TU Clausthal

Institute for Software and Systems Engineering

IoT and Digitalization for the Circular Economy

Lecture 0: Organization

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M.Sc. Anant Sujatanagarjuna
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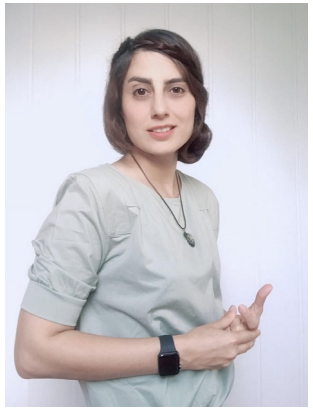
- Updated versions of these slides will be available in our Github repository.

Team

Prof. Dr. Benjamin Leiding

M.Sc. Anant Sujatanagarjuna



M.Sc. Shohreh Kia

Research Group

- **E**merging **T**echnologies for the **C**ircular **E**conomy → **ETCE**
- Research focus:
  - Intersection of IT and sustainability
  - Circular Economy and Circular Societies
  - Self-organized, decentralized and distributed systems
  - Localized and resilient food production → Watch our mushrooms! (Link)
- Other courses:
  - Requirements Engineering (WS – M.Sc.)
  - Emerging Technologies for the Circular Economy (SS – M.Sc.)
  - The Limits to Growth – Sustainability and the Circular Economy (SS/WS – open for everyone)

Research Group

- ETCE Website – Link
  - Course material
  - Theses/project topics

- Our research in action:
  - ZDF documentary (German) – Link
  - Klartext Preis 2020 (German) – Link

Learning Outcome

- Understanding the concept of a circular economy, sustainability, and related concepts (biocapacity, etc.).
- Gain a basic understanding of causes, dimensions, and the characterization of climate change, environmental pollution, and dwindling non-renewable resources.
- Introduction to IoT and cyberphysical systems in the circular economy
- Sensors and actuators for IoT, control and process systems of the circular economy
- Experience in prototyping IoT applications and systems
- The ability to critically assess upcoming technological solutions enabling/facilitating sustainability and the circular economy.

Lectures

- 17.04.2023 → Organization (L00) + Introduction (L01)
- 24.04.2023 → Circular Economy (L02)
- 08.05.2023 → Lifecycle Assessment – LCA (L03)
- 15.05.2023 → Introduction to the Internet of Things (L04)
- 22.05.2023 → Internet of Things – Communication + Security and Privacy (L05)
- 05.06.2023 → Internet of Things – Data Processing and BigData (L06)
  → Extra MOOC - Foodsharing
- 12.06.2023 → Industrial Internet of Things (L07)
- **19.06.2023 → No Lecture**
- **26.06.2023 → IoT in Mining I (L08)**
- **03.07.2023 → IoT in Mining II (L09)**
  → Technologies for Sustainability – MOOC Content (L10)
- ***10.07.2023 → Coding Workshop I (Goslar)***
- ***17.07.2023 → Coding Workshop II (Goslar)***
- **31.07.2023 → Exam Q&A**

Exercises

- 17.04.2023 → Exercise 01 – Carbon Footprint
- 24.04.2023 → Exercise 02 – Performance Economy
- 01.05.2023 → Exercise 03 – Your Favourite Fruit or Vegetable
- 08.05.2023 → Exercise 04 – LCA of Your Favourite Fruit or Vegetable
- 12.06.2023 → Exercise 05 – Industrial IoT
- 03.07.2023 → Exercise 06 – IoT in Mining
- 10.07.2023 → Exercise 07 – Technology Assessment

Course Organization

- News and updates → StudIP

- Organization of the lecture:
  - Slides are available on Github (Link)
    - Please report bugs!
  - Lectures and exercises as live stream (BBB – next slide)
  - Lecture recordings will be available on StudIP and on Github
  - Exercise time slots = Time for questions and eventual tutorials related to the exercises

Questions? Write us an email: etce-iot@tu-clausthal.de ← **We will only respond to emails written to this specific email address!**

