ARTIFACT-BASED COMPUTING & USER RESEARCH

TU WIEN

Design & Fabrication

M.Sc. **Florian Wolling** (Lecture), M.Sc. **Shahu, Ambika** (Exercises),
B.Sc. **Thomas Mantschko** (Tutor), Prof. Florian Michahelles

Technische Universität Wien
Artifact-Based Computing & User Research (http://media.tuwien.ac.at)
florian.wolling@tuwien.ac.at, ambika.shahu@tuwien.ac.at

Florian Wolling

Short Bio

- TU Wien, Austria — since Jan., 2023
- University of Oulu, Finland — 2019 – 2020
- University of Siegen, Germany — 2016 – 2022
- University of Freiburg, Germany — 2009 – 2016

Research

- Ubiquitous & Wearable Computing
- Wearable Sensing (ECG, PPG, IMU) [3-5]
- Intra-Body Communication [1, 2]

[1] *"OpenIBC: Open-Source Wake-Up Receiver for Capacitive Intra-Body Communication", Wolling et al., International Conference on Embedded Wireless Systems and Networks (EWSN 2022), ACM, 2022.*
[2] *"IBSync: Intra-body synchronization and implicit contextualization of wearable devices using artificial ECG landmarks" , Wolling et al., Frontiers in Computer Science, 2022.*
[3] *"Optimal Preprocessing of Raw Signals from Reflective Mode Photoplethysmography in Wearable Devices" , Wolling et al., International Conference of the IEEE Engineering in Medicine Biology Society (EMBC), IEEE, 2021.*
[4] *"The Quest for Raw Signals: A Quality Review of Publicly Available Photoplethysmography Datasets" , Wolling et al., International Workshop on Data Acquisition To Analysis (DATA), ACM, 2020.*
[5] *"Smartphone-Based Monitoring of Parkinson Disease: Quasi-Experimental Study to Quantify Hand Tremor Severity and Medication Effectiveness", Kuosmanen, Wolling et al., JMIR mHealth and uHealth, 2020.*

Design & Fabrication
Kick-off

- Lecture
  - Lecture 1: From Design to Fabrication
  - Course Organization, Schedule, and Grading
- Exercise & Project
  - Tutoring & Grouping

- Link to the TUWEL course:
  https://tuwel.tuwien.ac.at/course/view.php?id=57800

What is … ?

Design & Fabrication
Interactive Survey

… Design?

Design & Fabrication
Interactive Survey

… Fabrication?

Design & Fabrication

Ice Breaker

Design & Fabrication
Course Objectives

1. This course will be interactive
2. “Design & Fabrication”
3. Superficial overview of the various topics
4. No claim to completeness, but a starting point
5. Provides the basic skills and tools

Design & Fabrication
Literature

Creativity and Design Focus

- Lidwell et al. (2023), “Universal Principles of Design”, Quarto Publishing Group USA, ISBN 0-7603-7517-8, TU online library.
- Brignell et al. (since 2017), “Design Principles”, open source collection of design principles and methods, https://principles.design
- Norman et al. (1990), “The design of everyday things”, Doubleday/Currency, ISBN 0385267746, TU online library.

