linkedin.com/in/ssharma1991
github.com/ssharma1991

Shashank Sharma

Stony Brook, New York

Email : shashank.sharma@stonybrook.edu
Mobile : +1-631-512-0029

Education

Stony Brook University — Stony Brook, NY
Ph.D., Mechanical (Concentration: Design and Robotics, Minor: Applied Mathematics), GPA 3.95 — *Aug. 2015 – Present*

- **Relevent Coursework :** Robotics, Advanced Dynamics, Vibration and Control, Kinematic Analysis and Synthesis, Applied Stress Analysis, Product Design Optimization, Geometric Modeling, Analysis of Algorithms

Experience

Stony Brook University — Stony Brook, NY
Research Assistant — *May 2017 – Present*

- Developing a Computational Framework for Data-Driven Mechanism Design Innovation supported by $450K NSF grant.
- Created MotionGen a web-based mechanism design framework. Uses MEAN (MongoDB, Express.js, Angular.js, Node.js) stack to create a RESTful web service based on MVC architecture. iOS and Android app created using Apache Cordova framework.
- Path synthesis of mechanisms based on Fourier descriptor fitting using Nelder-Mead and Simulated Annealing optimization.
- Mixed motion and path mechanism synthesis using optimal non-uniform DFT and Singular Value Decomposition.
- Real-time simulation of planar and spherical mechanisms with prismatic and revolute joints using Newton-Raphson optimization.
- Synthesized path tracing mechanisms with optimum transmission angle using wavelet features in a neural network.
- Developing Spatial mechanisms synthesis techniques using Homotopy methods for type and dimensional synthesis.

Teaching Assistant — *Aug 2016 – Apr 2017*

- Developed SnappyXO, a laser-cut design-driven robotics platform which enables designing mechanisms, structures, and robots.
- Advised 250+ undergraduates in MEC101-Freshman Design Innovation and MEC 102-Engineering Computing.

Vivonics, Inc. — Stony Brook, NY
Product Design Intern — *Feb 2016 — Aug 2016*

- Developed PMT Monitor, a portable medical headset which detects head trauma by measuring visually evoked potential.
- Generated concepts for a mechanism which adjusts the interpupillary distance between the lenses. Focus was on manufacturability and robustness.

Leviathan Energy — Stony Brook, NY
Design Engineer — *Feb 2016 – May 2016*

- Collaborating on propeller airfoil design under Strategic Partnership for Industrial Resurgence program by SUNY.
- In charge of part design using design software such as Solidworks and Autodesk Inventor and prototyping of designed parts by FDM based 3D printing techniques.

Indian Institute of Information Technology — Jabalpur, India
Junior Research Fellow — *May 2014 – May 2015*

- Led a $70k+ research project funded by the Science and Engineering Research Board titled "Development of Additive-Subtractive Integrated Rapid Prototyping System for Improved Part Quality".
- Designed and Fabricated a Pellet based Screw Extrusion process to enable the use of CNC machines as hybrid 3D printers.
- Developed Toolpath Planning strategies to manufacture CAD models using Hybrid Manufacturing techniques.

Relevant Projects

Lane Detection for Autonomous Vehicles — Udacity
Python, Jupyter, OpenCV github.com/ssharma1991/autonomous-car-basic-lane-detection — *May 2019 – Aug 2019*

- Created a robust image processing pipeline to detect a highway lane in an image, pre-recorded video, or live-feed from dashcam.
- Calculated the car's position within lane and lane's radius of curvature using perspective transform and polynomial fitting.

Traffic Sign Classification — Udacity
Python, Jupyter, OpenCV, TensorFlow github.com/ssharma1991/autonomous-car-traffic-sign-classification — *May 2019 – Aug 2019*

- Created a LeNet inspired convolution neural network using TensorFlow to classify the GTSRB traffic sign dataset.
- Implemented data augmentation and image enhancement using OpenCV to achieve 94.8% accuracy on test dataset.

Behavioral Cloning — Udacity
Python, Jupyter, Keras github.com/ssharma1991/autonomous-car-behavioral-cloning — *May 2019 – Aug 2019*

- Created an end-to-end convolution neural network using Keras that predicts steering angles from dash-cam images.
- Used this model to autonomously steer a car around a virtual test track after neural network tuning and data augmentation.

Sensor Fusion — Udacity
C++ github.com/ssharma1991/autonomous-car-sensor-fusion — *May 2019 – Aug 2019*

- Processed LIDAR and RADAR data to estimate the position of a moving car with extended Kalman filter.

Two Armed Robotic Manipulator — MEC529 Robotics
Matlab — *March 2016 – May 2016*

- Optimal motion planning in Dual Quaternion space to pick and place objects considering manipulator reachability.

Interactive Manipulation of NURBS Surfaces MEC572 Geomtric Modelling
C++, OpenGL, Qt5 *March 2016 – May 2016*

- OpenGL based implementation in C++ for interactive manipulation of Non Uniform Rational B-Spline Surfaces.

Fracture test analysis for compact tension specimen Feb 2017 – May 2017

- Finite element analysis of a fracture specimen to predict and validate deformations at the crack tip using Abacus.

Conceptual Design Aug 2015 – May 2016

- Conceptual design of an Ergonomic Nutcracker and Stone Crusher.
- Formulation of product design specification and criteria and generation of the best possible product concept.

Quality Improvement of Aircraft Wing Assembly Aug 2015 – Nov 2015

- Identifying and correcting the root cause for high rejection rate of final assembly using Pareto Charts, Cause and Effect Diagrams, Control Charts and Histograms.

Mold Design and Manufacturing May 2012 – Nov 2012

- Designed and manufactured molds for irrigation industry products for Injection Molding Process.
- Flow Analysis results were used to optimize design and a Pricing Strategy was developed for industry.

Technical Proficiency

- **Languages :** Proficient in Python, Javascript, C++, MATLAB, Mathematica
- **CAD softwares :** Solidworks, CATIA, PTC Pro/ENGINEER (CREO), Ansys (CFD and Mechanical), Autodesk Inventor, Autodesk AutoCAD, Autodesk Moldflow, FeatureCAM , MSC-Adams, ZWCAD, HyperMesh, OptiStruct, Materialize Magics, Materialize Mimics, CNC G-M Code, Minitab
- **Tools & Technologies :** Keras, Tensorflow, OpenCV, HTML, CSS, Canvas, Node.js, Express.js, Redis, Apache Cordova, OpenGL, Jupyter, Anaconda

Selected Publications

- Sharma S., Purwar A., Ge Q.J.; **A Motion Synthesis Approach to Solving Alt-Burmester Problem by Exploiting Fourier Descriptor Relationship Between Path and Orientation.**, ASME J. Mechanisms Robotics; doi:10.1115/1.4042054
- Sharma S., Purwar A., Ge Q.J.; **An Optimal Parametrization Scheme for Path Generation Using Fourier Descriptors for Four-Bar Mechanism Synthesis.**, ASME J. Computing and Information Science in Engineering; doi:10.1115/1.4041566