AKASH KUMAR SINGH

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WORK EXPERIENCE

MULTIMODAL SEMANTIC SEGMENTATION | Reseach and Technology Center (RTC), Robert Bosch

May 2019 - July 2019 | MENTOR: Guruprasad M. Hegde

- The idea was to improve the performance of semantic segmentation on 2D RGB images using data from LiDAR point clouds for an autonomous driving car.
- Used CARLA (Open Source Simulator) to generate labelled point clouds, for training semantic segmentation networks, using simple 3D reprojection algorithms. Used open-source Apolloscape (scene-parsing) data to generate labelled point clouds for static objects only, using depth map and semantic label images provided.
- Trained Pointnet++ network on CARLA and Apolloscape datasets. Compared performance of models initialised from pretrained models on synthetic CARLA data with models trained on real data. Also compared the results between models trained on RGBXYZ point clouds and XYZ point clouds.
- Developed a framework to combine the results of a model trained on 2d RGB images and a model trained on 3d point clouds to perform semantic segmentation on a 2d RGB image.
- Implemented a Fast LiDAR point cloud segmentation algorithm, to get clusters in LiDAR point clouds for an autonomous driving car to infer accurate pose of objects in a scene.

GOOGLE SUMMER OF CODE | Robocomp

May 2018 – Aug 2018 | MENTORS: Marco A Gutiérrez and Ramon Cintas

- The project aimed to integrate Robocomp, a robotic framework, with a 3D robotic simulator, Gazebo, using zeroc-ice as a communication middleware.
- Used Gazebo plugins for robotics interfaces, corresponding to different sensors and actuators, to communicate with the Gazebo simulator.
- The integration is expected to allow developers more options from the framework and provide a better simulation with a more realistic physics engine.

AUTONOMOUS UNDERWATER VEHICLE | AUV-IITK, IIT KANPUR

February 2017 – Present | MENTOR: Prof. Mangal Kothari

- Implemented an Image Processing Algorithm (Image Fusion) to enhance the degraded underwater images in real time before feeding it to the perception module of the vehicle.
- Integrated UUV Simulator, an open source underwater simulator, to work with AUV-IITK code base
- Designed and developed the software architecture for AUV consisting of dedicated layers for hardware integration, controls & navigation, motion planning, and perception

PROJECTS

TRAFFIC LIGHT DETECTION | NYU-IITK, RESEARCH TRACK

June 2018 – July 2018 | Prof. Yi Fang (New York University)

- The project aims to explore the possibilities of developing a lightweight traffic light detection model based on Deep Learning, using various model compression techniques.
- Explored various techniques of reducing the size of neural networks without any significant decrease in accuracy.
- Implemented a RFCN network using tensorflow object detection APIs.

NYO | NEW YORK OFFICE, IIT KANPUR

May 2018 - July 2018 | Prof. Manindra Agarwal

- Worked as a front end developer to develop new features and improve UI/UX of a scalable web application.
- Used latest technology stacks like TypeScript in Angular 6 as well as HTML and SCSS for styling.

COURSE PROJECTS

BELLMAN OPTIMALS VS HUMANS | IIT KANPUR

Aug 2018 - Nov 2018| Prof. Nisheeth Srivastava

- The central idea was to compare human path-finding in a stochastic two-dimensional grid world with the Bellman-optimal solution found via value iteration, across various factors.
- Found an optimal path from a starting point to an ending point in a grid world using Bellman Equation to maximize the cumulative gain taking into consideration the length of the path as a cost factor.

- Developed a graphical user interface to collect data via experiment conduction on how humans choose an ideal path based on intuition.
- Analyzed the data collected to calculate the cognitive bias people have, along with different measures.

EDUCATION

INDIAN INSTITITE OF TECHNOLOGY, KANPUR | B.Tech in Electrical Engineering
July 2016- Present | Kanpur, Uttar Pradesh (INDIA)
CPI : 8.05/10

D.A.V. PUBLIC SCHOOL, NTS BARKAKANA, C.C.L. | AISSCE
June 2014 - March 2016 | Ramgarh, Jharkahnd (INDIA)
Result : 93.4%

D.A.V. PUBLIC SCHOOL, URIMARI | AISSE
March 2014 | Hazaribagh, Jharkahnd (INDIA)
CGPA : 10/10

SKILLS

Image Processing • Computer Vision • Linux Command Line • Robotics • 3D simulation

LANGUAGES

C • C++ • Python • LATEX • HTML • CSS • Typescript • shell(BASH) • Sed • Awk • Verilog

TOOLS

ROS • OpenCV • Git • SolidWorks • Arduino • Gazebo • zeroc-ice • Angular • Tensorflow
Keras • GNU octave • Matlab

SCHOLASTIC ACHIEVEMENTS

Secured rank 3146 at National level in JEE Mains 2016 among 1.13 million students.
Secured rank 2477 at National level in JEE Advanced 2016 among 198,000 students.

RELEVANT COURSES

Data Structures & Algorithms
Probability & Statistics
Cyber Security
Micro-Electronics
Control Theory
Principles of Communication System
Signals,Systems & Networks
Quantum Mechanics

OTHER CAMPUS ACTIVITIES

SOFTWARE LEAD, AUV-IITK, IIT KANPUR | July 2018 - Mar 2019

- Mentored juniors towards learning software structure of the vehicle
- Managed workflow and development of software system
- Runner up at the Final Round of NIOT SAVe 2019, Indian National Competition on Student Autonomous Underwater Vehicle Challenge held in Chennai

SECRETARY, ROBOTICS CLUB, IIT KANPUR | July 2017 - Mar 2018

- Promoting Robotics in campus community by organizing workshops and lectures
- Assisted the Coordinators in organizing competitions in Major technical events

SECRETARY, FINE ARTS CLUB, IIT KANPUR | July 2017 - Mar 2018

- Promoting Fine Arts in campus community by organizing various competitions and exhibitions
- Assisted in development of various art pieces around the campus