

ANIKET SHIRSAT

Phone: (480)371-8843 Web-page: [ashirsat.github.io](https://github.com/ashirsat) Email: ashirsat@asu.edu

Goal Seeking a challenging robotics & perception engineering full time position that will utilize my research expertise in multi-robot systems modeling ,design, implementation & integration to build solutions on embedded systems for distributed perception and decision making for connected autonomy.

Summary

- Knowledge in formulating & implementing multi-robot control strategies for several aerial robotic platforms (Intel Aero RTF, Parrot Bebop 2, DJI custom built frame), with *ROS* & *PX4*.
- In-depth understanding of developing & deploying computer vision based robot navigation algorithms on low compute embedded devices using *C++* and *Python 3*.
- Experienced in field testing & debugging robot control & navigation pipelines in *PX4* with *Gazebo* and *ROS*.
- Hands-on work experience at a drone start-up company.
- Proficient in using *Linux*, *Git* and *Jira* for agile development.
- Hands-on Experience in deploying networked mobile robots using *ZeroMQ* using *WiFi*.

Core Competencies

- Multi-robot system design, simulation & implementation utilizing *ROS*, *OpenCV*.
- Work experience in developing, deploying algorithms for vision based control & 3D navigation on low power arm and x86 architectures.
- Experience in *Software-In-The-Loop (SITL)* & *Hardware-In-The-Loop (HITL)* testing and debugging with log analysis using *ROS*.

Education

Ph.D., Mechanical Engineering (GPA:4.0/4.0)

Arizona State University, Tempe, AZ, USA.

Aug'16 - May'22

Relevant Courses: Multi-Robot systems, Computer Image Understanding & Pattern Analysis.

Research Focus: Navigation & Control of Multi-robot systems, Swarm Consensus, Multi-view Geometry.

Advisor: Prof.Spring Berman, spring.berman@asu.edu

M.S., Mechanical Engineering (GPA:3.43/4.0)

Arizona State University, Tempe, AZ, USA.

Aug'12 - May'15

Relevant Courses: Feedback Control Systems, Linear Control Systems.

Research Focus: Model-based control design for non-aggressive flight in a quadrotor UAV.

B.E., Mechanical Engineering (GPA:~ 3.77/4.0)

University of Mumbai, India

July'06 - May'10

Research Focus: Design & implementation of prototype Assembly Line.

Research Publications

1. **Aniket Shirsat**, Shatadal Mishra, Wenlong Zhang, and Spring Berman. Probabilistic Consensus on Feature Distribution for Multi-robot Systems with Markovian Exploration Dynamics. Accepted in IEEE-Robotics and Automation Letters (RA-L), 2022
2. **Aniket Shirsat** and Spring Berman. Decentralized Multi-target Tracking with Multiple Quadrotors using a PHD Filter. AIAA Scitech, 2021. doi:10.2514/6.2021-1583 (**Patent Pending**)
3. Shiba Biswal, **Aniket Shirsat**, and Spring Berman. Consensus over Stochastically Switching Networks Parameterized by a Continuous Random Variable, with Application to Distributed Mapping. In process of submission to IEEE Control System Letters (L-CSS), 2022
4. Karthik Elamvazhuthi, Zahi Kakish, **Aniket Shirsat**, and Spring Berman. Controllability and Stabilization for Herding a Robotic Swarm Using a Leader: A Mean-Field Approach. *IEEE Transactions on Robotics*, 37(2):418–432, 2021. doi:10.1109/TRO.2020.3031237

5. **Aniket Shirsat**, Karthik Elamvazhuthi, and Spring Berman. Multi-robot Target Search using Probabilistic Consensus on Discrete Markov Chains. In *2020 IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR)*, pages 108–115, 2020. doi:10.1109/SSRR50563.2020.9292589
6. **Aniket Shirsat**. Modeling and Control of a Quadrotor UAV. doi:10.31219/osf.io/5dwsc, 2015

Relevant Work Experience

Flight Controls Intern

Intel GmBH, Munich, DE

May'19 - Aug'19

- Implemented *Software-In-The-Loop (SITL)* simulation for testing performance of *semi-direct visual odometry (SVO)* on a simulated multirotor in *Gazebo*.
- Performed log analysis for *SITL* simulations for debugging and improving platform performance.
- Tested & integrated *visual odometry* from *Intel Realsense T265* for egomotion estimation.

Flight Operations Engineer

BetterView Marketplace, San Francisco, CA, USA.

Sep'15 - Jul'16

- Developed flight plans for DJI Phantom series quadrotors that were compliant with FAA regulations for performing aerial roof inspections.

Research & Academic Projects

Distributed Point Cloud Fusion with Intel Realsense D435i (Work In Progress)

- Implementing a *Multi-State Constrained Kalman Filter (MSCKF)* approach for egomotion estimation.
- Formulating a point cloud fusion framework using *GM-PHD* filter in *Python* with *ROS*.

Decentralized Multi-Target tracking with Quadrotor Swarm

Jan'20 - May'20

- Formulated & simulated a Markov chain based distributed multi quadrotor exploration strategy for tracking multiple static targets.
- Implemented *Gaussian Mixture Probability Hypothesis Density (GM-PHD)* filter framework for estimating target locations in *MATLAB* and in *C++* with *ROS*.

Vision Based Control of Quadrotor for GPS-Denied Navigation

Aug'19 - Dec'19

- Designed & simulated an *Image-Based Visual Servo (IBVS)* scheme with color detection for quadrotor waypoint navigation in *C++* with *ROS* & *Gazebo*.
- Implemented the *IBVS* controller in *Python* with *ROS* on a Parrot Bebop 2 quadrotor using *ArUco* markers.

Leader-Follower Formation Control for a Heterogeneous Group of Robots

Aug'16 - Dec'16

- Formulated & implemented a *leader-follower navigation* protocol for an aerial robot and multiple ground robots using *MATLAB* and the robot simulator *Webots*.

Technical Skills

- Hardware: Experienced in implementing real time navigation & image processing algorithms on Raspberry Pi 4, Nvidia Jetson Nano, UP board.
- Coding: Adept in developing robotic applications using *ROS*, *Gazebo*, *OpenCV* in C++ , & Python 3.