Technical Focus

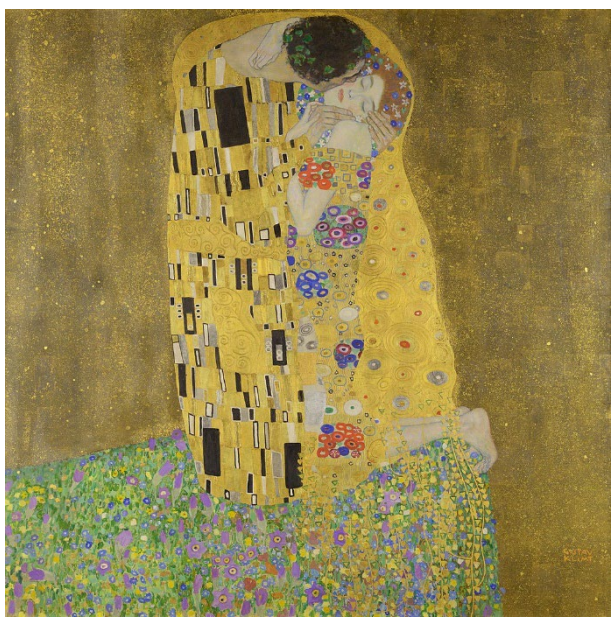
- Tempelman et al. (2014), “Manufacturing and Design: understanding the principles of how things are made”, Butterworth-Heinemann, TU online library.
- Kalweitet al. (2012), “Handbuch für Technisches Produktdesign”, Springer, ISBN 978-3-642-02641-6, TU online library.

ARTIFACT-BASED COMPUTING & USER RESEARCH

TU WIEN

Lecture 1
From Design to Fabrication

Art vs. Design

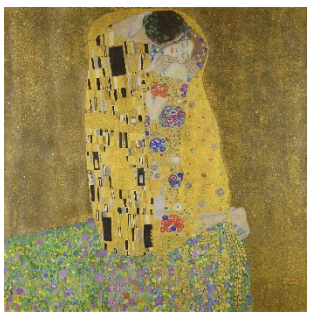


"The Kiss", Gustav Klimt (1907–08). https://en.wikipedia.org/wiki/Gustav_Klimt

"Eclipse", Sakura Adachi, https://www.sakurah.net/portfolio_page/eclipse/

www.pngwing.com, 2023.

From Design to Fabrication
Design



Art
- Cultural artifact
- A form of human expression
- Provokes thought and emotional response
- Product of technical skills and creative thought
- Originated in inspiration and muse

Design
- Based on a problem to solve
- Methodical and driven by a clear purpose
- Requires creativity
- Considers practicality and functionality
- Considers appeal, beauty, and aesthetics

What's the problem / purpose here?

Eden Gallery, https://www.eden-gallery.com/news/art-vs-design (accessed on 2023-10-03).

From Design to Fabrication

Design

Where do you find “design”?

From Design to Fabrication
Design

Use of the Word “Design”

- Process Design
- Application/Functional Design
- Interaction/Experience Design
- Brand/Corporate Design
- Software Design
- Graphics Design
- Fashion Design
- Product Design
- Electrical Circuit Design
- Chip Design
- …

Domains of “Design”

- Different perspectives
- Non-materialistic
- Materialistic

From Design to Fabrication

Definition of “Design”

A design is a concept of either an object, a process, or a system that is specific and, in most cases, detailed. Design refers to something that is or has been intentionally created by a thinking agent […].

The design usually has to satisfy certain goals and constraints; may take into account aesthetic, functional, economic, or socio-political considerations; and is expected to interact with a certain environment.

Typical examples of designs include architectural and engineering drawings, circuit diagrams, sewing patterns and less tangible artefacts such as business process models.

Wikipedia, https://en.wikipedia.org/wiki/Design (accessed on 2023-10-04).

