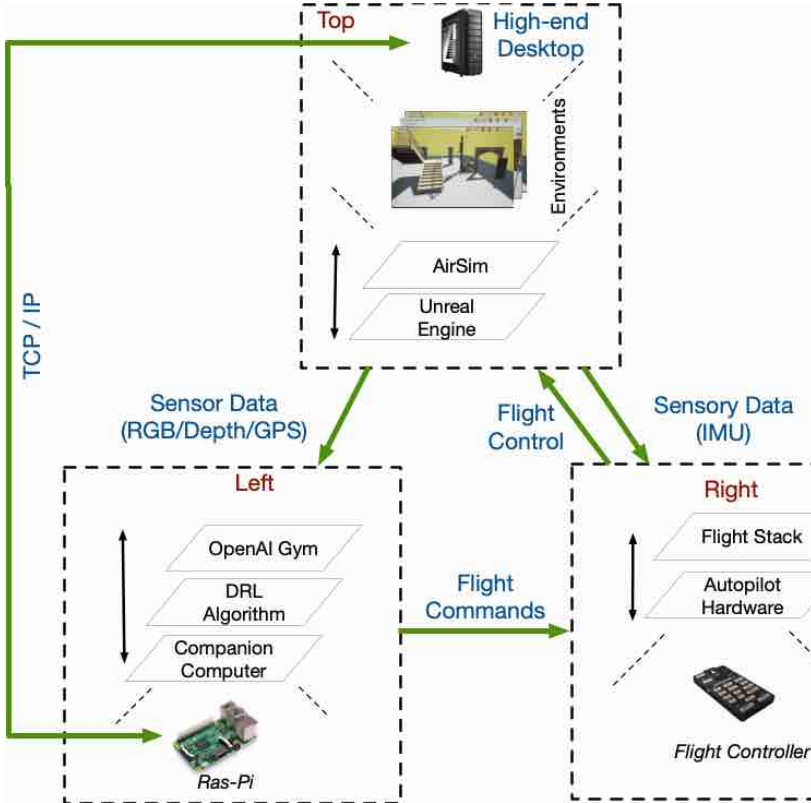|	
Phase 1: Work to install Carla and integrate it with OpenPilot	Goals: ● Create a github page for our project so that we can put our weekly outcome (weekly reports, installation guide, documents, and software repository) and progress report on the site. → Frank, please create it and share it with us. ● Both of you should be familiar with Git commands. ● Install Prerequisites/Dependencies ● Install specified modified fork of Unreal Engine ● Build Unreal Engine ● Clone Carla repository ● Download assets for Carla ● Build Carla (compile client, compile server, and start simulation) → Can you finish this task this weekend? ● Use the existing bridge to run Openpilot through the Carla Simulator ● Learn and replicate different "cybersecurity" attacking capabilities to attack autonomous vehicles in Carla. Read these two papers first and search more online: https://arxiv.org/abs/2202.12991 → Frank, please read them and present them in the next meeting. https://arxiv.org/abs/2007.16118 → Siddhant, please read them and present them in the next meeting. ● Identify the audit logs, which can possibly be obtained from Carla regarding the in-vehicular. ● One more step to think: once we have the data, can we apply any AI/ML algorithm to detect them? —> of course, this task is optional and needs further effort.
Phase 2: Utilize Air Learning and Deep Reinforcement Learning on the Carla simulator	Goals: ● Install the PX4 simulator. ● Install Air Learning environment generator ● Install Air Learning Reinforcement Learning Training ● Install https://stable-baselines.readthedocs.io/en/master/ ● Analyze and incorporate reinforcement learning algorithms listed in the Stable Baselines. ● Identify ways that can integrate the DRL algorithms listed in baselines to Air Learning. ● *Run a stable benchmark to evaluate and optimize the performance of the program* ● *Evaluate the impacts of different "exploits" on the performance of the program*

Phase 3: Integrate software progress with hardware through the use of Px4	**Goals:** ● Analyze and understand the PX4 System Architecture and how it relates to the Carla system ● Implement things like the following that has three key components (https://github.com/harvard-edge/AirLearning). ● Yea ● *Begin modifying the flight stack and middleware to alter flight algorithms* ● *Integrate the programs developed in Phase 2 with PX4, allowing the PX4 to run on autopilot*
Phase 4: Build software and/or develop research paper	**Goals:** ● Gather relevant media from previous phases (eg. images) ● Organize findings from previous phases ● Brainstorm format for paper (how the paper will be structured) ● Create outline ● Write a rough draft of the research paper ● Create any charts, graphs, etc based on earlier data/media to support our findings and add to rough draft ● Write final draft ● Consolidate the

Note:
1. The red lines are my addition, which should be considered. The orange lines are optional tasks.

2. In your weekly report, you should always refer to this table and check your accomplishments.
3. We use virtual machines and/or containers for most of our implementations, so that they are portable for all team members. Frank and Siddhant, get familiar with docker container and its commands.