

# Chahat Deep Singh

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**Research Interests:** Computer Vision, Artificial Intelligence and Aerial Robotics.

## CURRENT RESEARCH

- **FlyNet:** Deep Learning driven Structure-less Gap Detection for Quadrotor Flight through Unknown Window. (arXiv print coming soon); *Advisor: Prof. Yiannis Aloimonos and Cornelia Fermüller*
- **Transfer of Motion Primitives:** A Technique to Transfer the Human Motion Model to a Kinematic Chain Cooperatively Manipulated by a Swarm of Quadrotors. *Advisor: Prof. Yiannis Aloimonos*

## EDUCATION

- **University of Maryland** College Park, MD  
*Master of Engineering in Robotics* 2016–Present
- **Guru Gobind Singh Indraprastha University** New Delhi, India  
*Bachelor in Electronics and Communication Engineering* 2011–2015

## RESEARCH EXPERIENCE

- **Research Assistant** with Prof. Yiannis Aloimonos  
*Computer Vision Lab, University of Maryland* Jan 2017 – Present  
*Gap Detection using Optical Flow:* Worked on deep learning framework to obtain optical flow between two consecutive frames from RGB images followed by Gap Detection in the Presence of a Strong Parallax.
- **Project Assistant** with Scientist Vijayant Bhardwaj  
*Defence Research & Development Organization* May 2014 – July 2014  
*Computer Vision driven Laser Wander Correction:* Developed an adaptive optic system at *Laser Science and Technology Centre* that uses a very high frame rate monochrome camera and automatically corrects for light distortions in the medium of transmission.
- **Research Assistant** with Prof. Arvind Rehalia  
*Senior Year Project* October 2014 – May 2015  
*REDIPS, a Quadruped Robot:* Developed a Quadruped Robot, codenamed *REDIPS* having both autonomous and manual capabilities trained on standard Trot gait algorithm capable of object tracking and following.

## PUBLICATIONS

- **Mobile Surveillance Spheroid Robot with Static Equilibrium Camera, Leaping Mechanism and KLT algorithm based Detection with Tracking:** Shamsheer Verma, Chahat Deep Singh, Sarthak Mittal, Prateek Arora and Arvind Rehalia. International Journal of Control Theory and Applications, 09(41) 2016, 473-488. ISSN: 0974-5572.
- **Fully Autonomous and Manually Controlled Quadruped with Object Detection and Tracking:** Shamsheer Verma, Chahat Deep Singh, Arvind Rehalia. International Journal of Engineering and Technical Research (IJETR). Volume-2, Issue-9, 09-2014. ISSN: 2321-0869.

## COURSE PROJECTS

- **Segmenting Objects in a 3D Point Cloud:** Segmented a concave reconstructed point cloud into  $n$ -convex clouds.
- **CMSC733: Structure from Motion:** Created a sparse structure of the scene from a sequence of RGB images.
- **ENPM661: Collision-free Optimal Trajectory Planning in a Multi-Robot System:** Solved the problem of cooperative planning in order to simulate the algorithm for concurrent assignment and planning of trajectories (CAPT).
- **3D pose estimation:** Localization using Perspective-n-Point and optimizing it using GTSAM factor graphs.

## RELEVANT COURSES

- **CMSC 733 - Computer Processing of Pictorial Information:** Spring 2017 *by Prof. Yiannis Aloimonos*
- **CMSC 828G - Image Understanding:** Fall 2016 *by Prof. Rama Chellappa*
- **CMSC 726 - Machine Learning:** Fall 2017 *by Prof. Jordan Boyd-Graber*
- **CMSC 828T - Vision, Planning and Control in Aerial Robotics :** Fall 2017 *by Prof. Yiannis Aloimonos*
- **ENPM661 - Planning for Autonomous Robots:** Spring 2017 *by Dr. Michael Otte*

## SKILLS

**Computer Languages:** C, C++, Python, MATLAB, HTML5, Bash, L<sup>A</sup>T<sub>E</sub>X  
**Operating System:** ARCH LINUX, DEBIAN-based LINUX (ARM and x86-64), Windows XP/7/8/10  
**Tools:** Tensorflow, PyTorch, Git, Autodesk Inventor, Arduino

## REFERENCES

Yiannis Aloimonos  
University of Maryland

Cornelia Fermüller  
University of Maryland

Waseem A. Malik  
University of Maryland