GPU computing

Lecturers
Gauthier LAFRUIT (Coordinator) and Jan LEMEIRE

Course mnemonic
INFO-H503

ECTS credits
5 credits

Language(s) of instruction
English

Course period
Second term

Campus
Solbosch

Course content

Typical image processing algorithms (box filtering, windowed filtering, integral images, matrix calculus, etc) will be revisited for parallel implementations in CUDA with thread processing patterns that properly exploit the Graphics Processing Unit's (GPU) memory and system architecture.

Objectives (and/or specific learning outcomes)

By the end of the course, the student will have implemented 2D image processing algorithms in CUDA, targeting (near) real-time applications.

Pre-requisits and co-requisits

Required knowledge and skills

C/C++ programming skills are strongly recommended (medium level).

Good understanding of 2D image processing algorithms. Typical examples are 2D imaging like radial distortion removal, image stitching and depth estimation in 3D applications, cf. the course INFO-H502.

Teaching method and learning activities

The course follows a "learn by example" approach.

The exercises will prepare the student to the parallel implementation of a 2D image processing algorithm described in a scientific paper, e.g. depth estimation with stereo matching.

Contribution to the teaching profile

Massive multi-thread programming of a 2D imaging algorithm on a Graphical Processing Unit (GPU) for the multimedia engineer.

References, bibliography and recommended reading

John Cheng, Max Grossman, Ty McKercher, "Professional CUDA C Programming", John Wiley & Sons, 2014.

Course notes

Université virtuelle

Other information

Place(s) of teaching

Solbosch

Contact(s)

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Evaluation method(s)

Oral presentation and Project

Evaluation method(s) (additional information)

The evaluation covers a report and an oral presentation of a 2D imaging algorithm on GPU, while also answering complementary questions related to the theory part of the course.

Determination of the mark (including the weighting of partial marks)

The project report and its presentation on one side, and the theory Q&A on the other side count each for 50% of the final score.

Main language(s) of evaluation

English

Other language(s) of evaluation, if applicable

French

Programmes

Programmes proposing this course at the Brussels School of Engineering

MA-IRCB | Master of science in Biomedical Engineering | finalité Professional/unit 2 and MA-IRIF | Master of science in Computer Science and Engineering | finalité Professional/unit 1 and finalité Professional/unit 2