Animesh Nema

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Introduction

Robotics Engineer keen to apply his skills in a passionate company. A team player with mechanical and software development and integration skills. Proficient at utilizing available resources and achieving project success within aggressive timelines.

Education

Worcester Polytechnic Institute **Aug 2017 – May 2019**
Master of Science Robotics Engineering *Worcester, MA*

SRM Institute of Science and Technology **Aug 2013 – May 2017**
Bachelor in Mechanical Engineering *Tamil Nadu, India*

Certifications

Computer Vision Nanodegree | *Udacity* **Sep 2018**

- Secured a certification from Udacity in computer vision, which covered topics such as edge detection, gaussian blurring, neural networks, Visual SLAM etc.
- Used OpenCV, pytorch along with python throughout the course to complete multiple assignments and projects.

Technical Skills

Programming Languages: Python, C++, Matlab
Software Tools: ROS, Github, MacTalk, RViz, Gazebo, Robot Studio, MongoDB, Qt
Libraries: OpenCV, PyTorch, TensorFlow, Keras
CAD Design Tools: SolidWorks, Catia, AutoCAD
Relevant Courses and concepts: Computer vision, Deep learning, Robot controls, Motion planning, Robot dynamics, Swarm intelligence, OOP, Data pre-processing, SLAM, Object Detection, Homography, Forward & Inverse kinematics.

Experience

Berkshire Grey | *Software Engineer* **Apr 2021 - Present**

- Developing automation tools for complex robotic systems consisting of robot arm, stereo vision modules etc.
- Working on a vision based approach to map the robot arm's environment and validate the arm's position and orientation with respect to its surroundings.
- Created an interlinked MongoDB tool to store, retrieve and analyze various levels of information using pymongo driver.
- Worked on python drivers for network switches & industrial motors and designed multiple GUIs using PyQt5 for ease-of-use for technicians and accelerate the commissioning.
- Responsible for maintaining and testing the software architecture for the tools.
- Managing current projects for the team and assigning timelines & goals for upcoming projects.
- Collaborating with teams both within and outside the company for project development.

Medrobotics | *Robotics Software Engineer* **Jul 2019 - Apr 2021**

- Worked as a robotics engineer in a team responsible for the development of a robotic surgical platform that provided semi-automated control of multiple surgical instruments used during surgical procedures.
- Conducted tests to analyze the behavior and performance of the system under various conditions.
- Performed real-time tracking of the robotic arm movements in 3D space.
- Wrote development code for new features and rectified software bugs in the system.

WPI DARPA Internship | *Research Programmer* **Mar - May 2018**

- Worked as a research programmer on Warfighter Analytics for Smartphone Healthcare (WASH) project to analyze smartphone sensor data such as IMU, GPS, screentime etc to identify potential signs for PTSD or similar conditions in a participating military personnel.
- The sensor data was filtered and fed to a neural network to help identify patterns in user smartphone behaviour.

Projects

Visual odometry based relocalization | *Directed Research, WPI* **Oct - Apr 2019**

- 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.

Automated aerial cinematography using an UAV | *Motion Planning, WPI* **Oct - Dec 2018**

- Worked on a path 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.

Automated image captioning | *Computer Vision/Deep learning, Udacity* **Jul 2018**

- 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.

Adaptive trajectory control of a robotic arm subject to varying payloads | *Robot Controls, WPI* **Mar-April 2018**

- 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.

Facial keypoint detection | *Computer Vision/Deep learning, Udacity* **Jun 2018**

- 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.

Predicting grade of road for autonomous vehicles | *Deep learning, WPI* **Sep - Dec 2017**

- Trained a CNN 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.

Robotic control of surgical laser waveguide using ABB IRB120 robot | *Robot Dynamics, WPI* **Feb 2018**

- 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.

Three finger robotic gripper with tactile sensors | *B.Tech Final Year Project, SRMIST* **Mar - May 2017**

- Modelled a 3-finger robotic gripper design in solidworks and manufactured using 3D printing.
- Researched, identified, and selected the proper resistive force sensors that were mounted on the tip of each gripper to determine the appropriate minimum grasping force.
- Actuated robotic fingers using a single servo motor, programmed using an arduino PCB and S/W development kit.

References

Available upon request