

# 1<sup>st</sup> Field Test Plan

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## 1 Step 1: Path Planning

1. Where
  - (a) Stay around birmingham bridge/south shore riverfront park.
2. Objective
  - (a) Test and experiment with commands by sending throttle and steering to microcontroller.
    - i. 3 speeds: 10, 12, 15 mph
      - A. need to figure out mapping from [0,1] to a real speed.
    - ii. Different angles: 20,25,45
      - A. See how well speed is maintained at different steering angles
    - iii. multiple ways of specifying vel & steer
      - A. vcu\_cmd\_drive: throttle(0-1 value), steer(-1 to 1).
      - B. nav\_yaw: follows specified heading (radians)
  - (b) test inputting waypoints to see if boat can follow.
    - i. Try with GUI
    - ii. and then through ROS message
      - A. nav\_wpt: takes UTM coord (need to confirm)
  - (c) Ask for additional documentation from previous field test
3. How Long

- (a) Time:2 hours
  - (b) Distance:
4. Outcome
- (a) Record IMU data to see how well steering/throttle are controlled
  - (b) determine which method of sending commands would be best
  - (c) create different bag files for each test case

## 2 Step 2: Perception Plan

1. Where
- (a) Overall path: birmingham bridge  $\rightarrow$  nrec
  - (b) head to monongahela wharf area
    - i. Get data near shore
    - ii. on other side is gateway clipper fleet
  - (c) Drive to confluence/point state park
    - i. hopefully collect data with more boats around.
  - (d) David McCullough bridge - possibly some buoys/dolphins
  - (e) Head to Herrs Island/Washington Landing
    - i. stay around here for a while to observe boats/shores
    - ii. experiment with radar range and gain
    - iii. Drive through inlet between the island and the shore
2. Objective/Outcome
- (a) Collect as much radar data as possible
    - i. get data driving under bridge
    - ii. get data near docked boats
    - iii. get data near shore
  - (b) Record video with camera to compare to radar images
3. How Long
- (a) 2-3 Hours

### 3 Step 3: longer waypoint following

1. Where
  - (a) Start from NREC
  - (b) Test sequence of waypoints according to table below
    - i. goes from 40th st bridge to birmingham bridge
    - ii. Speed should be 10-15 mph
2. Objective/Outcome
  - (a) See how well waypoint following performs for a longer distance
  - (b) GPS data of the waypoints: No.1-19.
  - (c) Test strategy of hardcoding waypoints for final demonstration.
    - i. we may just hardcode a global path w/ basic collision avoidance
  - (d) Record all sensor data as well.
    - i. we can use logged radar image to prepopulate maps with obstacles (especially bridges)
3. How Long
  - (a) 1.5 Hours

S.No	Lat	Long
1	40.473543	-79.96773
2	40.469385	-79.971095
3	40.464829	-79.973984
4	40.459377	-79.98014
5	40.455986	-79.98534
6	40.450166	-79.992812
7	40.447607	-79.996955
8	40.44631	-80.001033
9	40.444875	-80.005927
10	40.443646	-80.011894
11	40.442503	-80.015569
12	40.440915	-80.01465
13	40.438817	-80.010814
14	40.436826	-80.005981
15	40.434623	-80.001112
16	40.432885	-79.997124
17	40.432568	-79.992592
18	40.434045	-79.978351
19	40.432971	-79.972491