From Design to Fabrication

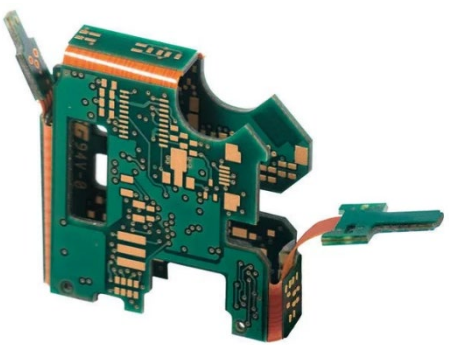
Design

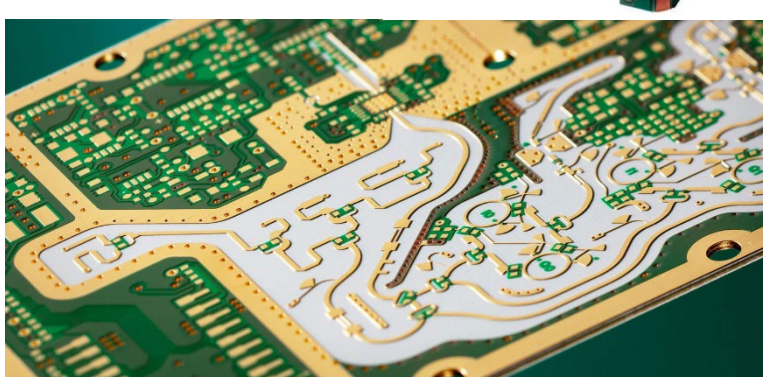
Design is more than aesthetics.

https://www.mzuri.co.uk/news/general/designed-to-inspire-design-classics/ (accessed on 2023-10-04).

From Design to Fabrication
Design

Design is also engineering.





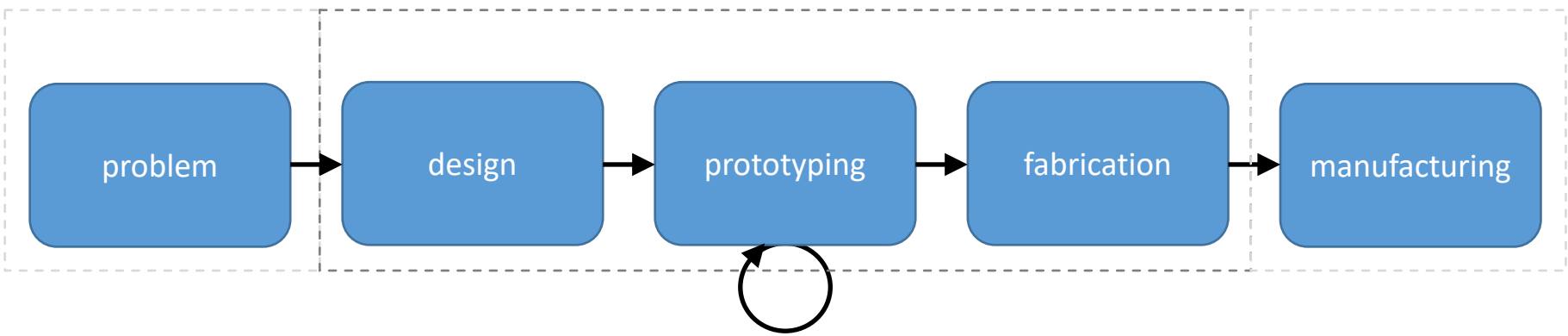
https://formlabs.com/blog/generative-design/ (accessed on 2023-10-04).

https://epp.industrie.de/allgemein/symmetrische-starrflex-technologie/, https://www.ksg-pcb.com/en/technologies/high-frequency-pcbs (accessed on 2023-10-04).

Fabrication vs. Manufacturing

From Design to Fabrication

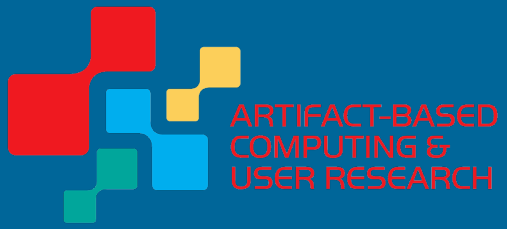
Definition



From Design to Fabrication

Topics of the Lecture

	Lecture
From Design to Fabrication	October 02
Creativity, Art, and Design	October 09
Prototyping	October 16
Computer-Aided Design	October 23
Materials	October 30
Forming and Subtractive Fabrication Technologies	November 06
Additive Fabrication Technologies	November 13
Electronic Circuit Design	November 27
Scalability and Responsible Innovation	December 11
Guest lecture by Tobias Röddiger, KIT Germany	January 08
Business Aspects	January 15
Final Presentations	January 22/29



