Shashank Sharma

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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.
- Creating 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.
- Designing algorithms for simulation and synthesis of Planar, Spherical and Spatial single-degree-of-freedom Robotic systems resulting in publications in journals by American Society of Mechanical Engineers.
- In-charge of Computer-Aided Design and Innovation Lab and collaborating with a research group of 10+ graduate students.

Teaching Assistant *Aug 2016 – Apr 2017*
- Developed SnappyXO, a laser-cut design-driven robotics platform which enables designing mechanisms, structures, and robots.
- Advised 250+ undergraduate students in MEC101-Freshman Design Innovation and MEC 102-Engineering Computing.
- Mentored students for their Robot Design projects which gained recognition from the Office of President at university.

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".
- Spearheaded design and manufacturing teams to create a new hybrid 3D printing process using Pellet based Screw Extruder with CNC machines
- 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*
- Developed a LeNet inspired convolution neural network using TensorFlow to classify the GTSRB traffic sign dataset.
- Achieved 94.8% accuracy on test dataset by data augmentation and image enhancement using OpenCV.

Behavioral Cloning Udacity
Python, Jupyter, Keras github.com/ssharma1991/autonomous-car-behavioral-cloning *May 2019 – Aug 2019*
- Designed an end-to-end convolution neural network using Keras that predicts steering angles from dash-cam images.
- Successfully 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*
- Implemented car location estimation algorithm using extended Kalman filter based on LIDAR and RADAR sensors data.

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, Git, npm, MongoDB

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