructure Limited** **Thane, MH**
Trainee, Power plant operations at Dahanu thermal power station 2015
2. **Larsen and Toubro** **Mumbai, MH**
Trainee, Hydrocarbon/heavy engineering (oil & natural gas special projects) 2014
1. **Siemens Limited** **Thane, MH**
Trainee, PLC, and SCADA systems 2014

Certifications

5. **Certified Quality Process Analyst (CQPA)** **Seattle, WA**
American Society for Quality (ASQ) 2019
4. **Green Revolution Global Certification** **Mumbai, MH**
International Center for Culture and Education (ICCE) 2016
3. **ANSYS Fluent** **Mumbai, MH**
Institute of Industrial Design 2015
2. **French A1.1** **Mumbai, MH**
L'Alliance Francaise de Bombay 2014
1**. CATIA V5** **Mumbai, MH**
CADD Center Training Services 2013

Select Graduate Coursework

ME516 Adv. Manuf. in Energy Tech.
ME535 Computational Tech. in ME
ME541 Fatigue in Materials
ME556/7 Exp. Stress Analysis I/II
ME561 Mechanics of Thin Films
ME564/5 Mech. Engr. Analysis I/II
ME599 Struct. Engr. in Aircraft (Audit)
MSE431 Failure Analysis

MSE471 Polymer Science & Engineering
MSE541 Defects in Materials
MSE582 Biomaterials in Tissue Engr.
AA540 Finite Element Analysis I
AA535 Adv. Composite Struct. Analysis (Audit)

Select Undergraduate Coursework

ME202 Strength of Materials
ME204 Material Science
ME205 Thermodynamics
ME206/255 Manufacturing Science I/II
ME207 Industrial Electronics
ME252/302 Theory of Machines I/II
ME253 Fluid Mechanics
ME254 Mech. Engineering Measurement
ME301 Heat and Mass Transfer
ME303 Mechatronics
ME304 Thermal Systems
ME305 Hydraulic Machinery
ME351 Refrigeration & Airconditioning
ME352/401 Machine Design I/II
ME353 Mechanical Vibrations
ME354 Internal Combustion Engine
ME402 Renewable Energy
ME403 Finite Element Analysis
ME408 Computational Fluid Dynamics
ME451 Design of Mechanical Systems
ME453 Industrial Finance & Enterprise Resource Planning
ME458 Automobile Engineering
MExxx Applied Mathematics I/II/III/IV

Other Learning

Completed 24 short courses in areas of acoustics, aerodynamics, astrophysics, biostatistics, big data, computer science, entrepreneurship, govt. policies & human history on platforms such as edX, Coursera, Stanford Online with an average score of 92.68%.

Professional Society Memberships

- Graduate and Professional Student Senate, UW Seattle 2017-2019
- Society of Automotive Engineers SAE India 2012-2016
- Indian Society of Heating, Refrigeration and Air Conditioning Engineers 2013-2014

Social/Professional Profiles

- LinkedIn www.linkedin.com/in/meshramsd/
- ResearchGate www.researchgate.net/profile/Sameer-Meshram-2/stats
- GrabCAD www.grabcad.com/sameer.meshram-1
- Google Scholar https://scholar.google.com/citations?user=plLaRSQAAAAJ&hl=en

Hobbies

Teaching, hiking, automotive technology, driving, playing drums, cooking

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