CA5 for EE5110/EE6110 Selected Topics on Automation and Control

Background

Manual warehouse stock counting used to be a tiring, boring and (sometimes) dangerous job. A small-size unmanned aerial vehicle (UAV) equipped with sensors and smart software algorithms can be a very good solution to automate such a process.

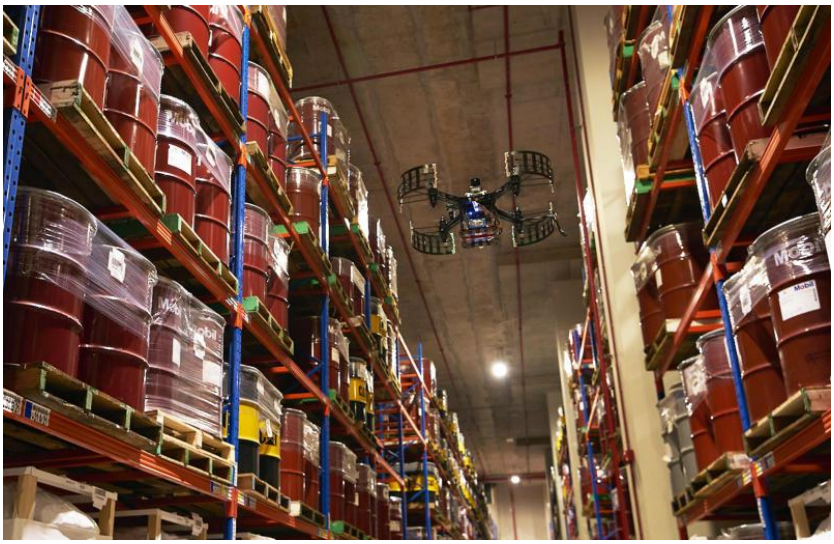

Figure 1: Autonomous warehouse stock counting by UAV

Work Requirements:

Write a report to survey existing state-of-the-art hardware products and software methods and propose your own UAV system that an be used for such an autonomous stock counting task by considering the following mission requirements:

- Maximum take-off weight of the UAV: Less than **3 kg**
- **Autonomously** fly and conduct stock counting for **both left and right sides racks** of a warehouse aisle with the following specifications and the mission must be finished **within one take-off** flight without battery change:
    - **Aisle length: 80 m**
    - **Aisle width: 2.5 m**
    - **Aisle height: 8 m** (5 layers of cargos with equally distributed layer heights)
    - Cargo information is encoded within a **barcode** facing the aisle

You should mainly focus on the following 3 topics for the considerations of the system design:

1. **Platform choice and component selection**
2. **Autonomous flight control**
3. **GPS-less navigation**

Report Format:

- Size: A4 portrait
- Font: Times New Roman 11.5
- Not more than 20 pages
- Name your report as A1234567.pdf (where A1234567 is your matric number)

Submission:

Upload to LumiNUS system under Segment D submission folder before **15 November 2021, 12 noon**.

**Note that plagiarism and copying are serious offences and students caught doing so will be reported to university. Late reports will also be penalized (10% per day).*