Curriculum Vitae

SHUBHAM JAIN

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EDUCATION

Year	Board/Degree	Institution	CPI/%
2019	MS (Major - Robotics Engineering)	Worcester Polytechnic Institute	4/4
2017	B.Tech (Minor - Artificial Intelligence)	Indian Institute of Technology Kanpur	8/10
2013	Class XII (ISC)	Smt. Sulochanadevi Singhania School	95.4%
2011	Class X (ICSE)	Smt. Sulochanadevi Singhania School	97.2%

TECHNICAL STRENGTHS

Computer Languages Python, C++, MATLAB, C, Java, HTML5, MySQL, javascript, php
Software & Tools OpenCV, Point Cloud Library (PCL), ROS, Caffe, Theano, Arduino, LaTeX

WORK EXPERIENCE

Diabetic Foot Wound Analyis — Research Assistant, WPI Jan, 2018 - present

- Developing a wound image analysis algorithm capable of detecting and calculating healing score of wounds.
- Improved wound segmentation accuracy using Associative Hierarchical Random Fields from 40% to 85% by experimenting with various preprocessing techniques such as contrast limited adaptive histogram equalisation
- Exploring use of Convolutional Neural Networks in the form of UNet model to get faster and better results.
- Working in collaboration with UMass Memorial Hospital under the guidance of Prof. Emmanuel Agu for thesis.

Amazon Robotics — Advanced Robotics Intern May, 2018 - Aug, 2018

- Tackled the issue of improving point cloud data from 3D sensors which has "holes" due to glare, occlusion, etc.
- Worked with OpenCV, PCL, ROS for motion planning of robotic arms and sensor fusion(cameras, 3D sensors).
- Built a working setup for automated detection and filling of missing data in point clouds using movable sensors.

Quikr India Pvt Ltd — Data Scientist May, 2016 - July, 2016

- Developed an AutoSuggest feature using Tries and Hashing in Python which gave suggestions in real time
- Implemented a Text Based Clustering Algorithm to find Trending Topics using millions of user search queries

Adoro India Pvt Ltd — Computer Vision Intern May, 2015 - July, 2015

- Created a Visual Search Engine that automatically classified types of clothing and suggested similar products
- Used a Matlab implementation of Deformable Parts Model for pose estimation to locate body joints in image
- Trained machine learning models using features like HoG, SIFT and MR8 with accuracy of up to 60%.

RELEVANT COURSES

Foundations of Robotics
Artificial Intelligence
Deep Learning for Perception
Fundamental Course on C Language
Linear Algebra
Introduction to Computer Vision
Machine Learning Techniques
Systems Engineering
Dynamics
Swarm Intelligence
Controls
Data Structures & Algorithms
Numerical Methods in Engineering
Recent Advances in Computer Vision
Probabilistic Mobile Robotics

PROJECTS

Lying robots in swarms - Dr. Carlo Pinciroli Jan, 2018 - present

- Exploring methods of pattern detection using robot swarms in the presence of lying robots in ARGoS simulator
- Implemented a novel algorithm which reduces dependence on lying robots by using a cosine similarity measure

Teaching Teleoperated Surgery - Dr. Gregory Fischer Jan, 2018 - Apr, 2018

- Demonstrated a working setup of two way force feedback and shadowing between master of DaVinci Surgical System (7 DoF) and Laprotek (6 DoF) which can be used by experienced surgeons to teach teleoperated surgery
- Calculated inverse kinematics of DaVinci master, used ROS for communication, PD controller for force feedback

Autonomous steering using CNN - Dr. Carlos Morato Jul, 2017 - Dec, 2017

- Used Convolutional Neural Networks to map raw image data to steering angles for autonomous lane-following.
- Successfully trained a 5-layer CNN using real-world data in Theano for driving a car in Udacity simulator.

