

*Diploma Thesis Assignment:*

# Implementation of ADAS feature fusion in OpenCL and performance comparison on different platforms

## **Mentor:**

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## **About Valeo:**

Valeo is one of the biggest tier-1 automotive components supplier worldwide, active in various areas such as lighting systems, powertrain systems, comfort systems, etc. In TCE Prague our work is focussed on development of ADAS (Advanced Driver Assistance Systems) and driving automation systems.

## **Motivation:**

Nowadays the high-end carmakers are racing towards more and more autonomous car. This trend requires more and more computing power to handle complex computations dealing with lots of sensor data. The multi-core CPUs and GPUs are of course present in cars nowadays, but up to now they have only been used for infotainment and other not-safety-critical tasks. In the very near future the market will welcome the first high-end car with very powerful safety-critical ECU (Electronic Control Unit, look up Audi zFAS) which will be able to handle advanced steering maneuvers when needed to improve passenger safety and comfort. The SW development has to address these challenges and thus the purpose of this assignment is to explore the possibilities of rather new programming approach suitable for computationally demanding tasks.

## **Assignment:**

1. Acquire necessary OpenCL know-how, find out limitations of considered target platforms and possibilities of running OpenCL code on these.
2. Study dissertation thesis Nico Kaempchen: 'Feature-Level Fusion of Laser Scanner and Video Data for Advanced Driver Assistance Systems'.
3. Implement described algorithm but only for features coming out of laser scanner sensor (implement object tracking and laser sensor measurement fusion into object map).
4. Perform comparison of runtime and memory resource consumption in target platforms:
  - a. Multi-core PC CPU
  - b. Multi-core ARM Cortex-A8 (Xilinx Zynq)
  - c. FPGA (Xilinx Zynq)
  - d. Parallella Epiphany