

## 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