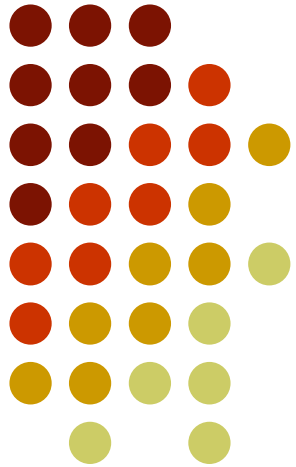
HUMAN COMPUTER INTERACTION

INFORMATICĂ, BSc, Year 3

2023 - 2024



Human Computer Interaction

IOC…

- [DEX] adv. (Pop. și fam.) Nu; nimic; defel; câtuși de puțin
- International Olympic Committee

- Indicators of Compromise (IoC) are pieces of forensic data, such as data found in system log entries or files, that identify potentially malicious activity on a system or network. [https://www.techtarget.com/searchsecurity/definition/Indicators-of-Compromise-IOC]

- In software engineering, inversion of control (IoC) is a design pattern in which custom-written portions of a computer program receive the flow of control from a generic framework. [https://en.wikipedia.org/wiki/Inversion_of_control]

Human Computer Interaction

IOC...

- Interfețe om-calculator
  - ~ Human Computer Interfaces
  - ~ Human Computer Interaction

ACM Computing Classification System [https://dl.acm.org/ccs]

Human-centered computing

Human computer interaction (HCI)

Human Computer Interaction

HCI…

Human–computer interaction (**HCI**) is research in the design and the use of computer technology, which focuses on the interfaces between people (users) and computers. HCI researchers observe the ways humans interact with computers and design technologies that allow humans to interact with computers in novel ways. A device that allows interaction between human being and a computer is known as a "**Human-computer Interface (HCI)**".

[https://en.wikipedia.org/wiki/Human%E2%80%93computer_interaction]

Human Computer Interaction

HCI…

- is the study of how people interact with computers
- consists of three parts:
  - ✓ the user
  - ✓ the computer itself, and
  - ✓ the ways they work together
- is concerned with understanding and improving the interaction between humans and computers to make technology more user-friendly, efficient, and enjoyable.

[https://www.academia.edu/38973879/Human_Computer_Interaction_Fundamentals_and_Practice]
[https://www.simplilearn.com/what-is-human-computer-interaction-article]

Human Computer Interaction

HCI…

- is a subfield within computer science concerned with the study of
  - the interaction between people (users) and computers and
  - the design, evaluation and implementation of user interfaces for computer systems that are receptive to the user's needs and habits.

From: Philosophy of Technology and Engineering Sciences**, 2009**
[https://www.sciencedirect.com/topics/psychology/human-computer-interaction]

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HCI…

- IoT + NLP + AR

https://www.conurets.com/human-computer-interaction/

https://research.com/special-issue/natural-language-processing-for-human-computer-interaction

Ravi Kumar,
Latest Developments in Human-Computer Interaction (2019-2023)

https://www.linkedin.com/pulse/latest-developments-human-computer-interaction-2019-23-ravi-kumar/

Human Computer Interaction

Enhancing HCI…

- IoT

The integration of IoT and machine learning is enhancing human-computer interaction by enabling smart interfaces and adaptive systems. Smart devices, such as voice assistants, smart speakers, and wearable devices, create an interconnected ecosystem that can seamlessly interact with humans.

For example, smart home systems can *learn* individual users' habits and automatically adjust lighting, temperature, and entertainment preferences. This synergy also extends to adaptive user interfaces that can dynamically adjust based on user feedback and behaviour.

[https://www.infobest.ro/the-synergy-of-iot-and-machine-learning-unlocking-the-potential-of-connected-devices/]

Human Computer Interaction

Enhancing HCI…

- IoT + ML

Machine learning algorithms analyze data from smart devices, including

- user preferences,
- behaviour patterns, and
- contextual information,

to deliver personalized and adaptive experiences.

