Gaurav Raut

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EDUCATION

University of Maryland — Master's in Engineering - Robotics — Expected May 2023
College Park, MD — GPA: 3.9/4.0

Courses: Classical and Deep Learning for Computer Vision, Perception for Robotics, Planning for Robotics, Software Development for Robotics, Control of Robotics System, Robot Modeling

Savitribai Phule Pune University — Bachelor of Engineering - Mechanical — May 2020
First Class with Distinction — Pune, India — GPA: 7.93/10

Courses: Numerical Methods of Optimization**,** Mechatronics, Robotics

TECHNICAL SKILLS

Software: C/C++, Python, ROS, MATLAB/Simulink, Ubuntu Linux, Git, CMake, GoogleTest, Travis/Coveralls

Engineering: ROS, Gazebo/RViz, OpenCV, Eigen, SolidWorks

Libraries: OpenCV, CUDA, Eigen, PyTorch, TensorFlow, ActionLib

Skills: Computer Vision, Deep Learning, Machine Learning, Robotics, Programming, Software Development and Testing

PROJECTS/RESEARCH

Website: gauraut.github.io

CLASSICAL AND DEEP LEARNING APPROACH TO ESTIMATE HOMOGRAPHIES AND CREATE PANORAMA (Python/ PyTorch)

February 2022

University of Maryland, College Park — Project link

- Implemented an API which takes input a list of images and outputs a stitched panorama using Python and OpenCV
- Designed and developed Adaptive Non-Maximal Suppression (ANMS), feature descriptor and feature extraction, RANSAC for outlier rejection and homography estimation modules, all from scratch
- Implemented the warping and image blending algorithm from scratch
- Implemented and trained an API which estimates homographic relation between images using Homography Net.
- Programmed the network using PyTorch and trained in both supervised and unsupervised manner

TEXTURE AND INTENSITY BASED EDGE DETECTION ALGORITHM (PB-LITE) (Python)

January 2022

University of Maryland, College Park — Project Link

- Implemented an API to detect edge using the probability of boundary edge detection algorithm and programmed using OpenCV and Python
- Designed and used custom made DOG, Leung-Malik and Gabor filter banks from scratch
- Implemented K-Means for Texture, Brightness and Color maps and computed their gradients using the above designed filter banks
- Produced edge detection results which were better than the traditional Sobel and Canny benchmark and were also closer to the ground truth

GAS: AUTONOMOUS COLLECTION ROBOT (ROS/C++)

December 2021

University of Maryland, College Park — Project link

- Developed an autonomous collection robot which uses Camera and LiDAR for object identification and obstacle detection
- Implemented autonomous navigation using MoveBaseAction library
- Implemented Object detection algorithm based on HSV colour space using OpenCV and cv_bridge
- Implemented developer level software development skills such as AIP, Pair Programming, Test Driven Development, UML

MARS ROVER WITH 5-DOF ROBOTIC ARM (ROS/Python)

November 2021

University of Maryland, College Park — Project link

- Designed and developed a Mars Rover with 5-DOF from scratch. Used SolidWorks to develop CAD and to export the URDF
- Integrated the Camera and LiDAR sensors for autonomous navigation
- Used the ActionLib library for the manipulator's controls
- Demonstrated an object pick and place scenario simulation in Gazebo using ROS

HOG BASED HUMAN DETECTION (C++)

October 2021

University of Maryland, College Park — Project link

- Developed a Human Detection module using the HOG algorithm implemented using OpenCV
- Demonstrated algorithm's capability of detecting and tracking standing humans
- Implemented developer level software development skills such as AIP, Pair Programming, Test Driven Development, UML

AN APPARATUS AND A METHOD FOR MEASURING SLACKNESS (Internship) June 2019 – August 2019

Kalyani Studio Private Limited, Pune | *Technology Intern*

- Developed and optimized the analog IR sensor integration of the apparatus
- Device capable of producing an accuracy of ±1 mm
- Patent filed on 11th November 2019. Application ID: 201921045820

SOLAR ELECTRIC HYBRID VEHICLE July 2017 – May 2019

Savitribai Phule Pune University, Pune | *Suspension and Management Head*

- Successful implementation of DAQ system interfaced with the help of Raspberry Pi and Arduino Mega providing real time data with the help of on-board sensors. User can receive data by connecting with the car via Android application
- Designed and manufactured a 3-wheeler tadpole-shaped Solar Electric Hybrid Vehicle
- Vehicle capable of running at a speed of 30 km/hr with Solar energy as the only power source
- Successfully completed the 2-hour endurance race without any failures