

## **Abdul Sayeed Khan | Curriculum Vitae**

1157 McIntyre St, Ann Arbor, MI 48105

(734) 272-1627 | [absk@umich.edu](mailto:absk@umich.edu) | [Google Scholar](#) | [LinkedIn](#)

### **Education/Professional/Research Appointments**

**Ph.D. in Naval Architecture and Marine Engineering (GPA 4.05/4.00)**

University of Michigan, Ann Arbor-MI, USA, January 2020 – Present

**Graduate Student Researcher (Temp)**

University of Michigan, Ann Arbor-MI, USA, August 2019 – December 2019

**M.S. in Aerospace Engineering (GPA 3.93/4.00)**

University of Michigan, Ann Arbor-MI, USA, August 2018 – July 2019

**Senior Project Associate**

Indian Institute of Technology Kanpur, India, February 2018 – July 2018

**Senior Engineer**

Honeywell Technology Solutions, Bengaluru, India, July 2015 – January 2018

**M.Tech. in Aerospace Structures (GPA 10/10, Cadence Gold Medal for the Best Thesis)**

IIT Kanpur, Kanpur, U.P., India, July 2013 – June 2015

**Indian Academy of Sciences Research Fellow**

Indian Institute of Technology Bombay, M.H., India, May 2013 – June 2013

**B.Tech. in Aerospace Engineering (GPA 9.47/10, Department Silver Medal)**

SRM University, Chennai, TN, India, August 2009 – May 2013

### **Journal Publications**

1. **Khan AS**, Liu F, Dong P. Joining of metal and non-polar polypropylene composite through a simple functional group seeding layer. J Manuf Process 2023;85:90–100.  
<https://doi.org/10.1016/J.JMAPRO.2022.11.022>.
2. Liu FC, Dong P, **Khan AS**, Sun K, Lu W, Taub A, et al. Amorphous interfacial microstructure and high bonding strength in Al-Fe bimetallic components enabled by a large-area solid-state additive manufacturing technique. J Mater Process Technol 2022;308:117721.  
<https://doi.org/10.1016/J.JMATPROTEC.2022.117721>.
3. Liu F, Dong P, **Khan AS**, Zhang Y, Cheng R. 3D printing of fine-grained aluminum alloys through extrusion-based additive manufacturing: Microstructure and property characterization. J Mater Sci Technol 2022. <https://doi.org/10.1016/J.JMST.2022.08.017>.
4. Directly Welding Plastic to Metal for Structural Applications: a state-of-the-art review – Part I Promising-Processes (**Primarily authored – Submitted to The Welding Journal - Accepted**).
5. Directly Welding Plastic to Metal for Structural Applications: A state-of-the-art review – Part II Joint Design and Property Characterization (**Primarily authored – Ready for Submission to The Welding Journal**)

6. Effect of automotive corrosion cycle on Al-Fe spot joints achieved using friction-based joining method (**Primarily authored** - Under preparation).
7. Solid-state 3D printing of aluminum alloy on stainless steel plate – (**Primary author** – Under preparation)
8. Friction-stir process modeling using particle image velocimetry – (**Co-author** – Under preparation)
9. Feasibility analysis of 3D printed titanium scaffold for dental implants using digital image correlation – (**Co-author** – Under preparation)
10. Preliminary process modeling using finite element method to achieve optimized metal-PP composite hybrid joint for structural lightweighting application (**Primary author** – Under preparation).
11. Friction extrusion additive manufacturing of 1018 steel and stainless steel using novel SoftTouch AM™ solid-state method (**Primary Author** – Under preparation)

## Conferences

1. European Solid Mechanics Conference, Spain – July 2015
  - Experimental Investigation and Mathematical Modeling of Material Behavior of Rubber Materials.
2. 3<sup>rd</sup> Aerospace Structures and Design Conference, Organized by Royal Aeronautical Society (RAeS), UK, held at TU Delft, the Netherlands, Oct 2012
  - Onboard Damage Control Technique.

## Patents

1. **Abdul Sayeed Khan**, Pingsha Dong, Lei Zuo, 2023. "SoftTouch solid-state additive manufacturing process and system", United States Provisional Patent, U. S. patent application no. 63/470,196.
2. **Abdul Sayeed Khan**, Pingsha Dong, Fengchao Liu, 2022. "Methods to directly join metals to polymer/polymer composites using functionally active insert layer", United States Patent, U.S. patent application no. 18/223,829.
3. Tim Haynie, John Bosker, Dave Hofferbert, Arnold Wright, **Abdul Sayeed Khan**, Max Hossfeld, 2023, "Tooling and Process for Friction Extrusion Additive Manufacturing", United States Provisional Patent, U. S. patent application no. 63/519,285.

