



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:

INTERAKCIJA ČLOVEK-RAČUNALNIK

Course title:

HUMAN-COMPUTER INTERACTION

Študijski program in stopnja
Study programme and level

Študijska smer
Study field

Letnik
Academic year

Semester
Semester

PREDMETNI UČITELJ Enovit magistrski študijski program druge stopnje	PREDMETNI UČITELJ	2.	4.
SUBJECT TEACHER Five-year master's degree program Subject Teacher	SUBJECT TEACHER		

Vrsta predmeta / Course type

Obvezni / Compulsory

Univerzitetna koda predmeta / University course code

UR08

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30	0	45	0	0	105	6

Nosilec predmeta / Lecturer:

NIKO LUKAČ

Jeziki /

Predavanja / Lectures:

Slovenščina / Slovene

Languages:

Vaje / Tutorial:

Slovenščina / Slovene

**Pogoji za vključitev v delo oz. za opravljanje študijskih
obveznosti:**

Prerequisites:

• Ni pogojev

• None

Vsebina:

- Zgodovinski pregled računalniških vmesnikov in definicija interakcije človek-računalnik.
- Programske rešitve za gradnjo grafičnih uporabniških vmesnikov (WIN32, MFC, WPF, Qt).
- Vrste interakcij pri grafičnem vmesniku. Modeliranje človeškega doseganja izbire elementov na zaslonu.
- Pomembne človeške lastnosti (zaznavanje, spomin, vizualna ostrina...). Obdelava informacij, mentalni modeli, kognitivna in kinematična obremenitev.
- Izbira ustreznih barv: zaznavanje barv, barvni modeli, barvne sheme. Uvod v tipografijo.
- Vzorci oblikovanja uporabniških vmesnikov in uporabniške izkušnje. Temni vzorci pri uporabniških vmesnikih.
- Zgodovina vizualizacije, 2D vizualizacijske tehnike. Berljivost in interpretacija vizualizacij.
- Uvod v 3D grafične uporabniške vmesnike in vizualizacijske tehnike.
- Govorni uporabniški vmesniki. Sinteza in razpoznavanje govora pri govornih vmesnikih.
- Zgodovina haptike, haptični uporabniški vmesniki in oprijemljivi uporabniški vmesniki.
- Koncepti navidezne in obogatene resničnosti ter pripadajoče strojne in programske rešitve.
- Uporabniški vmesniki na podlagi kolaborativne poglobljene analitike.
- Uvod v uporabniške vmesnike, ki temeljijo na paradigmi možgani-računalnik.
- Inteligentni grafični uporabniški vmesniki, adaptivni uporabniški vmesniki ter optimizacija snovanja vmesnikov.
- Principi snovanja uporabniških vmesnikov. Hevristično ocenjevanje uporabniškega vmesnika. Testiranje uporabnosti.

Content (Syllabus outline):

- Historical overview of user interfaces and definition of human-computer interaction.
- Software solutions for building graphical user interfaces (WIN32, MFC, WPF, QT).
- Types of interactions in a graphical interface. Modeling human selection of elements on the screen
- Important human characteristics (perception, memory, visual acuity, etc.). Information processing, mental models, cognitive and kinematic load.
- Choosing appropriate colors: color perception, color models, color schemes. Introduction to typography.
- User interface design patterns and user experience. Dark patterns in user interfaces.
- History of visualization, 2D visualization techniques. Readability and interpretation of visualizations.
- Introduction to 3D graphical user interfaces and visualization techniques.
- Speech user interfaces. Speech synthesis and recognition in speech interfaces.
- The history of haptics, haptic user interfaces, and tangible user interfaces.
- Concepts of virtual and augmented reality and related hardware and software solutions.
- User interfaces based on collaborative immersive analytics.
- Introduction to user interfaces based on the brain-computer paradigm.
- Intelligent graphical user interfaces, adaptive user interfaces, and interface design optimization.
- Principles of designing user interfaces. Heuristic evaluation of user interface design. Usability testing.

Temeljna literatura in viri / Readings:

- Julie A. Jacko, The human-computer interaction handbook: fundamentals, evolving technologies, and emerging applications, CRC Press, 2012, ISBN: 978-1-4398-2943-1, COBISS.SI-ID: 9864788
- I. Scott MacKenzie, Human-computer interaction: an empirical research perspective, Elsevier, 2013, ISBN: 978-0-12-405865-1, COBISS.SI-ID: 10627412
- Helen Sharp, Yvonne Rogers, Jennifer Preece, Interaction design: beyond human-computer interaction, J. Wiley & Sons, 2019, ISBN: 978-1-119-54725-9, COBISS.SI-ID: 2048614931

Cilji:

