



TEACHING MODULE Announcement

PhD in Information and Communication Technology for Health

Università degli Studi di Napoli Federico II

Module Title: Design and Implementation of Augmented Reality Software Systems

Lecturer: Dr. Domenico Amalfitano

University of Naples Federico II

Department of Electrical Engineering and Information Technology (DIETI)

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CV: Domenico Amalfitano is a fixed term assistant professor at the Department of Electrical Engineering and Information Technology (DIETI) of the University of Naples Federico II. He received the Ph.D. degree in computer engineering and automation from the University of Naples Federico II, in 2011. His main research interests include in the areas of software engineering, software testing, software testing automation, reverse engineering, software maintenance, program comprehension, and software development processes improvement. He applied his research activity in the contexts of Mobile Apps, Web Applications, and Automotive Embedded Software.

Lecturer: Ing. Domenico Irilli

Microsoft Italia

domenico.irilli@microsoft.com

CV: Domenico Irilli graduated in Computer Engineering at Politecnico di Torino in 2005. After a professional experience in banking sector he landed in Microsoft and covered several roles. Now he manages the digital transformation and application modernization practices through the Microsoft Cloud for the most important Italian costumers. His areas of interest concern Blockchain, Augmented Reality and Artificial Intelligence for cognitive services.



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Dates and Locations (rooms are in DIETI Building 3A, via Claudio 21, Room to be confirmed)

Date	Hours	Room	Lecturer
May 29 th 2020	10.30-12.30	Meeting room (4.19), 4th floor	Prof. Anna Rita Fasolino
June 3 th 2020	9:30-12:30	Meeting room (4.19), 4th floor	Domenico Amalfitano
June 5 th 2020	9.30-12.30	Meeting room (4.19), 4th floor	Domenico Amalfitano
June 8 th 2020	9.30-11.30	Meeting room (4.19), 4th floor	Domenico Amalfitano
June 10 th 2020	9.30-11.30	Meeting room (4.19), 4th floor	Domenico Amalfitano
June 12 th 2020	9.30-11.30	Meeting room (4.19), 4th floor	Domenico Amalfitano
June 16 th 2020	10.30-12.30	Meeting room (4.19), 4th floor	Domenico Irilli
June 16 th 2020	14.30-16.30	Meeting room (4.19), 4th floor	TBD
June 19 th 2020	14.30-16.30	Meeting room (4.19), 4th floor	Domenico Amalfitano

Overview

With the term Augmented Reality, we refer to the use of devices such as displays, cameras, and sensors for overlaying digital information to the real world. The application of augmented reality technology is opening up new opportunities in the health industry. In a market, that it is expected to reach a value of \$1.5B in 2020, developing high-quality Augmented Reality Software Systems is more and more needed.

The goal of this module is to introduce the Augmented Reality Software Systems to the researchers working in the health domain and to present software engineering solutions appositely crafted for specifying the requirements, designing, implementing, and evaluating the quality of such software systems. At the same time, the module will show the new research trends in the field of Augmented Reality Software Systems and its novel applications in healthcare.

To earn the credits, at the end of the course students are requested to provide a good quality presentation about the potential application of Augmented Reality in the context of their research field. Alternatively, students can also present a project (or running demo) of an Augmented Reality Software System prototype they develop. Student's presentations will take place in the last lesson. Details about the presentation format will be given during the course. The schedule of the presentations will be defined during the course.

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Content

Lesson 1 (2 hours) - Introduction to Augmented Reality Software Systems: Module overview, goals and objectives. Introduction to Augmented Reality Software Systems and their applications in Health Domains.

Lesson 2 (3 hours) - Augmented Reality Software Systems Requirements Modelling and Specification: Introduction to UML as modeling language for Augmented Reality Software Systems design. Analysis and modelling of AR Software Systems requirements and specifications in UML.

Lesson 3 (3 hours) - Augmented Reality Software Systems Design: Software Architectures adopted for designing Augmented Reality Software Systems. UML as modelling language for designing Augmented Reality Software Systems architectures. Architectural patterns and Architectural styles for documenting, designing and implementing Augmented Reality Software Systems.

Lesson 4 (2 hours) - Technologies for Implementing Augmented Reality Software Systems: Description and comparison the software technologies enabling the implementation of Augmented Reality Software Systems. Hands on creating a virtual environment and adding virtual information to real scenes with Unity 3D and Unreal Engine. Object recognition and tracking with Vuforia SDK.

Lesson 5 (2 hours) - Technologies for Implementing MAR (Mobile Augmented Reality) Software Applications: Introduction to iOS (ARKit) and Android (ARCore) SDK for developing Mobile Augmented Reality Software Applications. Design and implementation of portable MAR Software Applications. Deploying MAR Software Applications on different mobile devices using Unity 3D and Vuforia. Integrating MAR software applications with native apps.

Lesson 6 (2 hours) - Technologies enabling the implementation of Augmented Reality Software Systems for Head Mounted Devices (HMD): Design and implementation of Augmented Reality Software Systems for Microsoft HoloLens Head Mounted Devices. Case study: from requirements analysis to design, implementation and deploy on the physical device.

Lesson 7 (2 hours) - Microsoft Seminar on Case Studies and Industrial Research Trends: In this lesson ing. Domenico Irilli, from Microsoft Italia, will held a seminar aimed at presenting real case studies and industrial research trends in the field of Augmented Reality Software Systems Development.

Lesson 8 (2 hours) - Lecture lead by a doctor presenting current and future research directions about the usage of Augmented Reality Software Systems in medical field.

Lesson 9 (2 hours) - Assessment - The lesson is dedicated to the final assessment.

ECTS Credits: 4 (20 hours)

Notes

Lessons, if needed, will be held in videoconference mode through the **Microsoft Teams Class** named “**ICTH Module - Design and Implementation of Augmented Reality Software**”. Participants to the Module are requested to e-mail to Dr. Domenico Amalfitano reporting the following information: Student name, name of the PhD course and cycle.

Info: **Dr. Domenico Amalfitano** - tel. 081-7683819 – domenico.amalfitano@unina.it