First year engineering school project

Camera Alignment Tool for the Security of Toulon harbor

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[1]Team Leader and responsible for the embedded electronics and programmation

1. Context

This project fits into the context of monitoring zones, specifically in the bay of Toulon (France). Monitoring that requires the deployment of high-performance optoelectronic sensors to ensure target identification, tracking, and geolocation using cameras. These operations depend on the environment and deployed systems such as the recognition range of the optoelectronic system.

To guarantee accurate target localization in images, it is essential to collect camera data. This will optimize the overall performance of the surveillance device and ensure precise detection and classification of potential targets. Among these parameters, those listed below particularly interest us because they play a crucial role in estimating target kinematics :

- Camera location in latitude and longitude.
- Elevation and Azimuth angle.
- Altitude

2. Aim

I needed to find a way to measure and transmit in real time the altitude, GPS coordinates, and line of sight angles of an embedded camera with precision.

3. Tools

STM32 Microcontroller, accelerometer, gyroscope, gps

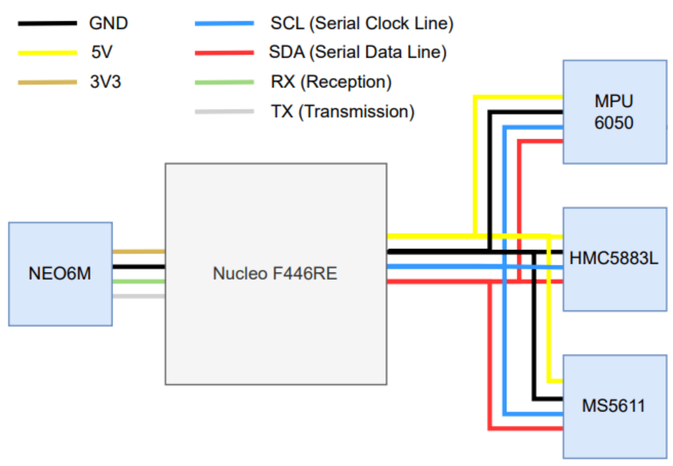
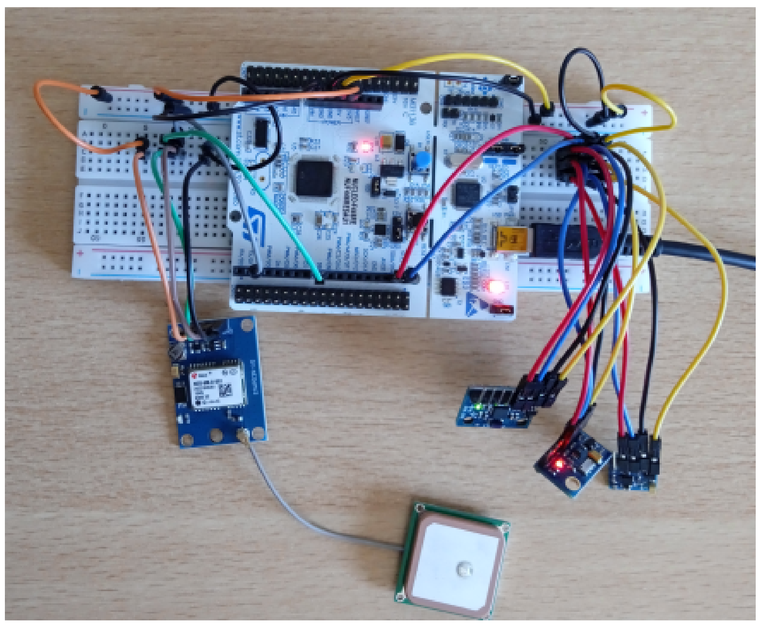


Figure 1: System Circuit and Components

4. Work done

I was able to create a functional system capable of measuring the parameters of the camera with the help of sensor fusion and Kalman filtering in 1 month of work.



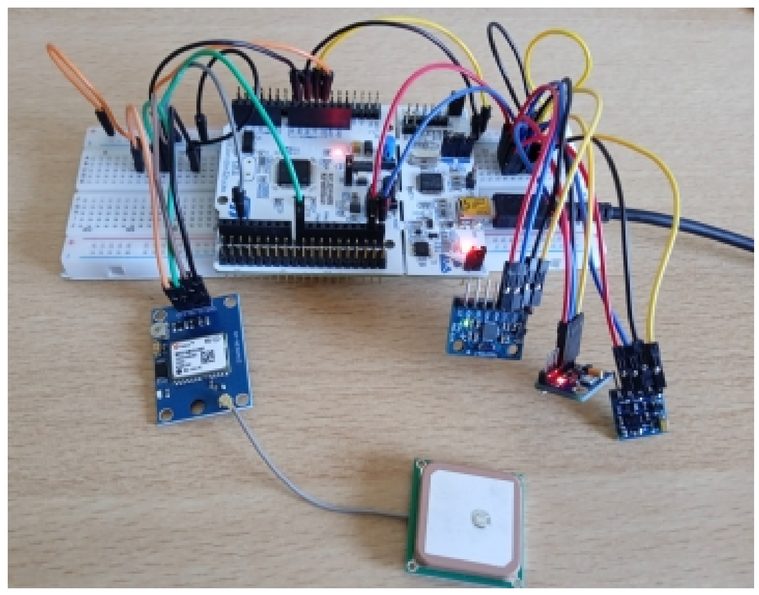


Figure 2: System

I can not tell the precision due to NDA concerns but the tool concept was more than efficient.

I was also the team leader so I needed to make reports and presentations to the professors and companies but also needed to dispatch the work to the members of the team.

5. Conclusions

The system was capable of giving all the parameters requested with great precision and the company that needed the tool was very satisfied of our solution. Also, I was able to lead the team to get a full mark on the project.