- Cilj predmeta je, da bodo študenti razumeli in znali uporabljati osnovne tehnologije iz področja interakcije človek-računalnik, ter bodo zmožni načrtovati in razviti napredne uporabniške vmesnike

Objectives:

The objective of this course is to for students to understand and be able to analyse of human-computer interaction technologies, as well to be able to design and implement advanced user interfaces

Predvideni študijski rezultati:Znanje in razumevanje:

- poznavanje karakteristik človekovih zaznav in njihov pomen pri interakciji človek-računalnik
- razumevanje ciljno usmerjenega načrtovanja uporabniškega vmesnika
- razumevanje uporabnikov in testa uporabnosti
- implementirati in uporabljati osnovne uporabniške vmesnike
- razumevanje osnov navidezne in obogatene resničnosti
- razumeti in uporabiti različne tehnologije obogatene in navidezne resničnosti

Prenosljive/ključne spretnosti in drugi atributi:

- Spretnosti komuniciranja: ustno izražanje pri ustnem izpitu, pisanje strokovnega poročila o opravljenih vajah, ustni zagovor laboratorijskih vaj.
- Uporaba informacijske tehnologije: uporaba programskih orodij za hitro izdelavo uporabniških vmesnikov in testiranje uporabnosti interakcije človek-računalnik.
- Reševanje problemov: ocenjevanje uporabnosti različnih uporabniških vmesnikov.
- Delo v skupini: občasno delo v skupini pri laboratorijskih vajah.

Intended learning outcomes:Knowledge and understanding:

- knowledge of human senses and their role at human-computer interaction
- understanding of goal oriented design of user interface
- razumevanje uporabnikov in testa uporabnosti
- to be able to implement and use basic user interfaces
- understand the basics of virtual and augmented realities
- to understand and to be able to use various augmented and virtual reality technologies

Transferable/Key skills and other attributes:

- Communication skills: oral examination, writing report about lab work, oral examination of lab work.
- Use of information technology: the use of software tools for rapid prototyping of user interfaces and for testing usability of the human-computer interaction.
- Problem solving: evaluation of usability of different user interfaces,
- Working in a group: periodic group work in the lab

Metode poučevanja in učenja:

- predavanja,
- seminarske vaje,
- laboratorijske vaje.

Learning and teaching methods:

- lectures,
- tutorials,
- lab work.

Načini ocenjevanja:

Pisni izpit - 50%
Laboratorijsko delo - 50%

Assessment:

Written exam - 50%
Laboratory work - 50%

Opombe: Pisni izpit se lahko nadomesti s kolokviji v enakem deležu 50 %

Comments: The exam may be replaced by written midterm examinations in the weight of 50%.

Reference nosilca / Lecturer's references:

- LUKAČ, Niko, MONGUS, Domen, ŽALIK, Borut, ŠTUMBERGER, Gorazd, BIZJAK, Marko. Novel GPU-accelerated high-resolution solar potential estimation in urban areas by using a modified diffuse irradiance model. *Applied energy*. 1 Jan. 2024, vol. 353, part a, [article no.] 122129, 13 str., ilustr. ISSN 1872-9118. DOI: 10.1016/j.apenergy.2023.122129. [COBISS.SI-ID 169272579] project: Thanks to the Slovenian Environmental Agency for providing the long-term horizontal irradiance data and classified LiDAR data. The authors acknowledge the financial support from the Slovenian Research and Innovation Agency (Research Core Funding Nos. P2-0041 and P2-0115, as well as Research Project No. J7-50095). The authors would like to thank NASA's Land Processes Distributed Active Archive Center (LP DAAC) for the open LAI data used in this paper, namely The MCD15A3H Version 6.1 Moderate Resolution Imaging Spectroradiometer (MODIS) Level 4.
- BIZJAK, Marko, MONGUS, Domen, ŽALIK, Borut, LUKAČ, Niko. Novel Half-Spaces Based 3D Building Reconstruction Using Airborne LiDAR Data. *Remote sensing*. 2023, vol. 15, iss. 5, [article no.] 1269, 17 str., ilustr. ISSN 2072-4292. Digitalna knjižnica Univerze v Mariboru – DKUM, DOI: 10.3390/rs15051269. [COBISS.SI-ID 144401155] project: P2-0041; funder: ARRS project: J2-4424; funder: ARRS project: L7-2633; funder: ARRS
- KOHEK, Štefan, ŽALIK, Borut, STRNAD, Damjan, KOLMANIČ, Simon, LUKAČ, Niko. Simulation-driven 3D forest growth forecasting based on airborne topographic LiDAR data and shading. *International journal of applied earth observation and geoinformation*: the journal is the successor of the former ITC Journal and has been published by Elsevier since 2002. July 2022, vol. 111, 13 str. ISSN 1569-8432. DOI: 10.1016/j.jag.2022.102844. [COBISS.SI-ID 110735107]