By combining these two technologies we can create **intelligent and intuitive systems that enhance user experiences, improve productivity, and simplify daily tasks.**

[https://www.infobest.ro/the-synergy-of-iot-and-machine-learning-unlocking-the-potential-of-connected-devices/]

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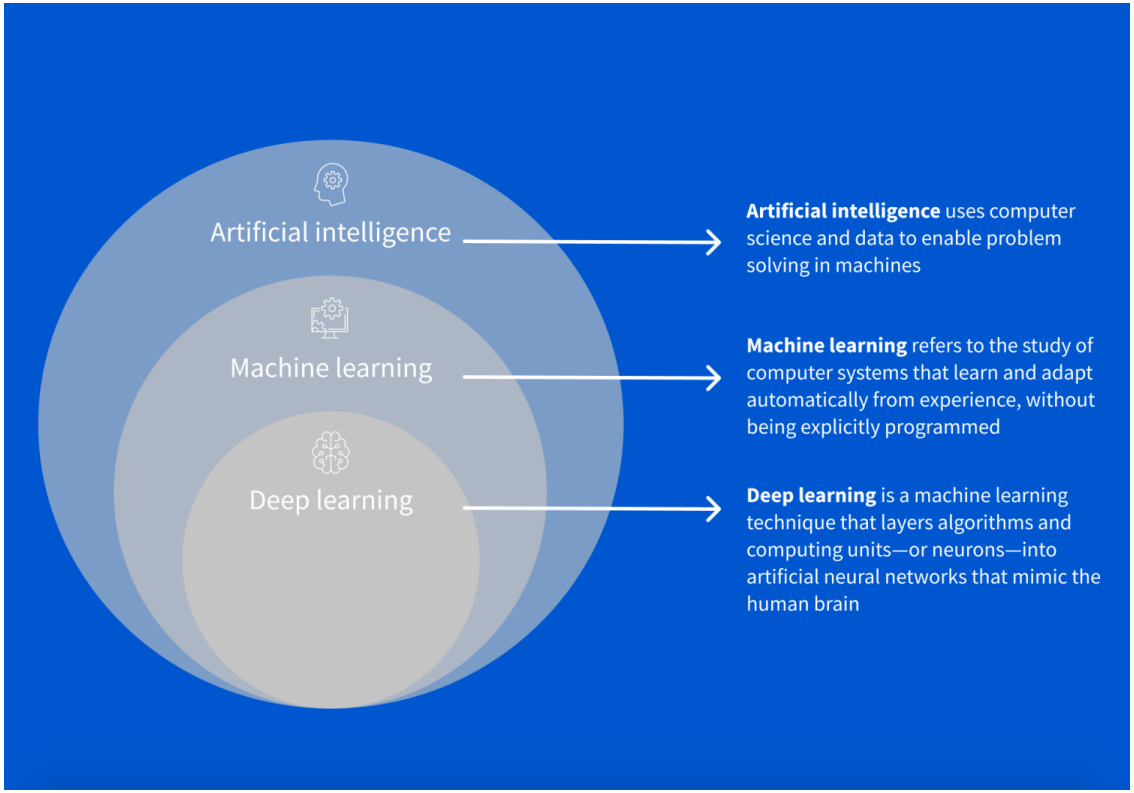
HCI…

- AI – ML - DL

ML = AI that can automatically adapt with minimal human interference

DL = a subset of machine learning that uses *artificial neural networks* to mimic the learning process of the human brain



[https://www.coursera.org/articles/ai-vs-deep-learning-vs-machine-learning-beginners-guide]

Human Computer Interaction

EXAMPLE:

DeLORo project -->
http://deloro.iit.academiaromana-is.ro/

HCI...

- DL - NLP

- is the discipline of building machines that can manipulate human language — or data that resembles human language — in the way that it is *written, spoken, and organized*
- evolved from computational linguistics

In recent years, a variety of **deep learning models** have been applied to *natural language processing* (NLP) to improve, accelerate, and automate the text analytics functions and NLP features.

