

Amir Tavakkoli

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EDUCATION

Arizona State University (ASU)

B.S. in Aerospace Engineering (Autonomous Vehicles Systems) – GPA: 3.38/4

January 2019 – May 2023

Technical SKILLS

Programming: Python, C++, C#, MATLAB, Java

Machine Learning Libraries: SciPy, Scikit-learn, Tensorflow, Keras, OpenCV

Simulation Tools: ROS, SVL, CARLA, AirSim, RoadRunner, Unreal Engine, Unity Engine

Operating Systems: Windows, Linux(Ubuntu 18.04, 20.04)

CAD: SolidWorks, Ansys

Utility: Microsoft Office, LaTeX

Professional Experience

ASU Cyber-Physical Systems Lab

Arizona State University, AZ

Research Assistant

July 2021 – Present

- Developing autonomous software programs using **Python** and **C#** programming languages in order to simulate self-driving cars with SVL and CARLA simulators in different scenarios for **Toyota R&D North America** under the supervision of Dr. Fainekos
- Performing a diagnostic test using **Linux** 18.04 and Robot Operating System (**ROS**) for Toyota Human Support Robot (**HSR**) in order to set up the robot to perform data collection using robot sensors, cameras, and LIDAR

ASU Mechanical and Aerospace Engineering Department

Arizona State University, AZ

Teaching Assistant

January 2021 – May 2021

- Assisting Dr. Murthy with holding office hours for 105 aerospace and mechanical students in dynamics class
- Holding review sessions and teaching the concepts of **kinematics and kinetics** of rigid bodies in order to obtain equation of motion of different objects such as cars, robots, etc.

Academic and Research Projects

- **Drone Simulation (SIL):** Simulating a **fully autonomous drone** payload delivery using AirSim simulator built from source in Unreal Engine. Developing customized script in order to simulate the customized path and maneuvers performed by drone using **PythonAPI** module in AirSim simulator. Under supervision of Dr. Garrett (Undergraduate capstone, still in progress) (**Python**)
- **Drone Simulation (HIL):** Integrating Pixhawk 4 flight controller with AirSim simulator to program Pixhawk 4 and use it as a flight computer for autonomous mission using QGroundControl and Mission Planner. Possibility of adding camera and LIDAR in order to perform **image processing** using **Machine Learning and Deep Learning** models for object detection/collision avoidance. Under supervision of Dr. Garrett (Undergraduate capstone, still in progress) (**Python, Ardupilot**)
- **Images Classification Using CNN:** Training a **Convolutional Neural Network** model to classify Kaggle dataset containing 25000 images in order to predict whether the image is a cat or dog. Evaluating different factors such as the number of convolutional and pool layers, number of feature maps, different subsampling methods, different learning algorithms, and complexity (number of hidden layers) of fully connected network (**Tensorflow, Keras, and OpenCV in Python**)
- **TOYOTA HSR Diagnostic Test and Gazebo Simulation:** Performing HSR simulation in **Gazebo** to see different movements of HSR. Running a diagnostic test in order to troubleshoot the given sensor errors, make the robot operational, and collect data. This robot supports Controller Area Network (**CAN**) port for communication and **CUDA, ROS, and OpenCV** software (**Ubuntu, ROS**)
- **LIDAR Simulation:** Performing a Light Detection and Ranging (LIDAR) simulation from scratch using Pygame module in Python. Creating customized environment using **object-oriented programming** in Python (**Python**)
- **Robot Object Detection and Collision Avoidance:** Performing a robot simulation equipped with an ultrasonic sensor for object detection in order to perform collision avoidance using **Pygame module (Python)**
- **Path Planning Using RRT:** Performing simulation of Rapidly Exploring Random Trees (**RRT**) algorithm for Simultaneous Localization and Mapping (**SLAM**) in order to find the shortest path from starting point to the endpoint without crossing the obstacles (**Python**)
- **Feedback Control System Design:** Designing feedback control systems (**PI, PD and PID**) in order to smooth the commands sent to a drone through flight computer (**Simulink, MATLAB**)
- **Data Structures and Algorithms,:** Implementing basic data structures such as linked lists, queues, stacks, and binary trees as a part of data structures and algorithms class (**Java**)
- **Probability Calculation:** Sorting and calculating the probability of letter grades in an exam. Generating 100, 1000, and 10000 random grades and sorting them based on the given grade categories, calculating the probability of each letter grade A, B, C, D, and F (**C++**)