Mandeep Singh

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Education

Monash University — *Melbourne, Australia*
Master of Artificial Intelligence — *2023 - Present*
Weighted Average Mean (WAM): 74.125%

Indian Institute of Technology Kanpur — *Kanpur, India*
Bachelor of Technology (Double Major)- Mechanical Engineering | Electrical Engineering — *2014 - 2019*
Cumulative Performance Index (CPI): 7.3/10.0

Ch. Chhabil Dass Public School, Ghaziabad — *Ghaziabad, India*
Class XII, CBSE-AISSCE Percentage: 96.4% — *2014 & 2012*
Class X, CBSE-AISSE Cumulative Grade Point Average (CGPA): 10.0/10.0

Achievements

2013-14 **All India Rank-208**, Kishore Vaigyanik Protsahan Yojana (KVPY) awardee | 120k candidates
2013-14 **National Top 1% (Top 300)**, NSEA, shortlisted for prestigious Indian National Astronomy Olympiad
2014 **All India Rank-490**, Joint Entrance Examination, JEE (Main) | 1.5 Million candidates
2014 **All India Rank-81**, Uttar Pradesh State Entrance Examination (UPSEE) | 140k candidates
2019 **Employee of the Month**, Samsung Research (SSIR) | September, 2019

Work Experience

Image Signal Processing in CMOS Image Sensor — ***Samsung Research, India***
Senior Software Engineer | System LSI, Samsung Semiconductor India Research (SSIR) — *July'19 - November'22*
- Devised a simpler & efficient Flicker Mitigation Algorithm for preview mode of super slow motion videos (480, 960 fps) in indoor lighting
- Developed & owned Bad Pixel Compensation related modules of firmware using FPGA, RTL simulations for various image sensors.
- Spearheaded in the FW programming of Remosaic related blocks & Upscaler of 200 MP Tetra^2 pixel image sensor, by active discussions with Design/Algorithm owners at DSR, South Korea

Data Science Internship — ***Gramophone, India***
Mentor: Mr. Ashish Singh, CTO, Gramophone — *May'18 - August'18*

Deep Learning based auto-detection of crop diseases in RGB images
- Comparative analysis of various Deep Neural Networks architectures- MLP, VGG16, VGG19, ResNet & Mask-RCNN.
- Increased accuracy from 65% to 95% by ensemble models of multi-class classifiers & data augmentation (PlantVillage) using Keras.

Ask Anna: Chat Assistant
- Created an information retrieval system based on the Latent Semantic Analysis (LSA) using a curated agricultural knowledge base.
- Analyzed & visualized as word cloud of the texts from WhatsApp chat groups, Gramophone community posts & feedbacks from users.

Recommendation System
- Built a recommendation system for the personalized community posts by using the implicit metadata of users (likes, comments.)

Visual Odometry for UAVs to autonomously inspect bridges — ***Virginia Tech, USA***
Research Scholar | Mentor: Prof. Pratap Tokekar, RAAS Lab, Dept of ECE, Virginia Tech, USA — *June'17 - March'18*
- Performed various state-of-the-art open-source VO/SLAM methods (like DSO, ORB SLAM 2, LSD SLAM, SVO) to localize the robot flying close to the George P. Coleman Memorial Bridge, Virginia in the 3D space and compared the performances using monocular camera.
- Comprehensively analyzed the integration of visual data with that from Inertial Measurement Units (using VINS-Mono, ROVIO) for better odometry estimates in indoor corridors, brick walled environments at VT campus & open field & was presented in ISER-2018.
- Formulated a novel method to integrate 2D LiDAR data with the odometry pipeline as a feedback loop to have better scale estimates.

Selected Projects

Visual Question Answering (VQA) | Prof. Harish Karnick, Dept. of CSE, IIT Kanpur — *March'18 - April'18*
- Created a deep learning based open-ended Visual Q/A framework using MS COCO dataset with multiple-choice questions on images.
- Extracted the features from the text by word embedding (word2vec, GloVe) & feature maps of images using pretrained VGG16 (CNN).
- Built and trained a memory network which consists of Multilayer Perceptron (MLP) and LSTM to get the contextual answer.

Vision based Active Target Tracking | Prof. Mangal Kothari, Dept. of AE, IIT Kanpur — *February'18 - April'18*
- Improved the existing deep learning based single target tracking solution: Fully-Convolutional Siamese Nets (University of Oxford).
- Devised a robust method (RSNN) to integrate the pretrained Siamese Neural Net with LSTM motion model which predict the position of the target by learning its motion (sequential data) for robust tracking even in occlusion and visually challenging scenarios.

Modular Aerial Vehicle (ModAV) | Prof. Ashish Dutta, Dept. of ME, IIT Kanpur — *August'17 - April'18*
- Conceptualized modularity in UAVs (different types of configuration like quadrotor, hexacopter) inspired by work of ETH Zurich (DFA).
- Designed the autonomous docking mechanism to make a successful prototype of quadcopter using 1 central unit & 4 modular units.

Technical Skills

Programming Languages: C | C++ | Python | SQL
Softwares & Utilities: MongoDB | TensorFlow | Keras | Pandas | ROS | Apache Spark | MATLAB | OpenCV | Git | LaTeX
Relevant Courses: Machine Learning | Multi-Agent System & Collaboration | Introduction to Databases | Natural Language Processing

Positions of Responsibility

Senior Executive (Head) | Science & Technology council, IIT Kanpur — *March'17 - March'18*
- Organized various council activities & pitched various ideas to reform the system so as to spearhead in the field of technology.

Senator | Students' Gymkhana, IIT Kanpur — *March'17 - March'18*
- Elected by an Electorate strength of over 800 students as their representative to the student senate.