

# AYUSH DEWAN

Robotics Research Center, IIIT, Hyderabad

<http://researchweb.iiit.ac.in/~ayush.dewan/>

## EDUCATION

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**International Institute of Information Technology, Hyderabad** *July 2014*  
MS by Research in Computer Science  
CGPA: 7.83  
**Dehradun Institute of Technology** *July 2011*  
Bachelors of Technology in Applied Electronics and Instrumentation  
Percentage Aggregate: 69.3

## TECHNICAL SKILLS

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**Languages:** C,C++,Python,Assembly  
**Platforms :** Keil, Matlab, Labview, MPLABIDE, MikroC, PICC  
**Operating System :** Windows, Ubuntu  
**Libraries:** ROS, OpenCV, OpenSceneGraph  
**Robots Worked With:** Pioneer Robots(P3DX,Amigo), Parrot ArDrone,Turtlebot  
**Sensors Worked With:** Microsoft Kinect, Flea2, SICK laser, Sonar.

## WORK EXPERIENCE

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**KUKA Robotics** June-July,2010  
*Intern* *Pune, India*

- Completed 6 weeks internship.
- Completed Basic and Advanced Robot Training Modules.
- Developed a Labview application for TCP/IP communication between KUKA Robot and a Joystick.

**Robotics Research center** August,2011-Present  
*Graduate Research Assistant* *IIIT Hyderabad, India*

- Working as a Graduate Research Assistant.

**IIIT** August,2013-Present  
*Teaching Assistant* *Hyderabad, India*

- TA for Mobile Robotics Course(CSE-483)
- My responsibility is to evaluate assignments, projects and conduct ROS tutorial classes

## PUBLICATIONS

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Suryansh Kumar, **Ayush Dewan**, K Madhava Krishna " *A Bayes Filter based Adaptive Floor Segmentation with Homography and Appearance Cues*" (**ICVGIP-12**)  
**Ayush Dewan**, Aravindh Mahendran, Nikhil Soni, K Madhava Krishna" *Optimization Based Co-ordinated UGV-MAV Exploration for 2D Augmented Mapping*" (Extended Abstract,AAMAS-2013).  
**Ayush Dewan**, Aravindh Mahendran, Nikhil Soni, K Madhava Krishna " *Heterogeneous UGV-MAV Exploration Using Integer Programming*" (**IROS-2013**)  
**Ayush Dewan**, K Madhava Krishna " *Distributed Asynchronous Multi Robot Exploration Using Max-Sum*" (**ICRA-2014**, Under Review).

## GRADUATE COURSE WORK

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Computer Vision (CSE5765)  
Artificial Neural Network (CSE4772)

## RESEARCH PROJECTS

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### Vision based exploration

**Abstract:** At present I am working on monocular camera based exploration system for ground robots and micro aerial vehicles. I use PTAM for interacting with environment. The objective is to densify sparse map pointcloud and improve the efficiency of PTAM by introducing a planning algorithm to dictate camera trajectory. The challenge to overcome is twofold, PTAM only provides sparse map information which is insufficient for exploration, thus some other clues like planar information are needed to generate a denser map. Secondly, the efficiency of PTAM depends on movement of camera and is very prone to rapid rotational motion, thus a planning algorithm is required to dictate trajectory of camera so that algorithm works efficiently for a large scale environment.

**Status:** In Progress.

**Utilities:** ROS, C++, Matlab

### Coordinated UGV-MAV Exploration for 2D Augmented Mapping

**Abstract:** The objective of this project was to explore an unknown area using heterogeneous agents (UGV and MAV) and build a 2D augmented map. The laser sensor on ground robot builds 2D ground map and using monocular camera on MAV a pointcloud for elevated area is generated. The exploration strategy was formulated as an Integer Programming problem. Using extensive simulation it was shown that the proposed method performs better than previous method in multiple scenarios. This work was presented in IROS, 2013.

**Status:** Completed.

**Utilities:** ROS, OpenCV, OpenSceneGraph, PCL, C++

### Distributed and Asynchronous multi robot exploration using Max-Sum

**Abstract:** The objective of this project was to exploit the distributive and asynchronous nature of a multi robot system for exploration. The problem of task/goal assignment is represented as factor graphs and is solved using Max-Sum algorithm. This work is under review for ICRA, 2014.

**Status:** Completed.

**Utilities:** ROS, OpenCV, OpenSceneGraph, PCL, C++

### Floor segmentation using monocular camera

**Abstract:** The objective of this project is to segment out the floor from a sequence of camera images. Using homography and optical flow, set of sparse features lying on floor are tracked and using color segmentation image is divided into multiple segments. The tracked features are then used for selecting segments lying on floor. This work was published in ICVGIP, 2012.

**Status:** Completed.

**Utilities:** OpenCV, C++

## COURSE PROJECTS

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Velocity Obstacle  
EKF Localization  
FASTSLAM  
Image Based Search  
Building a Panorama  
4DOF Robotic Arm

For details please visit <http://researchweb.iiit.ac.in/~ayush.dewan/projects>

## ACHIEVEMENTS AND ACTIVITIES

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Robotics Operating System(ROS) Contributor with high ranking w.r.t Karma(2nd in India).

Received a travel grant from conference committee to attend IROS,2013.

Reviewed a paper for IROS,2013.

Member of team winning National level Micromouse Competition at NIT, Trichy.

As an IEEE student member helped in organizing different technical competitions for college Techfest.

Winner of online FIFA Gaming Competition.