Vaibhav Sharma

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SUMMARY

- Experienced in holding versatile and dynamic engineering roles in consumer 3d printer manufacturing companies.
  - Mechanical Engineer: Developing mechanical designs, conducting design validation, defining software solutions, and filing patents.
  - Manufacturing Engineer: Redesigning for cost reduction, setting up NPI contract manufacturing, and training manufacturing staff.

EXPERIENCE

- **Manufacturing Engineer,** March 2017 – Present
  Formlabs, *Somerville, MA*
  Manufacturing engineer on two teams; one developing an industrial 3D printer automation solution, and second, debugging manufacturing problems in mass producing Form 2 3D printers. Designed and fabricated mechanical components through extensive design reviews, CAD, prototype testing and negotiating supplier quotes.
  Products developed:
  1. Form Cell
  2. Form 2 3D Printer
- **Mechanical Engineer,** January 2015 – March 2017
  Type A Machines, *San Leandro, CA*
  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 (patent pending)

  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*
  Developed optimization routines to conduct design space exploration and optimization of machining parameters.

HARDWARE PROJECTS

- **Design, prototype and cost reduction of Form Cell 3d prints transfer module,** *Manufacturing Engineer, Formlabs*
  - Designed parts for sheet metal, CNC machining and 3d printing in Solidworks CAD for rapid prototyping and mass manufacturing.
  - Increased the capacity of the transfer module by 60% and reduced the foot print by 10% by minimizing unutilized space.
  - Reduced the manufacturing cost by 40% by redesigning mechanical components (DFM) and shortlisting capable suppliers.
- **Design and prototype of 3D printer mounting,** *Manufacturing Engineer, Formlabs*
  - Designed, iterated and manufactured a novel 3-point 3D printer leveling solution that reduces operator interaction by 50%.
  - Prototyped solutions using 3D printers, CNC mills and laser cutters to test form fit and function of design before production.
- **Design of large aluminum extrusion frame for Form Cell,** *Manufacturing Engineer, Formlabs*
  - Redesigned a large aluminum extrusion frame using aluminum extrusions in Solidworks using parametric design and finite element analysis (FEA) to ensure a lighter weight and easy assembly (DFA).
  - Developed a parametric auto-generating bill of materials within Solidworks to reduce quoting errors.
- **Lead engineer in designing of FDA Grade G2 Extruder,** *Mechanical Engineer, Type A Machines*
  - 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 harness revisions focusing on Design for Manufacturability (DFM) and Design for Assembly (DFA).
  - Designed jigs and fixtures to rework machined components to accommodate supplier variability.
- **Lead engineer in transition and scaling for NPI contract manufacturing**, *Mechanical Engineer, Type A Machines*
  - Engineering lead 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.
- **Series 1 3D printer wiring harness revision and documentation**, *Mechanical Engineer, Type A Machines*
  - Identified and developed wiring revisions focusing on Design for Manufacturability (DFM) and Design for Assembly (DFA).
  - Consolidated and developed entire wiring assemblies in Autodesk Inventor and Rapid Harness.

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- **Self-initiated project, Optimization of 3D Printing Parameters**, *Research and Development Intern, Type A Machines*
  - 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.

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 FEA 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

- **Solidworks:** Product design, Kinematic simulation, Structural analysis. **Autodesk Inventor:** Product design, Harness design, 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++.

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