VisLab internship opportunities

March 2024
VisLab Introduction

A high-tech company based in Parma, VisLab is focused on all aspects of ADAS and autonomous driving including machine learning, deep neural networks (DNNs), stereovision, robotics, sensor fusion, planning, system calibration, and more.

Founded in the late ‘90s as a research laboratory at the University of Parma, VisLab quickly established itself as a pioneer in vehicle autonomy before spinning off from the University in 2009.

In 2015, VisLab was acquired by Ambarella, a publicly traded semiconductor Company based in Silicon Valley headquartered in Santa Clara (California, USA) and with offices in Detroit (Michigan, USA), Munich (Germany), Hong Kong, Hsinchu (Taiwan), SeongNam City (South Korea), Shanghai (China), Shenzhen (China), and Yokohama (Japan).

Specializing in the development of advanced computer vision hardware processors, Ambarella relies on VisLab for core research and development across all the markets with a particular focus on automotive.

VisLab provides top level research in the most contemporary high-tech fields such as autonomous driving, robotics, and deep learning. VisLab equips and operates a fleet of autonomous vehicles and received the first authorization from the Italian Ministry of Transportation to run autonomous driving tests on open roads.

Check www.vislab.it for further information.
VisLab: 25 Years of CV and Autonomous Driving

1998: Mille Miglia 2000+km on Italian highways 94% autonomous steering

2010: VIAC 15K km cross-continent drive AD following

2014: DEEVA 13 stereo camera systems; CV integration; 100% AD

2015: Ambarella acquires VisLab

2005, 2007: DARPA Grand and Urban Challenge. 100% AD

2013: PROUD: Braive drove 13km in Parma. Level 4 demo 100% driverless AD

2018: AD perception stack demonstrated on CV1

CES 2018: camera on the roof track of Lingotto building in Turin

CES 2019: AD driving on the roof track of Lingotto building in Turin

CES 2019: AD driving on the roof track of Lingotto building in Turin

CES 2020: L4 autonomous driving demo in Las Vegas with automatic parking. CV2-based

CES 2022: L4 autonomous driving demo and new Oculii-based sensing suite.

2023: Full L4 autonomous driving stack demo on CV3

VisLab Today
- Algorithm first approach applied to Computer Vision
- Continuous research benefits future Ambarella chips

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CES 2022: L4 autonomous driving demo and new Oculii-based sensing suite.

2023: Full L4 autonomous driving stack demo on CV3
Title: Pedestrian intention forecasting

Description: The goal of the internship is to develop a network that is able to predict intention of pedestrians, using a video input. The intern will start from the study of the state of the art, to move on to the development of the network and to tests using public datasets. The intern will have to try different network architectures to evaluate them and select the best one.

Requirements:
• At least basic knowledge of neural networks
• Knowledge of the Python programming language

Tutor: Maria Chiara Laghi, Alessandro Capasso

Duration: 6 months
Title: Testing new architectures for a neural network-based planner

Description: The goal of the internship is to test different architectures for a network that can plan the trajectory of an autonomous vehicle. The intern will start from the study of the state of the art, to move on to network development and testing using a simulator provided by the company. The intern will have to compare the performance of the developed network with others already present in the company.

Requirements:
• At least basic knowledge of neural networks
• Knowledge of the Python programming language

Tutor: Maria Chiara Laghi, Alessandro Capasso

Duration: 6 months
Title: Development of a network based on a hybrid imitation and reinforcement learning approach

Description: The goal of the internship is to develop a planning network for an autonomous vehicle based on a hybrid imitation and reinforcement learning approach. The intern will start from an in-depth study of the state of the art, to move on to network development and testing using a simulator provided by the company. The intern will have to try different network architectures to evaluate them and select the best one.

Requirements:
• A good knowledge of neural networks, in particular reinforcement learning.
• Knowledge of the Python programming language

Tutor: Maria Chiara Laghi, Giulio Bacchiani

Duration: 6 months
Internship 4

Title: Automatic generation of high-definition maps with neural networks

Description: The goal of the internship is to develop a network to generate high-definition maps. The intern will start from an in-depth study of the state of the art, to move on to network development and testing using real and simulator data provided by the company. The intern will have to try different network architectures to evaluate them and select the best one.

Requirements:
• At least basic knowledge of neural networks
• Knowledge of the Python programming language

Tutor: Dafne Molin

Duration: 6 months
Internship 5

Title: Automatic generation of simulated scenarios for autonomous driving

Description: The goal of the internship is to develop an algorithm which allows to automatically generate scenarios for autonomous driving. The algorithm can be a procedural algorithm, a neural network or a mix of both. The intern will start from an in-depth study of the state of the art, to move on to algorithm development and testing using simulator data provided by the company.

Requirements:
• At least basic knowledge of neural networks
• Knowledge of the Python programming language
• Knowledge of C++ programming language

Tutor: Matteo Pancioli, Hamid Hassannejad

Duration: 6 months
Internship 6

Title: System design and GUI development for managing power and health functions of an autonomous vehicle

Description: The goal of the internship is to define the system components and develop a graphical user interface (GUI) to manage power functions and the health status of an autonomous vehicle. The communication with the system will mainly be based on CAN and Ethernet. The intern will start from the system design definition and the system components identification, then a proof of concept of the system will be implemented and the GUI will be developed on it.

Requirements:
- Knowledge of power systems and basic electronics
- Knowledge of C++ programming language

Tutor: Gabriele Camellini, Omar Pighi, Paolo Grisleri

Duration: 6 months
**Internship 7**

**Title: Design and implementation of a power management system for autonomous vehicles**

**Description:** The goal of the internship is to design a system to manage the different power sources of a vehicle. The vehicle can be Internal Combustion Engine, Hybrid, or Full Electric, while the power sources can be the vehicle battery, the wall power, and auxiliary sources. The system will have to manage the different sources, possibly automatically, depending on the vehicle usage, in order to supply the necessary power to the autonomous system.

The system should also feature:
- Voltage and current measurement on the load branches
- Output protection with fuses
- Measurement of the total current
- Ethernet and CAN interface, with protocol definition for commands and report

The intern will start from the system design definition and the system components identification, then a proof of concept (POC) of the system will be implemented. The interface definition and implementation will be built on the POC.

**Requirements:**
- Knowledge of power systems and basic electronics
- Knowledge of C++ programming language

**Tutor:** Gabriele Camellini, Omar Pighi, Paolo Grisleri

**Duration:** 6 months
Internship 8

Title: Testing deep-learning-based architectures for heterogeneous data fusion

Description: The goal of the internship is to analyze and test different network architecture for the fusion of heterogeneous data, coming from radars, cameras, lidar and stereo cameras. The intern will start from the study of the state of the art, to move on to the analysis and the test. The intern will have to evaluate the different architecture and to select the best one.

Requirements:
• At least basic knowledge of neural networks
• Knowledge of the Python programming language

Tutor: Alessandro Pacchioni

Duration: 6 months
Title: Testing deep-learning-based architectures for heterogeneous data fusion, using publicly available datasets

Description: The goal of the internship is to analyze and test different network architecture for the fusion of heterogeneous data, coming from radars, cameras, lidar and stereo cameras. The intern will start from the study of the state of the art, to move on to the analysis and the test. The intern will have to evaluate the different architecture using publicly available datasets.

Requirements:
• At least basic knowledge of neural networks
• Knowledge of the Python programming language

Tutor: Alessandro Pacchioni

Duration: 6 months