Course Organization

Vorlesung + Übung: IoT and Digitalization for Circular Economy

Übersicht | Verwaltung | Teilnehmende | Dateien | Ablaufplan | Informationen | Videoserver | Moodle | Mehr …

Videoserver

Videoserver
Einstellungen
Hilfe

IoT and Digitalization for the Circular Economy *(WS 22/23)*

1	IoT-CE-L01-Introduction-I	07.11.2022	01:19:58
2	IoT-CE-L02-Introduction-II	07.11.2022	01:35:04
3	IoT-CE-L03-Introduction-III--Part-1	07.11.2022	01:19:28
4	IoT-CE-L03-Introduction-III--Part-2	07.11.2022	24:30
5	IoT-CE-L04-What-happened-so-far?	07.11.2022	01:26:38
6	IoT-CE-L05-LCA	07.11.2022	55:21
7	IoT-CE-L05-OpenLCA-Tutorial	07.11.2022	16:00
8	IoT-CE-L06-World3	07.11.2022	01:04:07
9	IoT-CE-L07-Circular-Economy-I	07.11.2022	01:27:17
10	IoT-CE-L08-Circular-Societies	07.11.2022	01:33:39
11	IoT-CE-L09-Introduction-to-the-Internet-of-Things	07.11.2022	01:53:12
12	IoT-CE-L10-IoT-Communication+IoT-Security-and-Privacy	07.11.2022	01:07:38
13	IoT-CE-L12-IoT-Data-Processing-and-Big-Data	07.11.2022	01:51:36
14	IoT-CE-L13-Technology	07.11.2022	01:28:58

Dates/Times/Locations

- Lecture:
  - Monday **2:15 pm to 3:45 pm** (Berlin time) – **17.04.2023** to **03.07.2023**
  - Location: Goslar Gotec (Am Stollen 19 C, 38640 Goslar, Germany) or via BigBlueButton (Link) **OR video recordings**

- Exercise / Q&A:
  - Monday **4 pm to 5 pm** (Berlin time) – **17.04.2023** to **03.07.2023**
  - Location: Goslar Gotec (Am Stollen 19 C, 38640 Goslar, Germany) or via BigBlueButton (Link)

- Practical Coding Workshop:
  - When: **10.07.2023 and 17.07.2023** from **9 am – 4 pm (Berlin time)**
  - Location: Goslar (DIGIT)

Exercises and Practical Workshop

- Individual work → no group submissions
- Submission of **each** exercise is **mandatory**
- You pass by submitting an exercise – *even if it is an empty page*
- You will receive feedback on your submission (during Q&A session)
- Exercise = learning feedback
- Practical workshop → You pass the workshop if you score 50% (or more)

Examination

- Prerequisite for admission to the final exam (all criteria have to be fulfilled):
  - Submit all exercises
  - Pass the practical workshop

- Final exam:
  - **Most likely 10.08.2023**
  - Oral examination (20min)
  - Online

Self-Study Star

Self-Study Star → 

- Slides with the self-study star indicate optional/additional study material that is **not** mandatory but could be helpful or interesting

Literature

- This course is not based on a single book and you **do not** need to buy a book to pass the exam.

- Donella H. Meadows, Jorgen Randers, and Dennis L. Meadows. *The Limits to Growth* (1972).
- Donella H. Meadows, Jorgen Randers, and Dennis L. Meadows. *Limits To Growth: The 30-Year Update* (2004).
- Baccini et al. *Metabolism of the Anthroposphere: Analysis, Evaluation, Design* (2012).
- Walter R. Stahel. *The Circular Economy: A User's Guide* (2019).
- W. Brian Arthur. *The Nature of Technology: What It Is and How it Evolves* (2011)

Literature

- Perry Lea. Internet of Things for Architects: Architecting IoT solutions by implementing sensors, communication infrastructure, edge computing, analytics, and security (2018).
- M.A. Khan, M.T. Quasim, F. Algarni, A. Alharthi. *Decentralised Internet of Things* (2020).
- Dimitrios Serpanos und Marilyn Claire Wolf. *Internet-of-Things (IoT) Systems Architectures, Algorithms, Methodologies* (2018).

Questions?