

Siva Karthik Mustikovela

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EDUCATION	Pursuing final year - Integrated Masters Program (May 2013 - June 2015(Expected)) Robotics Research Centre, advised by Prof. K Madhava Krishna. International Institute of Information Technology(IIIT-H) , Hyderabad, India Thesis : Searching for small objects in indoor environments over mobile robots. Bachelor of Tech. in Electronics and Communication (August 2009 - April 2013) International Institute of Information Technology , Hyderabad, India	
INTERESTS	Computer Vision and Learning applied to Scene Understanding, Inference and Reconstruction. Also interested in applications of Deep Learning and Probabilistic Graphical Models for vision.	
RESEARCH EXPERIENCE	Robotics Research Centre, IIIT-H, India (May 2013 - Present) <i>Research Assistant (Prof. K Madhava Krishna)</i> Project involves development of a mobile robot system that can efficiently search for small objects in large indoor scenes. Used C++(OpenCV, ROS, PCL), Matlab. <ul style="list-style-type: none">Devised an approach to discover small objects on floor through a Markov Random Field over a homography model and probabilistically infer about existence of a query object from far.Proposed a new polar data structure-Viewpoint Object Potential, that encapsulates the best set of discriminative viewpoints to efficiently recognize a 3-D point cloud of an object.Further, developed a Decision Analysis based search strategy to actively navigate through the environment and maximize the reward earned.The work resulted in 3 publications at ICRA-14(HongKong), ICPR-14(Sweden), ICVGIP-14(India).Member of the University team competing for Mahindra Driverless Car Challenge. Frueh and Partner-Personal Robotics AG, Zurich, Switzerland (Feb 2013 - Present) <i>Graduate Research Intern (Dr. Hansruedi Frueh)</i> Responsible for developing a Deep Learning based Face Recognition application and an object recognition and tracking platform to be ported onto their home built robot-PRob. Used Python(OpenCv, Theano), PCL, ROS, Gazebo, PyQT. <ul style="list-style-type: none">Incorporated a Deep Belief Network to train and classify facial representation points. Integrated the process end-to-end from data capture to recognition into a user friendly GUI.Implemented a 3-D object recognition and tracking platform along with a GUI for visualization of tracked objects.Presented several demos at Innorobo '14(Lyon, France) and ICRA '14(Hong Kong) Siemens AG - Corporate Research Centre, Bangalore, India (April - July 2013) Summer Research Intern (Pradeep Gopalakrishnan) Fetal Heart Sound Monitor(FHSM) data classification using Spiking Neural Nets(SNNs). <ul style="list-style-type: none">Analysed FHSM data for preliminary noise modelling and removal for extraction of a signal with high SNR. Further analysed it for various discriminative frequency characteristics among classes.Classified FHSM data using SNNs by transforming it to a higher dimensional temporal space using Receptive Field Encoding.Additionally built a human spoken digit classifier using SNNs. ARL, National University of Singapore (April - June 2012) Summer Research Intern (Dr. Mandar Chitre, Koay Teong Beng) Scalable long range AUV position estimation and RF communication platform. Used C++, Java, Arduino, Android ADK, Google Maps API. <ul style="list-style-type: none">Integrated an RF communication framework into AUV software platform to broadcast AUV position to deployment boats and ground stations.Estimated the position of AUVs in case of communication failure using Kalman Filter and already existing data like current flow, speed etc. Visualized all of this on Maps API on tablet devices. Notion Ink Design Labs, Bangalore, India (May - July 2011) Summer Intern (Rohan Shravan)	

- Built a scalable home automation system using Arduino and other add ons.
- Worked on web ontologies for knowledge based article retrieval through learnt user preferences.

PUBLICATIONS LINKS INCLUDED S. Kumar, **M Siva Karthik**, K Madhava Krishna, *Markov Random Field based Small Obstacle Discovery over Images*, IEEE, International Conf. on Robotics and Automation, 2014, Hong Kong

S. Mittal, **M Siva Karthik**, K Madhava Krishna, *Small Object Discovery and Recognition using Actively Guided Robot*, International Conf. on Pattern Recognition, 2014, Sweden

M Siva Karthik, S. Mittal, K Madhava Krishna, *Guess from Far, Recognize when Near: Searching the Floor for Small Objects*, Indian Conf. on Vision Graphics and Image Processing, 2014, India

M Siva Karthik, S. Mittal, K Madhava Krishna, *Decision Theoretic Search for Small Objects through Integrating Far and Near Cues*, International Conf. on Robotics and Automation, 2015(Submitted)

OTHER PROJECTS **Mobile Robotics** : Implemented an autonomous dynamic obstacle avoidance algorithm for mobile robot using concept of velocity cones, simulated in OpenCV and implemented on amigo bots.
Computer Vision : Implemented the Bag of Words based object recognition pipeline over the Caltech-101 dataset. Used this pipeline to extract all objects similar to a queried object. Further analysed the accuracy when the system has k-Nearest Neighbours approach for classification versus a trained SVM for each class.
Digital Image Processing : Implemented a biometric Image Steganography by encrypting fingerprints into face images through Wavelet component fusion. Further analysed the method's robustness to noise and affine transforms for retrieving the encrypted fingerprint from the image.

TECHNICAL SKILLS

- Languages : C++, Python, Matlab
- Operating Systems : Unix/Linux, Windows
- Libraries : OpenCV, ROS, PCL, Theano, ARIA
- Hardware : Kinect, Turtlebot, Pioneer-P3DX, Arduino

ACADEMIC ACHIEVEMENTS

- Ranked in top 0.8% among 6 Lakh participants in All India Engineering Examination-2009.
- Ranked 13th among Ten Thousand participants in National KVS Mathematics Olympiad 2005-06, organized by Kendriya Vidyalaya Sangathan, India.
- Ranked 22nd at the National Mathematics Olympiad Training Camp, Group Mathematics Olympiad 2007 organized by National Board of Higher Mathematics.
- Showcased a presentation at the Regional Space Olympiad at Advanced Systems Laboratory, Defence R&D Organization, Hyderabad, India (Leading a team of 5).
- Student delegate at the International Astronautical Congress - 07, Hyderabad, India.
- Represented F&P-Personal Robotics AG, Switzerland, at Innorobo-14, ICRA-14.

PROFESSIONAL SERVICES Reviewed papers for ICRA - 2015

CoCURRICULAR ACTIVITIES

- Elected Member of student Parliament of University for a tenure.
- Tutored students at Robocamp, a Robotics workshop hosted by my university.
- Elected Member of the students placements committee of the University for a tenure.
- Associate Team Leader for a project comprising of 25 students under a course- Engineering Systems dealing with the earthquake risk mapping of Hyderabad.
- A staunch food enthusiast and like to cook, read and explore cuisines from all over the world.

REFERENCES

- Prof. K Madhava Krishna(mkrishna@iiit.ac.in) - Robotics Research Centre, IIIT-H, India
- Dr. Hansruedi Frueh(hrf@fp-robotics.com) - ETH-Zurich and F&P-Personal Robotics, Zurich
- Pradeep Gopalakrishnan (pgopalak@xilinx.com) - Xilinx,India (previously with Siemens Research AG, India)
- Aayush Rai (aayush.raai@samplytics.com) - Samplytics, India (Previously with Siemens Research AG, India)
- Dr. Mandar Chitre - (mandar@nus.edu.sg) - ARL, National University of Singapore
- Koay Teong Beng - (koay@arl.nus.edu.sg) - ARL, National University of Singapore