Summer/Winter School "Computer Vision: Hard, Soft and Real Applications"

Saint Petersburg Electrotechnical University "LETI"

Degree or qualification is awarded: **standard certificate**

Language of study: **English**
Mode of study: **distance learning**
Duration: **1 week**
Availability of free education: **yes**
Price: **10 000 rubles**

Programme webpage at the university website:
https://etu.ru/en/study/winter-and-summer-schools/computer-vision-hard-soft-and-real-applications

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The School is dedicated to computer vision studying. Primary school advantage is the related course that covers all main computer vision aspects, such as hardware, including sensors application and GPU programming, and software, including images processing and automatic analysis. Acquired skills real applications are also covered.

The School is built on three modules:

1. “Hard” module, where students learn about modern computer vision cameras structure, low-level image data processing, GPU operations and video system engineering.
2. “Soft” module, where students learn about digital image processing methods and algorithms, video analytics, video data analysis, computer vision related machine learning issues.
3. “Real application” module, dedicated to integration of learned techniques in real applications. Successful implementations are discussed, covering common mistakes, difficulties, and ways to overcome them.

Lecture courses are synchronized with practical classes, where students apply the knowledge gained in practice and get a practical result

Key points

1. Today computer vision is one of the most popular scientific trends. Autonomous navigation, unmanned vehicles, face recognition etc. are now on the active agenda on any educational platform
2. We teach the main interrelated aspects: hard and soft. Usually just one aspect is covered.
3. The optimal balance between theoretical training and practice. Students will really be able to try themselves in the role of computer vision engineers.
4. Experienced teachers who are acting R&D engineers with leading telecommunication companies. The courses contain the most up-to-date information. Some data are not even in the "print" yet.
5. It is planned to open an English-language master's program on a related topic, with the help of that one can get fundamental training in this topic.

Specializations within this programme

Smart technologies and machine learning in computer vision

The module includes courses:

Machine Learning and Deep Learning in Computer Vision
Smart-technologies in digital image processing
Lections cover methods and algorithms for digital image processing, video analytics, panoramic images building,

machine learning, video data analysis, human perception based image synthesis. In practical classes, workshops and home tasks students learn to solve problems and develop algorithms in the field of computer vision systems, get programming skills (C++, Python) and use specialized libraries (OpenCV, Keras, TensorFlow, etc.)

Sensors and video processors for computer vision

The module includes courses:

Modern sensors for machine vision
Development of a video processor based on FPGA
Lections cover computer vision systems engineering principles, image optical features analysis (spectral, energetical, dynamic etc.), image sensors (CMOS, TOF, multispectral, UV, LWIR), data transfer interfaces.

On studying students get practical skills in computer vision systems engineering, namely estimation and calculation of parameters required for system operations, and models engineering in such environments as Matlab, Wolfram Mathematica, Altium Designer, control and processing systems engineering using FPGA (Quartus Prime).

Computer vision in real applications

The module includes courses:Computer vision in real applications (TV)
The module covers issues of applying the acquired skills and learned methods and algorithms in practice. Typical implementations and specifics for various industries are covered.