[https://www.deeplearning.ai/resources/natural-language-processing/]
[https://blog.paperspace.com/6-interesting-deep-learning-applications-for-nlp/]

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Enhancing HCI…

- NLP

- **Role of NLP Enhancing Human-Computer Interaction**

https://www.analyticsinsight.net/role-of-nlp-enhancing-human-computer-interaction/

- **How can NLP help HCI researchers analyse user feedback and behaviour?**

https://www.linkedin.com/advice/1/how-can-nlp-help-hci-researchers-analyze

Human Computer Interaction

Enhancing HCI…

- AR ~ VR ~ MR

- **The Future of HCI: Fusion of AR, VR & AI**

https://statusneo.com/the-future-of-hci-augmented-reality-virtual-reality-and-artificial-intelligence/

The future of HCI with AR, VR, and AI holds endless possibilities, promising to transform how we interact with technology and the world. From personalized experiences and immersive simulations to seamless collaboration and smart assistance, these technologies are set to **redefine the boundaries** of **human-computer interaction**.

As the journey continues, embracing innovation responsibly and **ethically** will ensure that these technologies bring positive changes to our lives while creating a more connected and inclusive **digital future**.

Human Computer Interaction

WHAT DO YOU EXPECT FROM THIS COURSE?

PROs	CONs

Human Computer Interaction

Conținutul activităților didactice – curs și laborator

1. Definiții și concepte
   a. componentele cheie ale HCI: utilizatorul, mașina – obiectele – contextul – task-urile dependente de context, interfața
   b. științe implicate: *computer science, cognitive science, human factors engineering*
2. Caracteristicile unui sistem cu HCI: utilitate, eficiență și confort, siguranță și securitate, accesibilitate, adaptabilitate
3. Exemple de sisteme cu nivel ridicat de interacțiune om-calculator
   a. ATM-uri (*Automated Teller Machine*, automate de bani), automate de tip *vending machine* (mâncare, băuturi, cărți, ș.a.)
   b. sisteme de control pentru trafic, sisteme de tip *time-critical*, sisteme *self-driving*
   c. sisteme *wearable* inteligente, asistenți și agenți senzoriali
   d. sisteme orientate pe monitorizarea sănătății, sisteme de orientare și dirijare, sisteme pentru persoane cu dizabilități
   e. sisteme educaționale interactive, *pre-touch sensing*, *paper ID*
4. Tehnologii și concepte corelate
   a. Human-oriented, human-centered IoT (*Internet of Things*)
   b. AR-VR-MR (*Augmented-, Virtual-, Mixed-Reality*)
   c. NLP (*Natural Language Processing*) – pentru simplificarea interacțiunii dintre om și calculator

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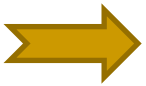
Course overview:

- Week 3 --- Oct 20th, 2023
  - MidTerm Evaluation Report



- Week 6(7) --- Nov xx, 2023
  - Practical evaluation – small team-projects (simulation & on board)
  - Students' projects list and schedule for the large projects
- Week 11 → ConsILR 2023 [https://profs.info.uaic.ro/~consilr/2023/]
- Week 13, 14
  - Students' projects – presentations & evaluation

- TBA → Invited speakers
- Week t, check on the eLearning course. → self learning

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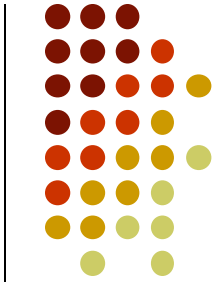

References

- ACM Digital Library and Learning Center
- IEEE online courses
- Siemens Software Industry education platform
- **Platforma UniCampus – CeL – UPTimișoara**
- Coursera
- Udemy

- HCI ~ IoT
- HCI ~ NLP
- HCI ~ AR

Find a resource and show it!

Human Computer Interaction

Students' activities:

- TR
- Software development / team project
- Final evaluation / written exam
- Research paper --> publication


use your IMAGINATION --> find a SCOPE


self-EVALUATION --> project OUTCOMES

Human Computer Interaction

To think about…

- People are more likely to follow orders today than thinking for themselves, which is a critical aspect of life, they just want to be able to do everything by just using the internet.

