Kartik Gupta

M.S. Robotics, OSU
B.Tech, IITK (India)

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OBJECTIVE STATEMENT

Applied researcher with 5+ years experience with robots, machine learning and computer vision.

RESEARCH PROJECTS

Graduate Research Assistant, OSU *Guide: Prof. Cindy Grimm OSU* *Oct'18 - Ongoing*

- Designed a computer vision based system for high precision 6D pose estimation and evaluation of edge deburring quality (within 1-2 mm) using an off-the-shelf camera for industrial application; (**MSEC 2020**)
- Performed visual planar pose tracking of abstract objects for robot grasping experiments. (**IROS 2019**)
- Developed **markerless pose tracking** of the 7 DOF Kinova robot arm using segmentation and optimisation.
- Developing **precise trajectory** control of a compliant robot arm using error modelling and iterative learning.

Autonomous Navigation Plan in Orchards *DataFlux Systems Inc, Berkeley* *May'15 - Jul'15*

- Designed an image processing pipeline to generate a navigation plan around a orchard using GoogleEarth image
- Achieved **95% accuracy** by implementing Canny Edge Detection, object classification and noise filtration.

PUBLICATIONS

K. Gupta, C. Grimm, B. Sencer, R. Balasubramanian "Vision-Based Precision Deburring and Edge Breaking Process Quality Control", Manufacturing Science and Engineering Conference (**MSEC, 2020**). (Accepted)

Y.H. Ong, J. Morrow, Y. Qiu, **K. Gupta**, C. Grimm, R. Balasubramanian. "Near contact grasping strategies: When simply closing your fingers is not enough", International Conference on Intelligent Robots and Systems (**IROS, 2019**).

COURSE PROJECTS, OSU

Task Allocation in MultiAgent Robotic Systems in a Warehouse *Oct'18 - Dec'18*

- Developed task allocation system using **reinforcement learning** and cooperative co-evolutionary algorithms for multi agent robotic system achieving **5-10%** performance improvement.

Benchmarking Motion Planning Networks (MPNet) *Jan'19 - Mar'19*

- Incorporated **end-to-end learning** for contractive auto encoders with MPNet achieving **10%** improvement.
- Extended MPNet for trajectory planning for 7DOF robot arm achieving faster planning compared to RRT*.

Multi-Scale Video Frame Interpolation *Mar'19-Jun'19*

- Proposed improving upon Nvidia's SuperSloMo using **coarse-to-fine** image generation with stage-wise training and achieved competitive results; experimented with **GAN** for further image refinement

ABU ROBOCON : ASIAN OCEANIAN ROBOTICS COMPETITION

Robocon 2015 - Badminton Playing Robots *Oct'14 - Mar'15*

- Automated robots using OpenCV for shuttle detection and extended Kalman Filter for trajectory prediction.
- *Results*: Accurately predicted the landing point of incoming shuttle in real time with an error margin of 5-7 cm.

Robocon 2014 - Autonomous Pole Walking Robot *Oct'13 - Mar'14*

- Developed a manual robot with holonomic motion and an autonomous robot capable of vertical pole traversal.
- *Results*: Secured **6th place** in the National Competition and bagged the award for Best Innovative Design.

TECHNICAL STRENGTHS

Programming:	Python, C++, MATLAB, R, C, PostgreSQL
Softwares & Libraries	PyTorch, OpenCV, ROS, MoveIt, Arduino, Tensorflow,Mujoco, Arduino

PROFESSIONAL EXPERIENCE

Data Scientist, OYO Rooms (India's Largest Hotel Chain)   *India, Jul'17 - Jul'18*
- Devised algorithm based on **occupancy prediction** for real-time dynamic pricing of 2500+ hotels.
- Implemented K-means clustering and non linear regression to identify days of peak demand and local seasons.

Business Analyst, Fastfox.com (Rental Service Provider)   *India, Sep'16 - Jun'17*

RELEVANT COURSES

Academic	Deep Learning, Computer Vision II, Robotic Manipulation, Sequential Decision Making, Reinforcement Learning, Probabilistic Mobile Robotics (Planning, Mapping, SLAM)
Coursera	Algorithms(I & II), Machine Learning, Robotics Specialisation(Perception, Mobility, Aerial)

EDUCATION

M.S in Robotics, Oregon State University (OSU) - GPA: **3.8/4**   *Sep'18 - Jul'20*
B. Tech, Indian Institute of Technology Kanpur, India (IITK) - GPA: **8.3/10**   *Jul'12 - Jun'16*

LEADERSHIP EXPERIENCE

- **Head, Science and Technology Council**, IIT Kanpur   *Apr'15 - Mar'16*
- **Team Leader, Institute Robotics Team**, ABU Robocon 2015 - IIT Kanpur   *Oct'14 - Mar'15*