## Awards and Recognitions

2017 – Silver Award (Growth and Customer focus)	Honeywell Technology Solutions, India
2016 – Prolific Kaizen Award	Honeywell Technology Solutions, India
2015 – Bravo Star (Right and Fast Designing)	Honeywell Technology Solutions, India
2015 – Cadence Gold Medal for M.Tech. Thesis	IIT Kanpur, Kanpur, U.P., India
2015, 2014 – Graduate Student Excellence Awards	IIT Kanpur, Kanpur, U.P., India
2013 – UG Department Silver Medal	SRM University, Chennai, T.N., India
2010 - 2013 – UG Student Excellence Awards	SRM University, Chennai, T.N., India
2011 – NASA Green Aviation 3 <sup>rd</sup> Prize	NASA Langley Research Centre, VA, USA
2009 – Silver Medal for Minority Student Excellence	AFMI, Agra, U.P., India

## Industry/Academia Collaborations

- Lightweight Innovation for Tomorrow (LIFT) solid-state additive manufacturing of aluminum alloys (Bond Technologies, Inc).

- Cooper Standards (Michigan), dissimilar material direct joining for leak-proof weathering strips.
- (Ongoing) Electric Power Research Institute (EPRI) solid-state additive cladding.
- (Ongoing) Purdue [improving electrical conductivity via solid state multi-material development].
- (Ongoing) UMICH [particle image velocimetry for friction-stir process modeling].

## Editorial Activities

- Peer Review Responsibilities (since October 2022)
  - Journal of Materials Processing Technology (2 reviews completed)
  - Journal of Manufacturing Processes (9 reviews completed)
  - 2023 IEEE Electric Ship Technologies Symposium (3 reviews completed)

## Research/Work Experience

Jan'2020 – Present, **Doctoral Researcher**, Univ of Michigan, Ann Arbor, MI

- Developed multi-material joining technology to formulate intimate bonding between polypropylene composite and metals.
- Analysed hybrid joints to elucidate joint interface formation mechanism at the nano-scale.
- Designed and developed solid-state additive manufacturing technology capable of 3D printing metals without fusion-based mechanisms.
- Analysed the effects of process parameters on grain refinement and 3D printability for aluminum alloys and steels.
- Performed inter-layer and intra-layer adhesion characterization and studied microstructure evolution for 3D-printed layers for high-speed solid-state 3D printing.
- Developed aluminum-to-steel (Al-Fe) dissimilar metal joints without detrimental intermetallic compounds (IMCs)
- Characterized the joint interface and joint strength properties to elucidate the effect of corrosion cycling on Al-Fe joints.

Sept 2018 – Dec 2019, **Graduate Researcher**, Aerospace Engg, Univ of Michigan, Ann Arbor, MI

- Analysed static and cyclic behavior of single polymer strands and woven swatches for crash protection barrier applications.
- Studied mechanical behavior of soft materials using full-field Digital Image Correlation (DIC) method.
- Developed a framework to analyze restricted crack growth in soft materials using full-field DIC.

Feb 2018 – July 2018, **Sr Project Associate**, Aerospace Engg, IIT Kanpur, Kanpur, U.P. India

- Evaluated new methods for testing, characterization, and mathematical modeling of soft materials' non-linear behavior.
- Kicked off high-value strain measurement (> 5.0 %) methods with flexible strain gauges for non-linear behavior validation.

September 2016 – January 2018, **Sr Engineer**, Honeywell Technology Solutions, Bangalore, KA, India  
Senior Engineer [Turbo Technologies Science Team]

- Led high-temperature material test data characterization, component-level material validation, and Thermo-Mechanical Fatigue (TMF) analysis support for turbocharger applications.
- Spearheaded the development of material data analysis automation tool on MATLAB, 40+ modules, >50% cycle time reduction.

- Established experimental facility for TMF component strain measurement using Contactless Strain Measurement Camera (CSM Camera) for high-temperature applications. Enabled the capability for more precise Chaboche Material Model creation.
- Built the IT platform for data management, migration, and population into the GRANTA database for the Honeywell Transportation Systems business group.

July 2015 – September 2016, **Sr Engineer**, Honeywell Technology Solutions, Bangalore, KA, India  
Senior Engineer [Aero-product (engine parts) Development Team]

- Designed a solenoid valve for 777X-ISOV and performed life-cycle assessment until the final launch.
- Analysed the root cause and fault tree analysis for the 777X-PRSOV Solenoid valves.

July 2013 – May 2015, **Graduate Researcher**, Aerospace Engg, IIT Kanpur, Kanpur, U.P., India

- Investigated non-linear material behavior to extract visco-elastic properties at different strain rates.
- Studied local hysteresis and the effect of strain rates on the internal structure of rubber materials.
- Performed in-situ hierarchical experimental investigation of near crack-tip deformation evolution during crack-propagation in rubber materials.
- Developed preliminary constitutive material modeling based on the Lemaitre damage model to predict the non-linear behavior.

May 2013 – June 2013, **UG Summer Research Fellow**, Indian Academy of Sciences, India.

