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 – 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 — Udacity
Python, Jupyter, OpenCV, TensorFlow, Keras, C++, ROS — *May 2019 – Aug 2019*

- Perception: A robust image processing pipeline is created to detect highway lanes in dashcam live-feed.
- Localization: Car's position within lane and lane curvature is calculated using perspective transform and polynomial fitting.
- Perception: LeNet inspired convolution neural network is developed to detect and classify 40+ kinds of traffic signs.
- Motion Planning: 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.
- Path 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.
- Localization: A 2D particle filter for sparse localization is designed and uses GPS and sensor data with a landmark map.
- System Integration: Robot Operation System (ROS) is used to robustly combine Perception, Localization, Planning, and Control.

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

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

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