

MathWorks® Hackathon

Drone Simulation

Instructions for Getting Started

This guide has detailed steps to help your team set up the hackathon: Drone Simulation.

Good luck!

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Getting Started

1) Challenge Statement

Problem Statement: Path planning algorithm for drone line-following in the 3D simulation environment.

In this project, you are tasked with designing a robust path-planning algorithm to enable an autonomous drone to detect and follow a pre-defined track in a 3D simulation environment. The simulation model provided is pre-configured with essential control systems and image processing blocks, which process the drone's camera feed to detect the track.

The core challenge is to design and implement the path-planning algorithm using Stateflow, ensuring that the drone can:

1. Accurately interpret the track detected by the image processing system.
2. Generate appropriate control commands for trajectory adjustments.
3. Handle various environmental conditions, including track discontinuities and sharp turns.
4. React in real-time to deviations from the track, ensuring the drone maintains course effectively.
5. Maintain safe and smooth flight dynamics while following the track.

The goal is to optimise the drone's ability to autonomously follow the track in the 3D environment while considering constraints such as flight stability, computational efficiency, and responsiveness to sudden changes in track layout. Success will be evaluated based on the accuracy of path-following, system stability, and robustness to simulation challenges.

You will use Simulink and Stateflow to design the decision-making logic for the drone's path planning, demonstrating a solid understanding of control system integration, state machine design, and real-time simulation testing.

2) Resources

The MathWorks 'Awesome MATLAB Hackathons' GitHub repository has a plethora of getting started resources for a variety of topics. If you're not sure where to start or feeling stuck, check it out to see if there's a resource for you!

<https://github.com/mathworks/awesome-matlab-hackathons>

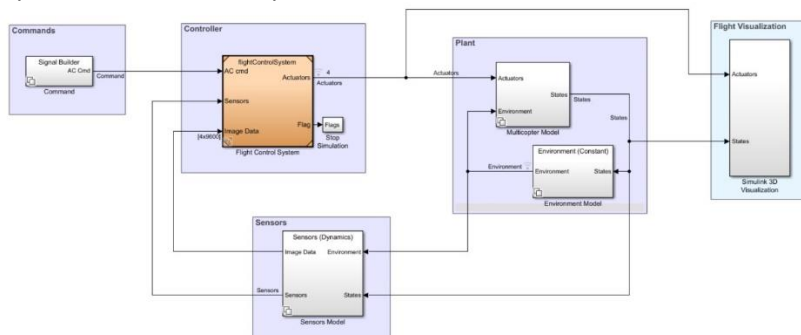
3) Requirements

Install the support package: [Simulink Support Package for Parrot Minidrone](#)

Toolboxes required for the Simulink Model:

- a) Aerospace toolbox
- b) Computer Vision Toolbox
- c) Control System Toolbox
- d) Signal Processing Toolbox
- e) Embedded Coder
- f) MATLAB
- g) Simulink
- h) Simulink 3D Animation
- i) Stateflow

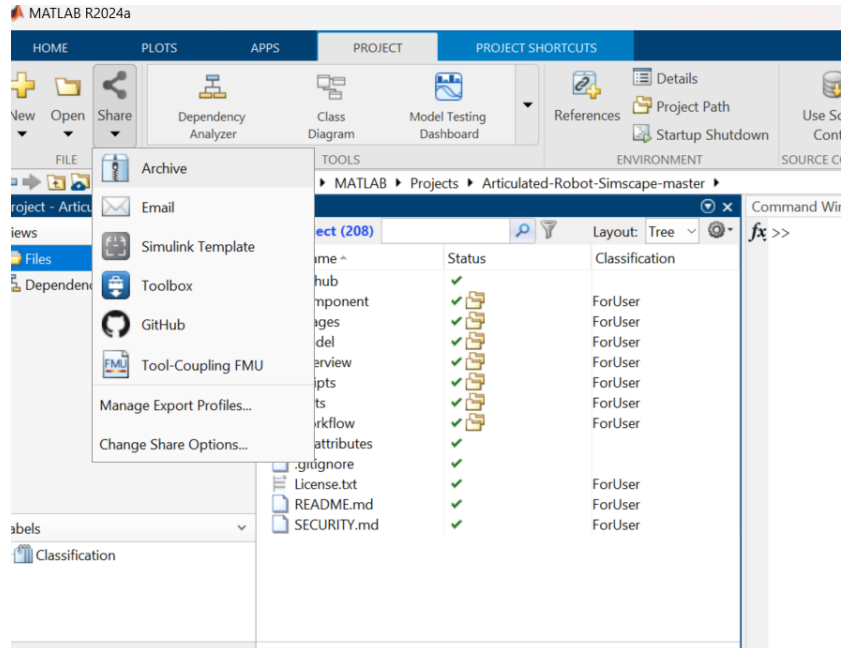
- To open the Simulink Model, type the following command in the MATLAB command window:
`>>parrotMinidroneCompetitionStart`



- Watch for ramp-up:
 - i. [Model Description](#)
 - ii. [Creating arena tracks](#)
 - iii. [Planning Flight States](#)

Submissions & Evaluations

- After finalizing the Simulink model, export your model as a project zip file (Project->Share->Archive)



- Save as Student Name or Team Name (Studentname.prj)
- Upload this archive to an online storage system that allows sharing, such as google drive, GitHub, etc.
- Submit a link to your archive via devpost

All the best!