- "**Technology is a useful servant, but a dangerous master.**" [Christian Lous Lange]

- **FUNNY IoT DEVICES**
- **FUN FACTS about IoT**

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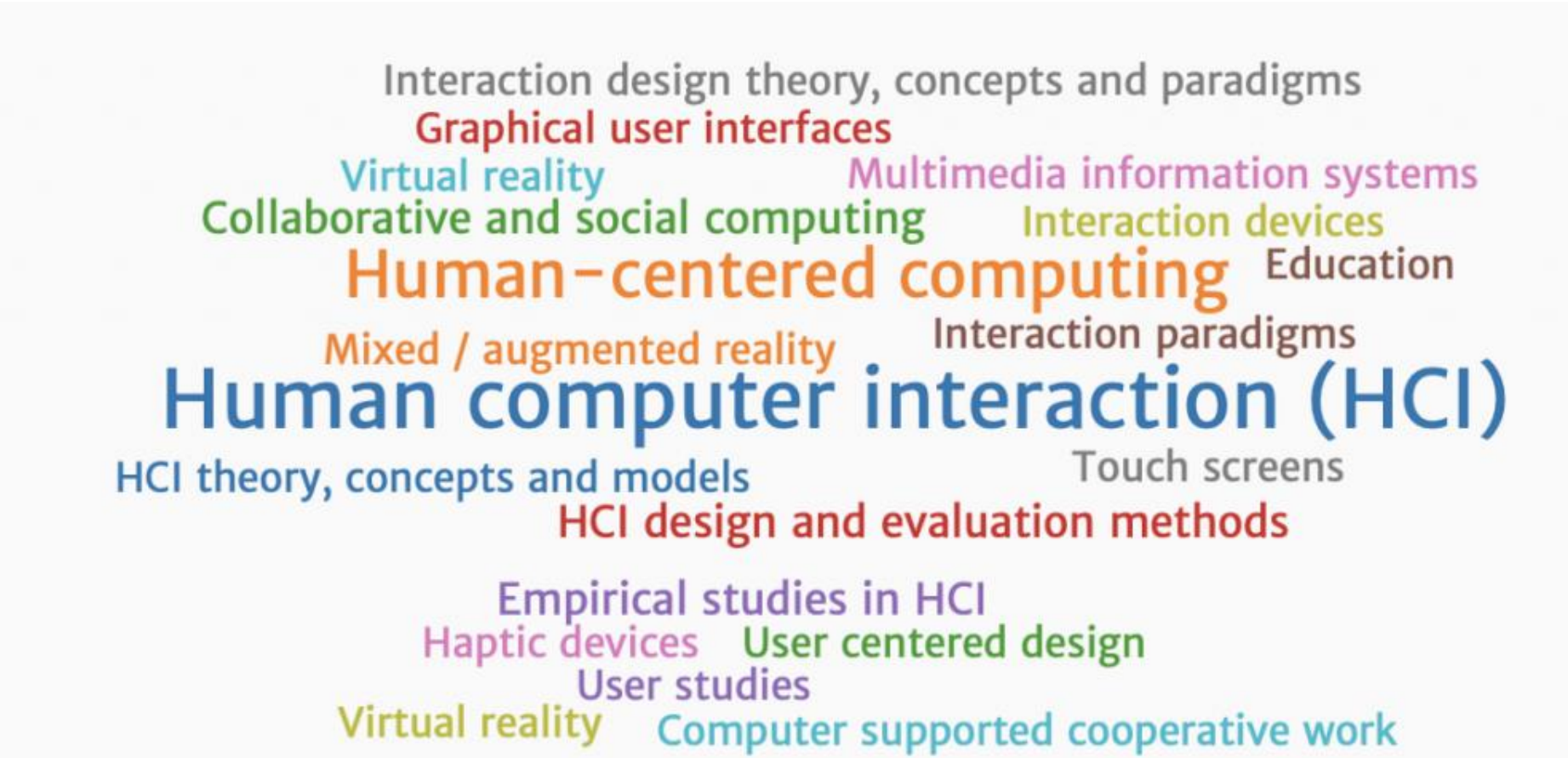

[https://programmerblog.net/what-is-human-computer-interaction/]