Unmanned Systems Coding Competition

Flight Path Planning/Optimization

**Objective:**

Write a python program that generates a flight path for a survey drone. The path must allow the drone to cover the entire field, while reducing the amount of redundancy of flying over previously visited spots.

Program needs to keep track of the drone’s battery percentage and return to a home base located outside the field before that percentage drops below 15%. Time to charge the battery must also be accounted for. See below for more specific details about charging times and other drone specifications. Overlapping previously visited spots on the field is allowed but needs to be minimized. The program must track the amount of overlapping that occurs by comparing the number of overlapped spots to spots only visited once.

The program also needs to output total time (flight time + charging time) and waypoints for the calculated flight path (either in an ordered list or a csv file).

There will be two weeks to complete your programs, with final code being due on 9/28/25.

**Grading Criteria:**

Programs will be judged based on total time it would take the drone to fly the calculated path and the time it takes to calculate the flight path.

**Inputs:**

The user needs to input coordinates for the field. Assume the field is a rectangular field of any size.

**Outputs:**

Total mission time(flight time + charging times), total distance flown, waypoints that can reconstruct the flight path to be taken

**Field Specifications:**

Size: 500m x 500m (square field)

Home Base Location: Top Left of Field

Ex: If top left field waypoint is (0,0), the homebase would be at (-1,-1)

**Drone Specifications:**

Battery Energy: 2kWh

Battery Cutoff: 15%

Speed: 10 m/s

Average Power Draw: 14kW

Charge Time: 20min

Coverage Range: 5m

**Calculations:**

There are a few calculations that your program will need to use:

* Usable battery energy
* Battery percentage being used
* When the drone will need to return to homebase