TUSHAR SAINI

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Phone: +1 (214) 518-9281
Employment sponsorship not required
GitHub: github.com/deviousfusion
LinkedIn: linkedin.com/in/tusharsaini
Location: San Jose, CA

SUMMARY

- Mechanical Engineer with hands-on experience in AM, **product design, prototyping, and validation** of complex electromechanical systems and structural components.
- Expert in **SOLIDWORKS** utilizing **GD&T and DFM** to develop modular hardware including sheet metal, polymers and composites
- Advanced proficiency in **ANSYS Mechanical** for mass optimization, structural and thermal analysis.
- Experience in developing custom optical setups and image segmentation and photogrammetry pipelines using **Python**, OpenCV and ML algorithms for feature detection & performance analysis.

EDUCATION

PhD., Mechanical Engineering, University of Texas at Arlington (Dec 2024) G.P.A.: 4.00
M.S., Mechanical Engineering, University of Texas at Arlington (Dec 2015) G.P.A.: 3.28
B.E., Aeronautical Engineering, Hindustan University, India (May 2013) G.P.A.: 3.67

SKILLS

- Hands on experience with design, prototyping and analysis software including **SOLIDWORKS**, SOLIDWORKS Simulation, **ANSYS Mechanical**, LabVIEW, AutoCAD and MATLAB.
- Experience in Printed Circuit Board (PCB) design and interfacing with **hardware sensors (accelerometers, strain gauges, load cells), NI-USB DAQ (LabVIEW)**, microprocessors, **actuators (linear and rotary)** and electronics (op-amps, resistors, capacitors, breadboards, LEDs) over UART, SPI and I2C.
- Strong foundation in **structures, FEA, topology optimization,** thermodynamics, control systems, and **DOE**.
- Experience in implementing algorithms using different software libraries including OpenCV and Robot Operating System (ROS), Machine Learning - K-means clustering and Convolutional Nearest Neighbor (CNN)
- Experience in working with programming and scripting languages: **Python**, JavaScript, C++, R, Unix Shell, XML and HTML.

WORK EXPERIENCE

***FabLab Special Projects Graduate Research Associate,* FabLab, UTA** **Jan 2016 – May 2024**

- **Developed and implemented custom hardware and software solutions** to enhance operational capacity, including inventory tracking, data collection, and access control for 3D printers and shop equipment
- **Engineered custom hardware and post-processors** to convert manual lathe and CNC mills for SOLIDWORKS CAM control
- **Managed a cross-functional team** of 6 engineers and software developers to guide hardware and software development for projects released as OctoPuppet and JuiceBox.

Additive Manufacturing Simulation Data Analyst Intern, ANSYS Inc, Park City, UT, USA **Aug 2019 – Dec 2019**

- **Identified the effects of different process parameters** on meltpool dimensions, microstructure and porosity of various metals and alloys (Ti6Al4V, AlSi10Mg, 316L, IN718, 17-4PH and CoCr)
- Developed **custom data processing, visualization and validation tools** for mapping the meltpool conduction zone based on experimental and simulation data to **identify manufacturing failure modes**
- Prepared and execute simulation runs with different laser power and velocity combinations based on SLM experimental runs

DOCTORAL RESEARCH EXPERIENCE

Layer-By-Layer In-Situ Detection and Analysis of Features and Defects in Additive Manufacturing (December 2024)

- Designed and implemented a **process agnostic in-situ layer analysis framework** and feature extraction using optical sensing.
- **Developed and evaluated various image segmentation**, edge detection, machine learning (using KNN and CNN) methods to analyze and classify in-layer manufactured features and defects
- Implement the developed framework and segmentation methods on custom built FDM platform to identify in-situ defects and features as small as 0.025 mm.

Additive Manufacturing Methodologies for Multi Process and Multi Material Scenarios (March 2021)

- Developed a custom multi-process platform integrating **thermoplastic and photopolymer delivery** using FDM, DIW and inkjet.
- Perform **Design of Experiments (DOE) analysis** to characterize multiple materials and process parameters to identify key parameter interactions, aiding in the **optimization of AM input parameters** such as material temperature, extrusion rate, layer cure time and UV intensity.
- **Applied DfAM principles to design** and 3D print bio-resorbable microfluidic constructs and precision assembly fixtures in SOLIDWORKS.

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PUBLICATIONS

- **T. Saini**, P. Shiakolas. **In Situ Active Contour-Based Segmentation and Dimensional Analysis of Part Features in Additive Manufacturing**. *J. Manuf. Mater. Process.* 2025, *9*, 102. DOI: 10.3390/jmmp9030102
- **T. Saini**, P. Shiakolas, and C. McMurrough. 2024. **Evaluation of Image Segmentation Methods for In Situ Quality Assessment in Additive Manufacturing** *Metrology*, 4: 598-618. DOI: 10.3390/metrology4040037
- **T. Saini** and P. S. Shiakolas, **A Framework for In-Situ Vision Based Detection of Part Features and its Single Layer Verification for Additive Manufacturing** in ASME International Mechanical Engineering Congress and Exposition, Volume 3: Advanced Manufacturing. Oct. 2023. DOI: 10.1115/IMECE2023-113763.
- **T. Saini**, P. Shiakolas, and K. Dhal, **In-Situ Fabrication of Electro-Mechanical Structures Using Multi-Material and Multi-Process Additive Manufacturing** in Contributed Papers from MS&T18, 2018. DOI: 10.7449/2018/MST_2018_49_55.
- P. Patel, **T. Saini**, T. Welch, P. Ravi, and P. Shiakolas, **Additive Manufacturing of Heterogeneous Bio-Resorbable Constructs for Soft Tissue Applications** in Contributed Papers from MS&T18, 2018. DOI: 10.7449/2018/MST_2018_1496_1503.
- **T. Saini**, **Additive Manufacturing Methodologies for Multi Process and Multi Material Scenarios,** The University of Texas at Arlington, 2015 http://hdl.handle.net/10106/27128
- P. Ravi, P. S. Shiakolas, T. Welch, **T. Saini**, K. Guleserian, and A. K. Batra, **On the Capabilities of a Multi-Modality 3D Bioprinter for Customized Biomedical Devices** in Volume 2A: Advanced Manufacturing, Houston, Texas, USA: American Society of Mechanical Engineers, Nov. 2015. DOI: 10.1115/IMECE2015-52204.