Warehouse Inventory Check

Host Organization: Honeywell

Preamble to the Problem:

Unmanned aerial vehicles (UAVs) are quickly emerging as a viable, low-cost technology for use in various indoor applications. These services and applications often demand precision UAV autonomy that requires highly refined control dynamics and strategic mission planning, both of which are contingent upon accurate determination and localization of the deployed UAV.

Beat the ransomware!

A warehouse server has been under virus attack and lost all the inventory stock data! They need immediate assistance in stocking their inventory ASAP else a huge amount of money down the drain. You are asked by warehouse in charge to scan all the inventories using a UAV.

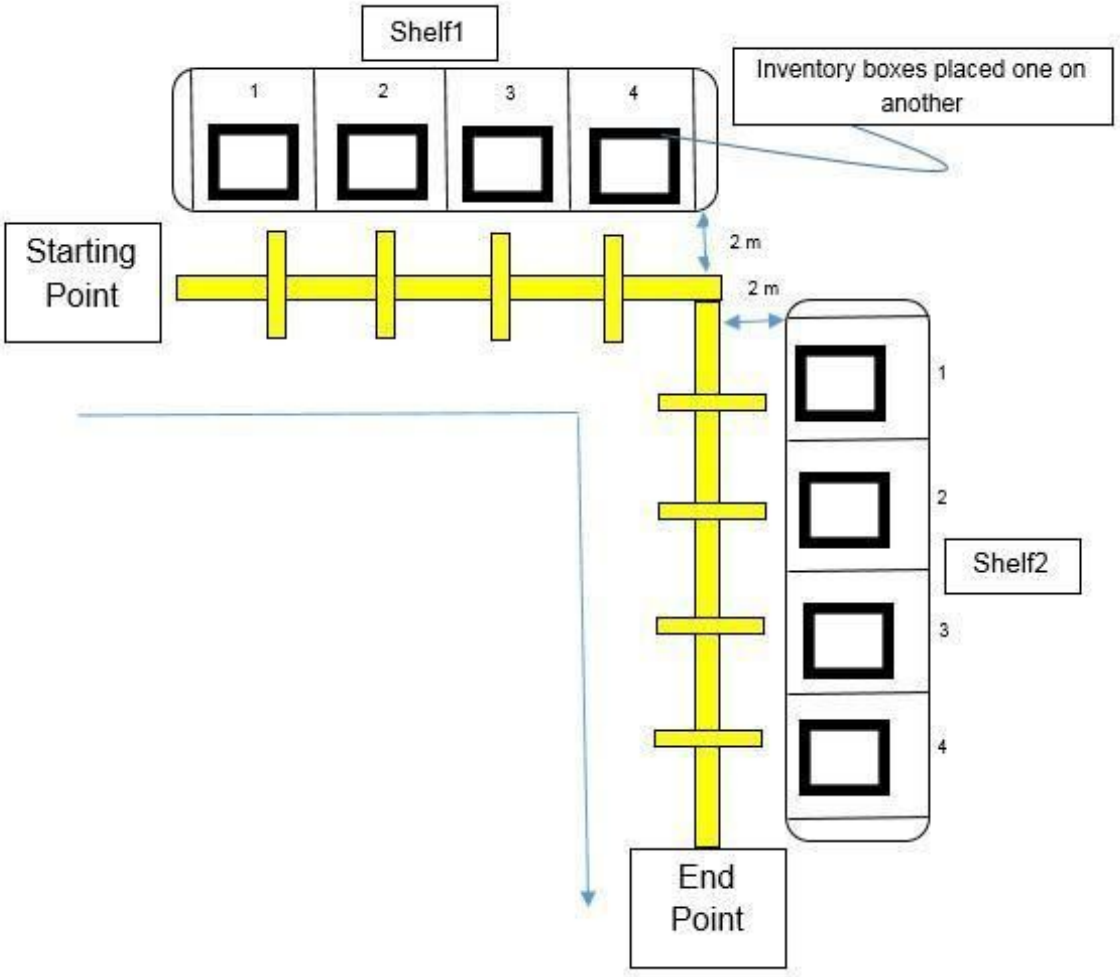

Figure 1: warehouse top view

Problem Statement:

The primary objective is to develop a UAV which can fly indoors (with any onboard or off board computation and tracking system).

- There will be two shelves of cardboard boxes with both QR codes (3 inches X 3 inches) and barcodes (2 inches height) on them. Each shelf has 2 rows of boxes (4 in each row). Box might or might not have hazardous symbol.

Figure 2: Box from front side

- There will be a marker lines (plain yellow marker) parallel to the shelves as shown in the Figure 3. Also small line strips perpendicular to this line facing each column.
- UAV has to perform these tasks autonomously on field:
    - Start from the Starting point.
    - Follow the line and scan all inventory boxes and update the location
    - (Barcode ID, QR Code ID, which shelf, which row, which column) real-time by showing on ground station or some other means.
    - Land on the End point
- Any methods can be used for autonomous takeoff and landing. The corresponding points will be just marked as square(100 cm X 100 cm)

Judging criteria:

Teams will be judged based on their presentation and flight demonstration scores:

Technical Presentation - 15 points

Explain the thought process, method, standards and procedures in developing the system.

Flight Demonstration - 85 points

- Autonomous takeoff – 10 points
- Autonomous navigation following the line and real-time scanning – (Total: 60 points)
    - Autonomous navigation following the line – 25 points
        - Pilot is allowed twice to manually control the drone back to the track if needed. 10 points will be reduced each time.

    - Real-time scanning of barcode/QR Code on the boxes to update warehouse inventory. If the system detects both barcode/QR Code, 5 extra points will be awarded. – 20 +5 points.
    - Placement information(shelf, row, column) of each boxes in real-time – 10 points
- Autonomous landing – 10 points
- Fast completion of the tasks – 5 points
    - Points will be awarded based on the least time taken for completing the mission.

Bonus points – 5 points

Identifying hazardous objects by recognizing hazardous symbol on the inventory box

General rules:

- The maximum time given for completing the task is 10 minutes
- Only 1 team can participate from each institute with maximum 5 members.
- Use of wooden and metallic propellers for UAV is not allowed.
- Use of radio controller is prohibited, the UAV should perform all the tasks autonomously but there must be a transmitter to override to manual control.
- Dimension: maximum diagonal length (motor to motor) of UAV should be 70cm.
- There should be an auxiliary safety switch to turn off the motors in case of emergency.