Vaibhav Sharma

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SUMMARY

- Versatile and dynamic engineering role in a 15-person 3D printer manufacturing company:
  - R&D Engineer: Leading electro-mechanical designs, conducting design validation, defining software solutions, and filing patents.
  - Mechanical Engineer: Scaling for NPI contract manufacturing, chairing review board, and training manufacturing staff.
  - Product Manager: Driving interdepartmental relationships between R&D, Engineering, Marketing and Sales to coordinate product releases for software and hardware releases.

EDUCATION

- **University at Buffalo, The State University of New York**
  Master of Science, Mechanical Engineering, February 2015 GPA : 3.79 / 4.00
  Focus: Optimization in Engineering Design, Design Theories and Machine Learning

- **Dehradun Institute of Technology, Dehradun, Uttarakhand, India**
  Bachelor of Technology, Mechanical Engineering, May 2013 First Division

EXPERIENCE

- **Mechanical Engineer,** January 2015 – Present
  Type A Machines, *San Leandro, CA, USA*
  Lead engineer in design, development and scaling for contract manufacturing of complex electro-mechanical 3D Printer comprising of fabricated metal components, stepper motor drives, multiple PCBs, off-the-shelf electronics, Linux OS and Arduino firmware.
  Products shipped:
  1. Series 1 3D Printer (product family): Series 1, Series 1 Pro.
  2. Print Pod
  3. FDA Grade G2 Extruder

  Accessories shipped:
  1. Series 1 3D Printer Printing Surface (product family): Regular, Heated Bed, BuildTak Flex Plate System.
  2. Series 1 3D Printer Hot End (product family): 0.4mm Stainless Steel, 0.6mm Stainless Steel, 0.4mm Tungsten Carbide Tip

  Software features developed:
  1. Absolute Internal Structures and Cubic Infill.
  2. Analytics for Slicing Engine
  3. Design Space Visualization
- **Research and Development Intern,** June 2014 – August 2014
  Type A Machines, *San Francisco, CA, USA*
  Developed optimization routines to conduct design space exploration and optimization of machining parameters.

HARDWARE PROJECTS

- **Design of FDA Grade G2 Extruder,** *Mechanical Engineer, Type A Machines*
  - Lead engineer in design and development of an FDA Grade 3D Printer Extruder.
  - Developed the project plan, specifications of the product, mechanical design, testing criteria and sourcing relationships.
  - Successfully finished the project 2 weeks before schedule and saved more than 40% of the allocated budget.
- **Series 1 3D Printer Validation and CAD Revision**, *Mechanical Engineer, Type A Machines*
  - Redesign of sheet metal components and machined metal components to maintain design concurrency.
  - Lead machined metal components validation project to develop acceptance criteria.
  - Identified and developed wiring revisions focusing on Design for Manufacturability (DFM) and Design for Assembly (DFA).
  - Designed jigs to validate the need for revisions on critical components.
- **Scaling for NPI contract manufacturing**, *Mechanical Engineer, Type A Machines*
  - Lead engineer in first product transition to contract manufacturing.
  - Engineering liaison for contract manufacturer's Product Lifecycle Team; overseeing knowledge transfer, BOM audit, ECO management, and validating suppliers. Active member of weekly Product Lifecycle Meeting to address technical contract manufacturing issues to maintain consistent production quality and process control.
  - Conducting first article inspection and supplier validation for second sourcing.
- **Optimization of 3D Printing Parameters**, *Research and Development Intern, Type A Machines*
  - Self-initiated project, Optimization of 3D Printing Parameters:
  - Identified key problem - The procedure used for finding 3D printing parameters was exclusively trial and error.
  - Used Design of Experiments to visualize design space and optimization routine (golden section search) to formulate repeatable and reliable procedure for converging to the optimal parameter value.
  - Proved efficacy of procedure by successfully finding ideal retraction settings for 3D printing PLA.

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SOFTWARE PROJECTS

- **Absolute internal structures and Cubic infill**, *Mechanical Engineer, Type A Machines*
  - Identified and presented inconsistencies in mathematical implementation for realizing internal structures of 3D Printed models.
  - Single-handedly developed the software implementation and user interaction paradigm for the new feature in Python and C++.
  - Drove feature release by coordinating packaging with Software team and supporting with Sales and Marketing team.
  - Published 1 whitepaper and 8 part blog series to market the feature.
- **Design Space Visualization**, *Mechanical Engineer, Type A Machines*
  - Identified and developed a software feature that conducts model based optimization in 3D printing to present the user with a decision-making response surface representing the effect of printing variables over time.
  - Greatly reduces the barrier of entry to understand the impact of 3D Printing parameters and enables optimization of print time and object weight. Enables the possibility of time-based or mass-based optimization in 3D Printing.
  - Developed software feature in Python using Numpy, Scipy and Matplotlib.

RESEARCH PROJECTS

- **Optimum design theory,** *University at Buffalo, Spring 2014*
  - Optimum design theory attempts to study the iterative nature of design process and suggests a new structure for conducting design.
  - The paper follows Pahl and Beitz's Systematic Design for engineering design. In order to make decisions it leverages from Pareto Optimality for continuous problems and HEIM for discrete problems. As a penultimate step, the design is subjected to applicability in product families and reconfigurable systems with a greater focus on product families. Throughout the process of design different roles played by Design Analytics is observed. Fundamentals from Axiomatic Design, Decision based Design, Pattern Recognition, Machine Learning, Cognitive Psychology and Economics were used to support the structure of Optimum Design Theory.
- **Shape optimization of a compliant torque wrench,** *University at Buffalo, Fall 2013*
  - Design of a 3D printable compliant torque wrench using CATIA for design, ANSYS for simulation and MATLAB for optimization with the goal of designing a user customizable tool using a self-generated optimization routine.
  - Successfully developed a customizable new product for rapid prototyping and additive manufacturing with fast turn-around time.
- **Development of a gesture based CAD Interface Using Leap Motion,** *University at Buffalo, Spring 2014*
  - Leap Motion based CAD interface was designed in MATLAB using machine learning to recognize gestures.
  - It allows the user to generate CSG primitives and advanced geometries and perform basic CAD operations. A user study was also conducted in order to determine the qualitative and quantitative efficacy of the system.

PATENTS

- **"Multi-parameter slicing for additive manufacturing"** 2015, U.S. Provisional Patent Appl. 62201999, August 06, 2015.
- **"Part removal by excitation of build surface"** 2015, U.S. Provisional Patent Appl. 62184430, June 25, 2015.
- **"Mass-based material sensing"** 2015, U.S. Provisional Patent Appl. 62175953, June 15, 2015.

SOFTWARE EXPERIENCE

- **Autodesk Inventor:** Product design, Harness design, Structural analysis. **Solidworks:** Product design, Kinematic simulation, Structural analysis. **CATIA V5**: Product design, Kinematic simulation, Structural analysis. **ANSYS:** Modelling, Structural analysis, Optimization.
- **Mathworks MATLAB:** Optimization, Machine Learning, Image Processing. **Python:** Numpy, Scipy.
- **Languages**: MATLAB, Python C, C++.