

## Media Processing Systems

Multimedia systems are information processing units that process not only text but any media stream such as speech, audio data, video sequences or haptic signals. The processing steps include recording, storage, transmission, conversion and reproduction of multimedia signals and often take human interaction into account. Multimedia capabilities of information processing systems are growing enormously and represent an important future market from an economic point of view.

Examples of multimedia systems are:

- Consumer electronics equipment, such as set-top boxes, plasma televisions, digital radio receivers, DVB systems, CD and DVD players, home cinema systems
- Mobile multimedia devices, such as smartphones, video game consoles, digital cameras, video cameras
- Studio and cinema technology, such as television cameras, microphone systems, audio and video storage systems, video projection equipment, surround sound systems
- Networked multimedia systems, e.g. music, image and video databases, audio and video streaming on the Internet, video telephony, video conferencing systems, remote-controlled sensors and actuators

In this study program, students are familiarized with the most important basics for the development of multimedia systems. This includes the following main topics:

- How can multimedia signals be recorded and played back? Questions of human-machine interface play a major role here, techniques for microphones, cameras and other sensors (e.g. imaging sensors in medicine) are explained. On the playback side, the bandwidth ranges from multi-channel speakers and projection systems to computer graphics.
- How can multimedia data be transmitted? A mere point-to-point transmission of source data is not feasible for multimedia signals because of the large data volume. Methods for source compression of speech, audio and video signals are developed and their reliable and timely transmission via heterogeneous networks (e.g. media streaming) are addressed.
- How is multimedia data stored? Large volumes of multimedia data have to be stored in such a way that access to individual media components is possible. This requires techniques of selective media search and timely media retrieval as well as their database organization.
- How are multimedia data automatically analyzed, interpreted and converted? This complex includes basic techniques of machine learning and signal analysis, such as methods for converting text to speech or speech recognition algorithms. Automatic interpretation of audio, image and video data for archiving systems or personal stereo and home cinema systems are also addressed.