

Arnav Dhamija

✉ adhamija@seas.upenn.edu • 🌐 www.arnavdhamija.com • 📄 [shortstheory](https://shortstheory.com)

Education

- **University of Pennsylvania SEAS** **Philadelphia, PA, USA**
May 2021
MSE Robotics, GPA: 4.00/4
Courses: Introduction to Robotics, Machine Learning, Computer Vision & Computational Photography, F1/10 Autonomous Racing, Learning in Robotics, Machine Perception
- **BITS Pilani, Hyderabad Campus** **Hyderabad, TN, India**
May 2019
BE (Hons) Computer Science Engineering, CGPA: 8.628/10

Internships

- **mLAB: Real-Time and Embedded Systems Lab** **University of Pennsylvania**
May 2020 – Present
Curriculum Learning for Drone Collision Avoidance
 - Created a **curriculum learning** approach for resolving colliding trajectories for two drones using [RLlib](#).
 - Developed simulations for a multi-drone environment using the [AirSim](#) simulator and Unreal Engine 4.
 - Demonstrated that curriculum learning improves convergence and reduces samples required for an optimal policy.
- **Acoustic Research Laboratory** **National University of Singapore**
January 2019 – May 2019
DtnLink - Disruption Tolerant Protocol for Underwater Networks
 - Developed a **disruption tolerant** protocol for underwater networks using [UnetStack](#), supervised by [Prof. Mandar Chitre](#).
 - Demonstrated that [DtnLink](#) can improve message delivery ratio by 4x in simulations.
 - Created an automated test suite and several example simulations. Extensively documented results in my [undergrad thesis](#).
- **Google Summer of Code: ArduPilot** **Remote**
May 2018 – August 2018
APStreamline - Adaptive Video Streaming for ArduPilot Robots
 - Developed [APStreamline](#), a **network adaptive live-streaming solution** for ArduPilot robots with companion computers.
 - Optimized streaming performance using C++ and GStreamer libraries for **GPU** encoding on the Raspberry Pi.
 - Added support for multiple cameras, video recording, and automatic quality adjustment based on packet loss.
- **Google Summer of Code: KDE** **Remote**
May 2016 – August 2016
kio-stash - Virtual Folders in KIO
 - Successfully implemented a **novel idea** for Virtual Folder support using the **KDE Input/Output** subsystem.
 - Learned automated unit testing, version control, and achieved proficiency with C++11 and Qt.
 - Shipped and packaged [kio-stash](#) for release in KDE's software repositories.

Projects

- **1:10 Scale Autonomous Racing** **Philadelphia, USA**
January 2020 – May 2020
ESE 615 - F1/10 Autonomous Racing
 - Developed a **Model Predictive Control** based control [algorithm](#) for a 1:10 scale car with a planar LIDAR and NVIDIA Jetson TX2.
 - Implemented **RRT*** with trajectory smoothing and **Gaussian Processes** for opponent prediction. Used **ROS** extensively.
 - Finished 2nd in class out of five teams in the virtual final race. Documented our results in the final [project report](#).
- **RGB-D Tracking** **Philadelphia, USA**
March 2020 – May 2020
ESE 650 - Learning in Robotics
 - Created a novel [algorithm](#) to track arbitrary objects using an RGB-D camera using a **particle filter** from 2D bounding box detections.
 - Showed reliable position and velocity estimation on tracking arbitrary objects using the [Princeton RGB-D](#) benchmark.
- **Vectors** **Hyderabad, India**
January 2018 – October 2018
Video Communication Through Opportunistic Relays and Scalable Video Coding
 - Implemented the [Spray-N-Wait](#) protocol to opportunistically transfer [Scalable Video Coding](#) encoded video in an Android app.
 - Demonstrated that SVC video has 2x lower packet loss and 3x the delivery ratio of H.265 video using ad-hoc networks.
 - Co-authored and published a [paper](#) in the **SoftwareX** journal, under [Dr. Abhishek Thakur](#).

Publications

- A. Thakur, A. Dhamija and Tejeshwar Reddy G. VECTORS — VidEo Communication Through Opportunistic Relays and Scalable video coding. SoftwareX (2019), <https://doi.org/10.1016/j.softx.2018.12.006>.

Software Skills

- **Programming Languages:** C++, C, Java, Python, Groovy, MATLAB, Node.JS, Bash, SQL
- **Libraries:** Ray/RLlib, PyTorch, NumPy, Qt, OpenGL, GStreamer, ROS, Eigen, AirSim, Pandas, Jupyter
- **Miscellaneous:** Git, \LaTeX , Wireshark, CMake, Linux, 3D Printing

Conference Presentations

- **Akademiy Conference 2017** **Almería, Spain**
July 2017
Presentation: An Introduction to the KIO Library
- **QtCon Conference 2016** **Berlin, Germany**
September 2016
Presentation: KIO-Stash - An Introduction and Use Cases