# Task 2D: Finding geolocation of the suspecious objects using drone

blogpost-style

Smit #1 November 21, 2022, 11:18am

@sd22

## Task 2D: Finding geolocation of the suspecious objects using drone

## Aim:

The aim of this task is to geolocate (latitude and longitude) suspicious object on the map.

**Resources:**

1. **Basics of opencv**

> For more detail description you can refer **opencv official documentation**.

1. **GDAL for geoprocessing**
2. **Plotting location of object detected in qgis using python script.**

## Installations

Update the sentinel_drone ros package from github

```
cd ~/catkin_ws/src/sentinel_drone
git pull origin main
cd ~/catkin_ws
catkin build
source ~/catkin_ws/devel/setup.bash
```

## Problem Statement:

In this task you will use computer vision techniques to find the location (latitude and longitude) of the image taken from the drone where the object is detected.

In task 2B and task 2C you successfully detected the object and its pixel location. Now in this task you need to get the geo-location (longitude and latitude) of the object on the map.

> Hint: One approach could be taking a photo of the yellow block after finding it (Task 2C) and georeference the image with **satellite image** (this a lower resolution of the satellite image) to get the geo-location of the centroid pixel co-ordinates of the object.

In task 1B you used QGIS georeferencer tool to manually find the matching features(GCPs- Ground Control Points) and georeference the aerial image but in this task you need to use image processing techniques to find the matched features in both aerial and satellite image and then use GDAL library to georeference the aerial image.

> - There are various method of feature matching like SIFT, SURF, ORB etc for matching features.
> - You are also free to use any other approach to find the exact location(latitude and longitude) of an object.

After getting the locations of the objects you need to plot them in QGIS map canvas on an openstreet map layer of a given arena using a python script.

> Note: All the script should run at the start of the run, You are not allowed to run any script in between the run.

## Procedure:

- QGIS application should be opened with Openstreet map as base layer containing the location of the arena. **ROS node** should be running in QGIS python console which will suscribe topic "***geolocation***" with message type **Geolocation** for reading the location of point passed by a rostopic from drone image.

> geolocation topic must use a custom message type containing **objectid, latitude and longitude**. The objectid should be in the following format: obj0, obj1 and obj3 for detected object number 1,2 and 3 respectively. Longitude and latitude have the float data type.

Geolocation Message type:

```
saail@eyantra:~/catkin_ws$ rosmsg show Geolocation
[sentinel_drone/Geolocation]:
string objectid
float32 lat
float32 long
```

- Launch sentinel drone in Gazebo simulator using terminal.

```
roslaunch sentinel_drone task_2d.launch
```

- Sentinal Drone will fly and scan the city.
- Detect the suspicious activities indicated by yellow block on the arena using the camera attached on the drone.
- Once yellow block is detected the geo location need to be found.

> Hint: Georeferencing the frame where object is detected.

- Geolocation point needs to be passed to a rostopic named “***geolocation***”(having message type Geolocation) through rosnode for plotting it on a base map of Openstreet map.
- All the points should be plotted on QGIS base layer map wherever the object was detected.

## Submission instructions

Submission instructions will be posted here soon

## Deadline

10 December 23:59 Hrs

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**Smit** unlisted #2 November 21, 2022, 11:18am

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**Smit** listed #3 November 25, 2022, 6:11am

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**Smit** closed #4 November 25, 2022, 6:11am