

Manish Soni

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Experience:

TCS Research, Robotics & AI.

[2016-Present]

Responsibilities:

Design and implementation of algorithms for robotics and computer vision in automation of warehouses.
Developing deep neural network algorithms for object detection and segmentation using Caffe and Tensorflow libraries.
Creation of URDF, SDF, XACRO files for simulation of robots. Creating client presentation and demos on vision and robotics.
Training and imparting knowledge to new recruits for working with robots.

Technical Skills:

- Programming languages: C++, C, Python.
- Software Libraries: Caffe, Tensorflow, Keras, Cuda C, OpenCV, PCL, Moveit, Gazebo, ROS.
- Robotic Manipulators: Universal Robot, Barret Wam, TAL Brabo.
- Vision Control Systems: Git

Projects:

[May 2017 - Aug 2017]	Semantic Segmentation of objects in bin of warehouse (Amazon Robotics challenge 2017) <ul style="list-style-type: none">• Developed the deep learning algorithm which gives the pixel wise probabilities for the 40 objects and background.• ResNet architecture was modified which accelerate the training and incrementation in accuracy.• Algorithm was developed on both Tensorflow and Caffe deep learning libraries.
[Jan 2016 - May 2017]	Primitives shapes based object model matching using Super4Pcs for estimation of suction grasp pose <ul style="list-style-type: none">• Finds out the centroid and object orientation by fitting the 3d model on Scene using Super4Pcs algorithm.• 3d model are of primitive shape cuboidal, cylinder and sphere, generated using PCL library.• Principal component analysis applied on fitted 3d model for finding orientation.
[Aug 2016 - Jan 2017]	Product counting in warehouses using deep learning techniques and google glass <ul style="list-style-type: none">• Developed modified RCNN based deep neural network which does object localization and classification.• Deep network was trained on 120 objects which gives 99.2 percent accuracy on object detection.• Google glass is used to take images. Processing was done on back end GPU server.
[Jun 2016 - Aug 2016]	Motion planning for an automated pick and place robot in a retail warehouse using MoveIt <ul style="list-style-type: none">• RRT and bilateral RRT algorithm was used with MoveIt to generate the trajectories for the robot to pick and place the object in warehouse.• Octomap feed from Kinect was used to avoid the collision with the rack and other objects.• Whole project is tested in practical environment as well as in Gazebo simulation.

Achievements & Publications:

- Computer Vision Lead of Team IITK-TCS which participated in Amazon Robotics Challenge, held in RoboCup 2017, Nagoya, Japan. Won 3rd place in pick task, 5th place in stow task and 4th place in final round out of 16 teams in the competition.
Link: <https://sites.google.com/site/swagatkumar/iitk-tcs-arc-2017>.
- Overall Batch topper throughout B.Tech programme, Awarded **Academic Excellence** for outstanding academic performance.
- **Paper:** Design and development of an automated robotic pick & stow system for an e-commerce warehouse. Available at <https://arxiv.org/pdf/1703.02340.pdf>
- **Paper:** Motion planning for an automated pick and place robot in a retail warehouse. Accepted at Advances in Robotics 2017, India. ACM DOI: 10.1145/3132446.3134904

Educational Qualifications:

University/Board	Education	Grade/Mark	Year of passing
IIT Jodhpur	B.Tech. Electrical Engineering	9.6/10	2016

Internships:

Eberhard Karls University of Tuebingen, Germany (under Dr. Wolfgang Rosenstiel)	Image-based detection of blinks in eye images <ul style="list-style-type: none">• Using Canny Edge Detector to detect edges in upper half of eye images and calculated Histogram.• Implemented K-means clustering on the distances between Histograms.• Successfully Detected Blinks with an accuracy of 98% when eye is centered in image.
IIT GUWAHATI (Under Dr. Prithwijith guh)	Speech synthesis and recognition <ul style="list-style-type: none">• Speech synthesis using festival speech synthesis system.• Silence region detection using clustering and connected component analysis.• Dynamic time wrapping for speech sample matching.