Reinforcement Learning on Cartpole System - Dr. Dmitry Korkin Jul, 2017 - Dec, 2017

- Implemented Actor Critic model, Asynchronous Actor Critic, Deep Q learning and Proximal Policy Optimisation on CartPole environment in OpenAI gym and compared their performance and convergence time using Python

Lane detection and Localisation - Dr. Gaurav Pandey July, 2016 - April, 2017

- Developed algorithms for Lane and Obstacle Detection usable in Indian scenarios for autonomous cars
- Proposed and implemented a modified Hough Line Transform to detect lanes with greater speed and accuracy
- Used laser based LIDAR sensors to obtain a 3D point cloud data for obstacle detection and classification
- Led the Vision team of the institute's newly formed IGVC (Intelligent Ground Vehicle Challenge) team

Video Captioning - Dr. Gaurav Sharma July, 2016 - December, 2016

- Trained Sequence to Sequence-Video to Text(s2vt) and Deep Compositional Captioning (DCC) models in Caffe
- Implemented a novel combination of the above methods to use the temporal information obtained from the RNN of s2vt as an input to the DCC model for generating better captions by using data from DBPedia
- Explored the use of audio data for captioning and successfully demonstrated its use to refine generated captions

Pedestrian Simulation and Tracking - Dr. Anurag Tripathi January, 2016 - December, 2016

- Aim to detect and track trajectories of pedestrians and use that data to improve crowd flow simulations
- Implemented Power Law and Helbing models in C++ and did a comparative study between simulation results
- Used the CamShift Algorithm with SIFT features to track humans in successive frames from real-world data

Efficient Kernel Methods - Dr. Piyush Rai July, 2016 - December, 2016

- Surveyed and experimented with efficient alternatives to kernel methods like Nyström method, Approximate Feature Maps, Random Kitchen Sinks, fastfood, Memory Efficient Kernels and online kernel methods
- Implemented Random Binning Features and Random Fourier Features in Python
- Performed a comprehensive comparative study between the performance of methods on six different datasets

Image Captioning - Dr. Vinay Namboodiri July, 2015 - December, 2015

- Implemented the paper 'Every Picture tells a story : Generating sentences from images' in Matlab and Python
- Obtained an accuracy of close to 60% for obtaining (object, action, scene) triplet for a given query image

Campus News Website - Programming Club, IITK May, 2014 - June, 2014

- Designed a facebook-inspired website where users login and have a personalized newsfeed of all campus events
- Developed an algorithm which uses user's webmail data to autonomously classify and categorise relevant events
- The website automatically scrapes data from institute website, student senate and twitter for up-to-date data

ABU ROBOCON - ASIA PACIFIC ROBOTICS CONTEST

Green Energy Recharging the world August, 2015 - March, 2016

- Built a semi-auto robot which drives an autonomous bot along a predefined zig-zag path using wind energy
- Developed a novel line following algorithm which uses a regular webcam and an on-board Odroid processor
- Implemented a wall following algorithm using ultrasonic sensors and Arduino microprocessor for PID control
- Second Runners Up among over a hundred teams from engineering colleges all over India

Robominton August, 2014 - March, 2015

- Designed and fabricated two Badminton Playing Robots capable of playing on a full sized badminton court
- Used blob detection and optical flow for shuttle localisation and extended Kalman filter for trajectory prediction
- Could accurately predict shuttle trajectory and its destination in real time with an error margin of just 5-7 cm

Salute to Parenthood August, 2013 - March, 2014

- Made an autonomous robot that could traverse ladders and pipes and a manual robot to carry and place it
- Created self-defined libraries in C++ for controlling Servos, Motors, Pneumatics and sensors using an Arduino
- Secured 6th place in the National Competition and bagged the award for Best Innovative Design

ACHIEVEMENTS

Ranked in National Top 0.2% (amongst 1,400,000 candidates) in JEE Mains 2013 and 3471 (amongst 150,000 candidates) in IIT-JEE Advanced 2013

Secured a rank in top 1% out of 40721 candidates in the National Standard Examination in Physics

Acquired an A* grade in the course Programming in C for an outstanding performance

Nominee of Gopalkrishna Singhania Gold Medal(highest honours in school) in Class 12 for all-round excellence

EXTRA-CURRICULAR ACTIVITIES

Completed 3 years in classical keyboard playing, while clearing annual examinations for the same

Led the institute's Robocon team to win 2nd Runners up award in ABU Robocon 2016 with participation from over a hundred teams all over India

Part of institute's Robocon team to win Best Innovative Design award and bag 6th place in ABU Robocon 2014

Took an institute wide guest lecture in IITK on Introduction to OpenCV attended by over fifty people in 2015.

Took weekly lectures as an Academic Mentor for the course Fundamentals of C for the junior batch

Won 3rd place in Pitch Ur Product in eSummit'15, IITK for an innovative collage maker using Image Processing

Mentored eight freshers as a Student Guide and helped them emotionally and academically all year round

Participated in a 40 day squash summer camp with a rigorous practice schedule of about six hours per day