linkedin.com/in/ssharma1991

github.com/ssharma1991

Shashank Sharma

Stony Brook, New York

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

Udacity, School of Autonomous Systems　　　　　　　　　　　　　　　　Mountain View, CA
Self Driving Car Engineer Nanodegree　　　　　　　　　　　　　　　　　　　*Mar. 2019 – Present*
- **Relevant Areas:** Computer Vision, Deep Learning, Sensor Fusion, Localization, Planning, Control, System Integration

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.

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.

Technical Proficiency

- **Languages :** Python, Javascript, C++, MATLAB, Mathematica
- **CAD softwares :** Solidworks, Autodesk Inventor, PTC Creo, CATIA, Ansys (CFD and Mechanical), Autodesk AutoCAD, Autodesk Moldflow, FeatureCAM , MSC-Adams, ZWCAD, Altair HyperMesh, Altair 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