linkedin.com/in/ssharma1991
sharmashashank.com

Shashank Sharma

Stony Brook, New York ☎ 631-512-0029

shashank.sharma.1991@outlook.com
github.com/ssharma1991

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 – Mar 2020*

- **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 a $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 apps 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 the 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 that enables designing mechanisms, structures, and robots. It has successfully raised $16K+ on Indiegogo for a crowdfunding campaign.
- Advised 250+ students in MEC101-Freshman Design Innovation, MEC 102-Engineering Computing, and Vertically Integrated Projects(VIP) Program. The Robot Design projects gained recognition from the Office of President at university.

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

- Coordinated with the design team on developing PMT Monitor, a portable medical headset that detects head trauma.
- Generated concepts for an interpupillary distance adjusting mechanism focusing on manufacturability and robustness.

Leviathan Energy — Stony Brook, NY
Strategic Partnership for Industrial Resurgence (SPIR) Intern — *Feb 2016 – May 2016*

- Designed and manufactured Hydro-kinetic turbines with improved airfoil design which produce 50% more power in collaboration with Leviathan Energy.
- Created engineering models using Solidworks and Autodesk Inventor and fabricated parts by FDM based 3D printing.

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. Created Toolpath Planning strategies to manufacture CAD models using Hybrid Manufacturing techniques.

Relevant Projects

Self Driving Car subsystem design and integration — Udacity
Python, Jupyter, OpenCV, TensorFlow, Keras, C++, ROS — *May 2019 – Aug 2019*

- Detection: A robust image processing pipeline is created to detect highway lanes in dashcam live-feed.
- Perception: Car's position within lane and lane curvature is calculated using perspective transform and polynomial fitting.
- Classification: LeNet inspired convolution neural network is developed to detect and classify 40+ kinds of traffic signs.
- Deep Learning: Cloned human behavior using an end-to-end neural network to autonomously steer a car using camera input.
- Sensor Fusion: Car location is estimated using an extended Kalman filter which acts on LIDAR and RADAR sensors data.
- Localization: A 2D particle filter for sparse localization is designed and uses GPS and sensor data with a landmark map.
- Trajectory Planning: A Finite State Machine based planner is created to achieve autonomous highway driving with other cars.
- Control: A PID controller is implemented to maneuver a vehicle around a virtual track using steering, throttle and brake.
- System Integration: Robot Operation System (ROS) is used to robustly combine Perception, Planning, and Control.

Motion Planning for a Robot with Two Anthropomorphic 6-DOF Arms — MEC529 Robotics
Matlab — *Mar 2016 – May 2016*

- Inverse Kinematics and Dual Quaternion interpolation based optimal trajectory planning to pick and place objects considering individual arm's workspace and dexterity.

Interactive Manipulation of NURBS Surfaces MEC572 Geometric Modelling
C++, OpenGL, Qt5 *Mar 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 :** 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
- **Tools & Technologies :** Keras, Tensorflow, OpenCV, HTML, CSS, Canvas, Node.js, Express.js, Redis, Apache Cordova, OpenGL, Jupyter, Anaconda, Git, npm, MongoDB, Docker, ROS

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