**ANIMESH NEMA**

5 Pacella Park Drive, Apt 6312

Randolph, MA 02368

(774) 502-4739

[anema@wpi.edu](mailto:anema@wpi.edu)

<https://animeshnema.github.io/index.html> <https://github.com/AnimeshNema> [www.linkedin.com/in/animesh-nema/](http://www.linkedin.com/in/animesh-nema/)

**INTRODUCTION**:

Robotics Engineer keen to apply his skills in a passionate company. Team player with Systems, Mechanical and Software development & integration skills. Strong lab and communication skills with a keen attention to detail. Proficient at utilizing available resources and achieving project success within aggressive timelines.

**EDUCATION**:

WORCESTER POLYTECHNIC INSTITUTE (WPI), Worcester, MA

**Master of Science Robotics Engineering**, May 2019 - (GPA 4.0/4.0)

SRI RAMASWAMY MEMORIAL UNIVERSITY (SRM), Tamil Nadu, India

**Bachelor of Technology Mechanical Engineering**, May 2017

**WORK EXPERIENCE**:

**7/2019-present Medrobotics Corporation, Raynham, MA**

# Robotics Engineer

Robotics Engineer in a team responsible for the development of a Robotic Surgical Platform that provides high-fidelity real-time video and robotic & manual control of multiple surgical instruments used during Surgical Procedures. The medical system consists of electronic and robotic modules that allow for non-invasive procedures that reduce the need for higher risk surgical alternatives.

Technical responsibilities include, but are not limited to, the following:

* Writing algorithms required to model the control of the robotic arms in the system
* Providing inputs for the development of the overall System Architecture & Software Architecture of the design
* Conducting tests to analyze the behavior and performance of the system under various conditions
* Characterization of forces associated with Dynamic and Kinematic modeling of the system
* Responsible for performing real-time tracking of the robotic arm movements in 3D space
* Writing development code for new features and correcting existing software bugs in the system

All system development is done within FDA Quality System Regulation (QSR) guidelines

**SKILLS**:

* Programming Languages: C++, C, Python, Buzz
* Software Tools: ROS, Git, Subversion (SVN)
* Libraries: PyTorch, TensorFlow, Keras, OpenCV
* CAD design tools: SolidWorks, CATIA, AutoCAD
* Simulation Tools: Gazebo, MoveIt
* Computational tools: MATLAB
* Operating systems: Windows, QNX, Linux

**PROJECT EXPERIENCE**:

**10/2018-4/2019 Visual Odometry based Relocalization using ORB feature descriptor**

# Worcester Polytechnic Institute (WPI)

Directed Research

* Developed a computationally inexpensive re-localization module for a vision-only based system, using computer vision techniques and a single Kinect camera.
* Applied ORB feature descriptor to identify key points in a scene and find matches from the map.
* Performed perspective transformation on images to find the relative pose of the camera, for pose estimation.
* Utilized algorithms like RANSAC to minimize outliers and improve accuracy.
* Visualized the results and computed time taken to confirm the cost effectiveness of the approach

**10/2018-12/2018 Automated Aerial Cinematography using an UAV**

# Worcester Polytechnic Institute (WPI)

Motion Planning

* Developed a motion planning algorithm to enable the quadcopter to autonomously traverse in an environment and capture scenes, while avoiding obstacles.
* The quadcopter was given a fixed trajectory, but on approaching an obstacle it used RRT\* planner to move away and automatically navigate back to original path.
* Utilized ROS for communication and simulated using Gazebo.

**7/2018-7/2018 Automated Image Captioning**

# Worcester Polytechnic Institute (WPI)

Computer Vision / Deep Learning

* Developed an LSTM recurrent neural network architecture that worked in parallel with another CNN architecture to generate automated image captions.
* The CNN would first identify objects of interest and output keywords from a given image and the RNN would then generate captions based on the keywords received.
* Supervised learning was performed on both the networks using images with multiple captions.

**6/2018-7/2018 Facial Key point Detection**

# Worcester Polytechnic Institute (WPI)

Computer Vision / Deep Learning

* Designed an algorithm to detect 68 key points on a face (to identify features such as eyebrows, eyes, nose, lips and facial contour) by applying computer vision and deep learning techniques.
* Applied various transformations on the image dataset and developed a CNN using PyTorch.

**3/2018-4/2018 Adaptive trajectory control of a Robotic arm subject to Varying Payloads**

# Worcester Polytechnic Institute (WPI)

Robot Controls

* Modelled an adaptive trajectory tracking controller on a 2-link Robotic arm to carry objects of unknown masses while maintaining its desired path.
* Modified the conventional approach by using function approximation techniques, resulting in a less expensive and a much smoother performance.
* Visualized the path on a graph and compared it with the original algorithm to verify the inference.

**2/2018-4/2018 Robotic Control of Surgical Laser Waveguide using ABB IRB120 Robot**

# Worcester Polytechnic Institute (WPI)

Robot Dynamics

* Performed dynamic modeling and control of the ABB IRB120 robot mounted with a laser waveguide, to follow certain trajectories and carry out tissue ablation.
* Developed a Python code for generating trajectories.
* Simulated using Gazebo and MoveIt.

**9/2017-12/2017 Predicting Grade of Road for Autonomous Vehicles using Supervised Deep Learning**

# Worcester Polytechnic Institute (WPI)

Deep Learning

* Built a Convolutional Neural Network and trained it on a labeled dataset of IMU and GPS readings to predict the grade of the road ahead of the autonomous vehicle.
* Carried out video parsing, data filtering and data augmentation techniques to improve performance.
* Analyzed the performance of the model by observing the real-time video implementation of the results.

**1/2017-5/2017 Three Finger Robotic Gripper with Tactile Sensors**

# Worcester Polytechnic Institute (WPI)

B.S. Final Year Project

* Modelled a 3-finger robotic gripper design in SolidWorks.
* Researched, identified and selected the proper resistive force sensors that were mounted on the tip of each gripper required to determine the appropriate minimum grasping force.
* Manufactured the parts via 3-D printer.
* Actuated Robotic fingers using a single servo motor, programmed using an Arduino PCB and S/W Development kit (SDK).

PERSONAL INTERESTS

Cricket, Fitness, Musical Instruments (piano, guitar)

REFERENCES

Available upon request