# Kourosh Arasteh

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## Education

**University of Illinois at Urbana-Champaign** Electrical Engineering, BS- May 2019, Minor Computer Science

### Technical Coursework:

| Electrical & Computer Engineering: | Computer Science: | Fundamentals: |
|---|---|---|
| ◆ Principles of Safe Autonomy* | ◆ Machine Learning* | ◆ Digital Signal Processing & Lab |
| ◆ Robot Dynamics & Control* | ◆ Making Sense of Big Data | ◆ Probability with Engineering Applications |
| ◆ Multimedia Signal Processing | ◆ Artificial Intelligence | ◆ Differential Equations Plus |
| ◆ Field Robotics | ◆ Algorithms & Models of Computation | ◆ Calculus III Honors |
| ◆ Robotics | ◆ Data Structures | |

## Professional Experience

**Undergraduate Research Assistant**          *Distributed Autonomous Systems Lab*          Champaign, IL (9/17-Present)

Real-time classification of sub-canopy crop features using camera data. 3D LIDAR point cloud/camera data fusion using Extended Kalman Filters. Mapping of dynamic,off-road environments. Developing training regimes to minimize volume of training data required for algorithm convergence. Standardization of robotic data collection in the field.

**GMT Intern – Automation Integration**          *Anheuser-Busch InBev*          St. Louis, MO (6/17-8/17)

Researched 802.11 standards and technologies for potential to apply to network infrastructure update. Revised legacy Anheuser-Busch Wireless and Wired LAN Standards. Updated all 22 US breweries to 5GHz wireless coverage. Developed documentation of Radio Resource Management best practices. Performed pilot RF surveys to develop AP distribution plan.

## Projects

**Senior Capstone Project* | Multi-Agent GPS-Denied Site Characterization**          (1/19-5/19)

Exploring potential for collaborative ground-agents to characterize a construction site in GPS-denied, dynamic environments. Developing supervisory sky-agent to localize ground agent position and orientation, ground-agents to map points of interest in the global site, and controller-agent to perform stitching and ground-agent exploratory path-planning. Discretizing and Parallelizing the 'Mapping' and 'Localization' aspects of 'SLAM' between agents, allowing for interchangeable and scalable groupings of sky and ground agents in contested environments.

### Computer Vision:

- *SIFT(Scale-Invariant Feature Transform) Image Classification* – Scale-space Extrema Detection, Keypoint Localization, Orientation Assignment, and Keypoint Description for diverse image set
- *Facial Recognition & Tracking in Video* – Minibatch & Gradient Adversarial Training on ConvNet
- *CV Integration with UR3 Robot* – Background Elimination, Multiple object tracking across frames, robotic manipulation

### Signal Processing:

- *Multiband Excitation Speech Synthesis* – Human Vocoder for Voiced/Unvoiced Spectral Envelope & Excitation
- *Speech Recognition Gaussian Hidden Markov Model* – Recognition across 5 speakers and 5 words using HMM
- *Speech to Lips Video Synthesis* – Barycentric Representation and ConvNet Learning for lip pose to speech
- *Shazam System Implementation* – Audio fingerprinting, Combinatorial hashing of frequency domain peak constellations for sample matching & optimized lookup

### Artificial Intelligence/Machine Learning:

- *Minimax Gomoku Player* – Created Minimax and Reflex Agents to play a game of Gomoku
- *Q-Learning, SARSA, Deep Reinforcement Learning Pong Players* – Developed 3 Agents to play 2-Player Pong

## Activities

**Engineering Open House**, Director, Director of Exhibits          Champaign, IL (8/15 - Present)
-Led board of 24 engineers in planning and execution of College-wide Showcase, 30,000+ visitors, 300+ exhibitors

## Skills

**Software Fluencies:** Python, C++, OpenCV, ROS, Tensorflow, Scikit-Learn, Pandas, MATLAB