

INTERSHIP OPPORTUNITY

Machine Learning

COMPANY

3D Aerospace (www.3daerospace.eu) is an European young start-up established in June 2018. We are located at Toulouse (France) in Montaudran and are developing an innovative new generation of GNSS (GPS / Galileo) mapping receiver.



The company is based on equality gender, positive working atmosphere, hard work transparent communication and continuous improvement. We want to propose a safe environment to make innovation happens. At 3D, failure is perceived as an opportunity to learn and improve and is accepted as long as a rigorous and structured work is applied.

3D Aerospace is currently developing two brands, DeVines and GaliGo. DeVines is part of the precision viticulture market, which brings together all the technological innovations related to viticulture. With DeVines, we offer an all-in-one solution, which combines several services in a single tool. GaliGo, our second brand under development, is part of the connected cities market. GaliGo offers a real-time updated traffic mapping solution and delivery network optimization.

YOUR ROLE

During the period of the internship, you will have the opportunity and responsibility to work on three main topics:

1. Review the vision subsystem of the receiver & the machine learning objectives.

3D Aerospace is developing through its brand DeVines, precision viticulture services. Our images are calibrated and of premium quality thanks to our company made mapping GPS receiver (submetric accuracy). Out of the three services, two services are entirely based on machine learning capabilities:

- Detection of dead vineyard plants and missing plants. This is one of the main needs, expressed by our customers. The vine plant needs to grow for three years prior to reach a level of maturity sufficient to produce grapes for wine production. Hence, it is crucial for the grape grower to know exactly the location of the missing plants in his / her vineyard.
- Detection and identification of the number of grapes per plant from the blooming till the harvest. The vineyard production has always been stamped by its irregular yearly harvest quantity. The yield control is decisive for the harvest organisation and the wine quality. Different methods try already to make a prediction of the yield by estimating the grape volume at harvest on geographical areas more or less widespread; The aim is to provide a fast and reliable method enabling an early yield estimation to all the persons involved in the viticulture area.

During this first part of the internship, you will have to:

- Review and consolidate the vision subsystem requirements based on the system requirements - related to the mapping GPS receiver part.
- Review and consolidate the machine learning & database subsystem requirements based on the system requirements - related to the database & machine learning part.
- Review and consolidate the calibration algorithm / strategy for the array of cameras related to the mapping GPS receiver part.
- Review the fields of view of the array of receiver's cameras.

2. Development and implementation of detection of missing or dead trees.

One of the purposes of this internship is the detection of missing or dead trees in the vineyard. Hence during this second phase of the internship, you will have the following objectives:

- Perform a literature review on the possible methodologies. The intern will have to select the most appropriate method, based on accuracy, easiness of implementation, computation time and storage.
- Pre-processing data collected during the last campaign in order to clean the data set for machine learning implementation.
- Develop the machine learning architecture in terms of convolutions, layers and subsampling.
- Implement and test the developed machine learning algorithm on the test datasets.
- Optimise the process for automatic processing dataset from our mapping platform eHermes.
- Organise a database for the storage of the results and its associated API (backend).

3. Development and implementation of detection grapes on vine plants.

One of the purposes of this internship is the detection of grapes per plant. Hence during this third phase of the internship, you will have the following objectives:

- Perform a literature review on the possible methodologies. Although applying a mask R-CNN seems the most appropriate method, the intern will have to select the most appropriate method, based on accuracy, easiness of implementation, computation time and storage.
- Pre-processing data collected during the last campaign in order to clean the data set for machine learning implementation.
- Develop the machine learning architecture in terms of convolutions, layers and subsampling.
- Implement and test the developed machine learning algorithm on the test datasets.
- Optimise the process for automatic processing dataset from our mapping platform eHermes.
- Organise a database for the storage of the results and its associated API (backend).

4. Data visualisation in Java (smartphone app) and in JS (web app)

Finally, you will be in charge of the visualisation of the results in a JAVA smartphone application. The tasks will consist of:

- Create a map tile using the open-source libraries such as OpenStreetMap (front end).
- Connect the back end developed in tasks 2. And 3. To the front end
- Overlaying the data results into the map tile
- Providing the necessary documentation for the end users

ADDITIONAL INFORMATION

Location: 3 Avenue Didier Daurat, 31400 Toulouse, France

Internship Duration : 6 months starting from February / March to End of August / September 2022.

Working Language: English

Internship allowance: about 575.50€ per calendar month (3.90€ per hour)

Contact email address: contact@3daerospace.eu

Working conditions: 3D Aerospace is a small team of passionate and hard worker people. Our small size is actually one of our main strengths as it provides agility, flexibility and a sense of family-size company. Our organisation is based on daily scrums and monthly milestones review.

Application process: One case study to prepare offline and an one to one interview with 3D Aerospace core team.

Follow-on possibility: Following the completion of the internship and based on satisfactory results during the internship you could be offered job opportunity at the company.