Realtime Interactive Systems

Module title

Abbreviation

Realtime Interactive Systems

10-HCI-RIS-152-m01

Module coordinator

Module offered by

holder of the Chair of Computer Science IX

Institute of Computer Science

ECTS

Method of grading

Only after succ. compl. of module(s)

5

numerical grade

Duration

Module level

Other prerequisites

1 semester

graduate

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Contents

This course provides an introduction to the requirements, concepts and engineering art of highly interactive human-computer systems. Such systems are typically found in perceptual computing, virtual, augmented, mixed reality, computer games and cyber-physical systems. Lately, these systems are often termed real-time interactive systems (RIS) due to their common aspects.

The course covers theoretical models derived from the requirements of the application area as well as common hands-on and novel solutions necessary to tackle and fulfil these requirements. The first part of the course will concentrate on the conceptual principles characterising real-time interactive systems.

Questions answered are: What are the main requirements? How do we handle multiple modalities? How do we define the timeliness of RIS? Why is it important? What do we have to do to assure timeliness? The second part will introduce a conceptual model of the mission-critical aspects of time, latencies, processes and events necessary to describe a system's behaviour. The third part introduces the application state, its requirements of distribution and coherence and the consequences these requirements have on decoupling and software quality aspects in general. The last part introduces some potential solutions to data redundancy, distribution, synchronisation and interoperability.

Along the way, typical and prominent state-of-the-art approaches to reoccurring engineering tasks are discussed. This includes pipeline systems, scene graphs, application graphs (aka field routing), event systems, entity and component models and others. Novel concepts like actor models and ontologies will be covered as alternative solutions. The theoretical and conceptual discussions will be put into a practical context of today's commercial and research systems, e.g. X3D, instant reality, Unity3d, Unreal Engine 4 and Simulator X.

Intended learning outcomes

At the end of the course, the students will have a solid understanding of the boundary conditions defined by both the physiological and psychological characteristics of human users as well as by the architectures and technological characteristics of today's computer systems. The students will have gained a solid understanding of what they can expect from today's technological solutions. They will be able to choose the appropriate approach and tools to solve a given engineering task in this application area and they will be equipped with a solid theoretical foundation enabling them to develop alternative approaches for future real-time interactive systems.

Courses

Type, number of weekly contact hours, language — if other than German

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Module taught in: German and/or English

Method of assessment

Type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus

written examination (approx. 90 minutes)

Language of assessment: German and/or English

creditable for bonus

Allocation of places

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Additional information

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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<td>Master's degree (1 major) Human-Computer-Interaction (2015)</td>
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