- Extracted material behavior by one pot in-situ prepared polymers for artificial muscles.
- Studied the effect of nano-ferritic particles on the magnetic actuation of the ferrogels.

Jan 2013 – May 2013, **UG Visiting Researcher**, IIT Bombay, India

- Analyzed small-scale un-manned vehicle (UAV) and micro-air vehicle (MAV) propeller designs and geometries using contactless optical measurements (single-spot tracers)
- Analyzed small-scale vehicles for 6 DOF performance validations and supported genetic algorithms (GA's) application for MAVs.
- Implemented multi-dimensional design optimization (MDO) methodologies to increase the MAV performance.

May 2012 – June 2012, **UG Summer Research Fellow**, CASDE, IIT Bombay, India.

- Analyzed multidisciplinary design optimization (MDO) concepts for aerospace engineering.
- Developed a framework to leverage the MDO concepts for design optimization and performance enhancement.

Aug 2010 – May 2011, **UG Design Lead, NASA Green Aviation Competition 2010-11**

- Designed a conceptual aircraft using the latest structural integration to reduce weight.
- Improved noise and fuel efficiencies by innovative combinations of airframe designs and materials.
- Reduced cost per seat by overall performance improvement for a 200-passenger capacity aircraft.

## **Mentoring/Teaching Responsibilities**

- University of Michigan Ann Arbor
  - Mentoring an M.S. student to develop a testbed for particle image velocimetry experimental analysis using friction stir processing to join PMMA sheets.
  - Mentored an M.S. student to learn and perform experimental trials using friction processing technology to join dissimilar metals and solid-state additive manufacturing.
  - Mentoring a UG student to learn and support innovative design and fabrication of a novel solid-state 3D printer.
- Honeywell Technology Solutions, Bangalore, T.N., India
  - Mentored two junior engineers to perform high-temperature material testing and high-temperature strain measurements using the contactless strain measurement technique (CSM camera or DIC)
  - Supervised a software developer to efficiently design the material testing platform architecture for high-temperature material data characterization used in turbo technologies.
  - Supervised 2 IT engineers to execute data migration from internal HTT servers (India) to global GRANTA (UK) servers under global company accessibility and safety protocols.
- Indian Institute of Technology, Kanpur, U.P., India
  - Mentored two master's degree students to learn experimental techniques for analyzing soft material mechanical and thermomechanical behavior.
  - Supported centralizing the experimental mechanic's lab equipment for improved accessibility and set up regulated maintenance procedures.
  - Teaching assistant in experimental mechanics lab, UG Aero Structures Lab, IIT Kanpur, India
    - i. Conducted classes to explain material deformation theory and fracture mechanisms in metallic, polymeric, and elastomeric materials.
    - ii. Prepared and calibrated experimental setups for structural mechanics experiments.
    - iii. Formulated lab report formats and graded lab reports.
- SRM University, Chennai, T.N., India
  - Research and development lead for the Aerospace Student Association to plan and execute student-led design projects, research collaborations, and national and international design competitions.
  - Mentored three international design competitions, including AIAA and NASA Green Aviation Competition, totalling more than 12 students to devise the design architecture and utilize structural integration for improved aircraft noise and fuel efficiency.
  - Mentored freshmen and sophomore students in fluid mechanics and aerodynamics labs for conducting student project flow analysis and low-speed aerodynamics analysis.
  - Tutored freshmen and sophomore students on the mechanics of materials and aerospace structures courses

## **Lab Techniques/Skills**

- Experimental material characterization techniques
  - EBSD for microstructural analysis (TESCAN MIRA, TESCAN RISE)
  - SEM for in-situ and ex-situ material analysis (JEOL IT500)
  - XPS for elemental and chemical state distribution analysis (Kratos Axis Ultra XPS)

- Micro-CT for defect and void characterization (Zeiss Versa 520 MicroCT)
- Digital Image Correlation using both in-house built and standard apparatuses
- XRD, TMA, DMA, UTMs, and Nano-indenter.
- Computational techniques
  - FEM and preliminary mathematical/material modeling
  - Abaqus and Ansys for stress and thermal analysis
  - LAMMPS for MD simulation
  - MATLAB

### **Professional Memberships**

1. Society of Manufacturing Engineering (SME)
2. Society of Naval Architecture and Marine Engineering (SNAME)
3. American Society of Mechanical Engineers (ASME)

### **Volunteer Activities**

- Student housing movements and helping them set up in the new area (U of M)
- Gardening setup (MCA Ann Arbor)
- Honeywell Turbo Technology annual day commodore (Green Turbo Technologies)
- Networking, database, and company portfolio management (Student job fair, IITK)
- Student dorm kitchen food inspector (IITK)

### **News Articles**

[Friction-based additive manufacturing.](#)

[Dissimilar material joining.](#)

[NASA Green Aviation Challenge, 2010-11.](#)