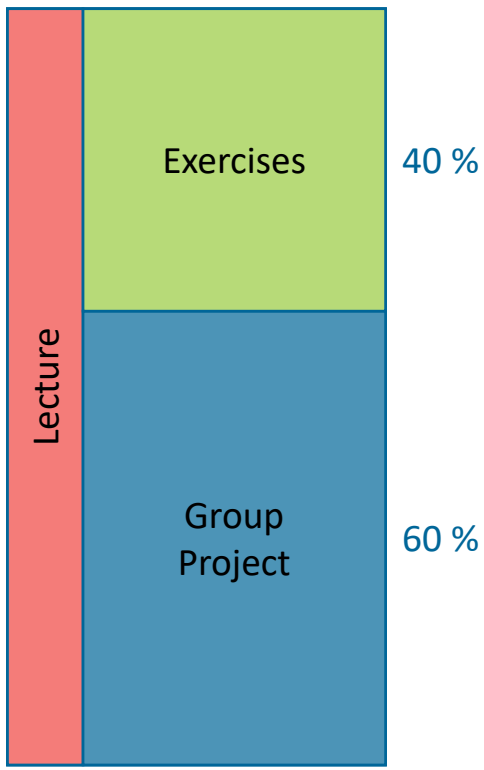
TU WIEN

Organization

Course Organization, Schedule, and Grading

Organization
Course Schedule

- VU = Lecture + Exercise
- Lecture: Theoretical considerations
- Exercises: Application of fundamentals
- Project: Conceptualization and prototyping



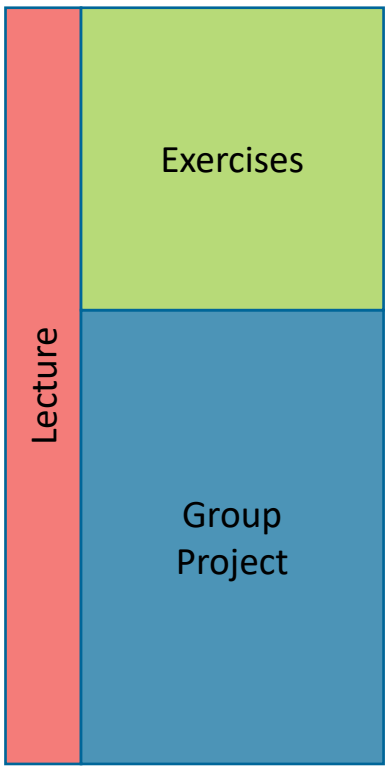
6 ECTS = 150 h / semester

150 h / 14 weeks ≈ ~~10.7 h / week~~
8 h / week

- Link to the TUWEL course:
  https://tuwel.tuwien.ac.at/course/view.php?id=66446

Organization
Course Schedule

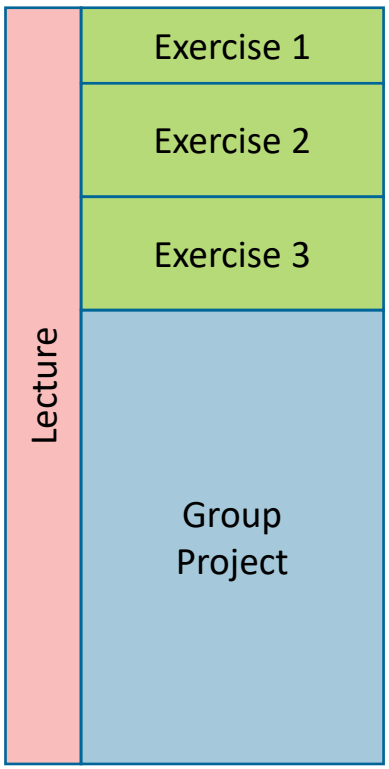
- VU = Lecture + Exercise
- Lecture: 30 – 60 min / week
- Exercises: ~7 h / week (on average)
- Project:



- Link to the TUWEL course:
  https://tuwel.tuwien.ac.at/course/view.php?id=66446

Organization
Course Schedule

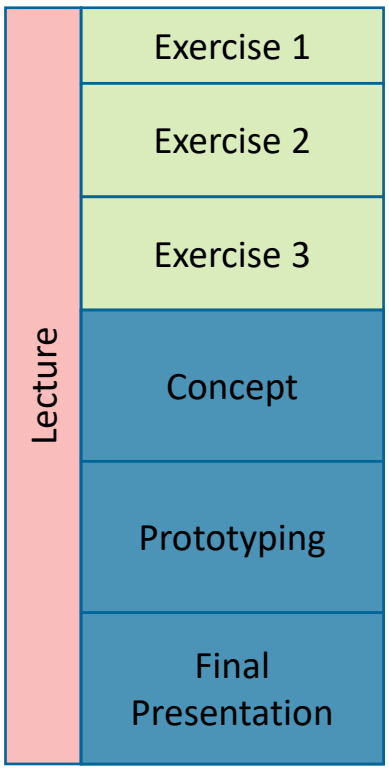
- VU = Lecture + Exercise
- Lecture
- Exercises: 3 individual exercises
- Project



- Link to the TUWEL course:
  https://tuwel.tuwien.ac.at/course/view.php?id=66446

Organization
Course Schedule

- VU = Lecture + Exercise
- Lecture
- Exercises
- Project: Group work (4 members)
  - Concept: video submission (5 min)
  - Prototyping: video submission (5 min)
  - Final Presentation: in class (5 min + 5 min Q&A)

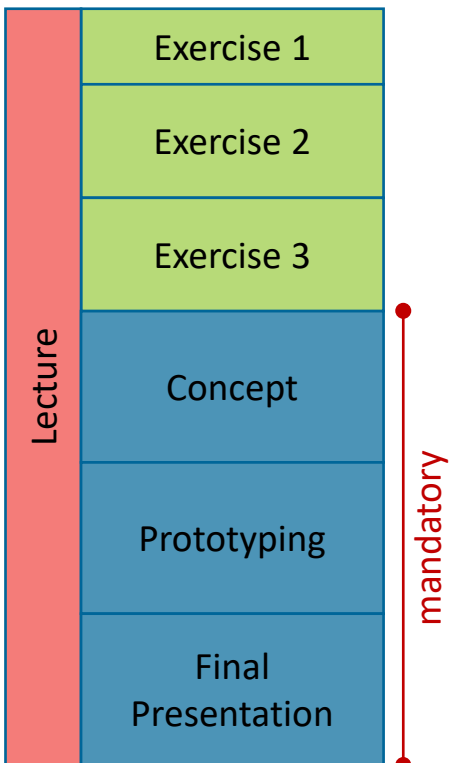


- Link to the TUWEL course: https://tuwel.tuwien.ac.at/course/view.php?id=66446

Organization
Course Schedule

- VU = Lecture + Exercise
- Lecture
- Exercises
- Project

- Final Presentation is given in class!
- Submission at all project stages is mandatory!



- Link to the TUWEL course: https://tuwel.tuwien.ac.at/course/view.php?id=66446

Organization
Final Presentations

- Submission at all project stages is mandatory
- Submission of the slides beforehand
  - January 21, 2025, until 23:59 h
  - No changes allowed afterward!
- Final Presentations are given in class
- There will be two presentation days
  - January 22, 2025, from 11:00 h (c.t.) to 13:00 h
  - January 29, 2025, from 11:00 h (c.t.) to 13:00 h
  - Random assignment of presentation slots – *be prepared and ready!*
  - Participation is mandatory!

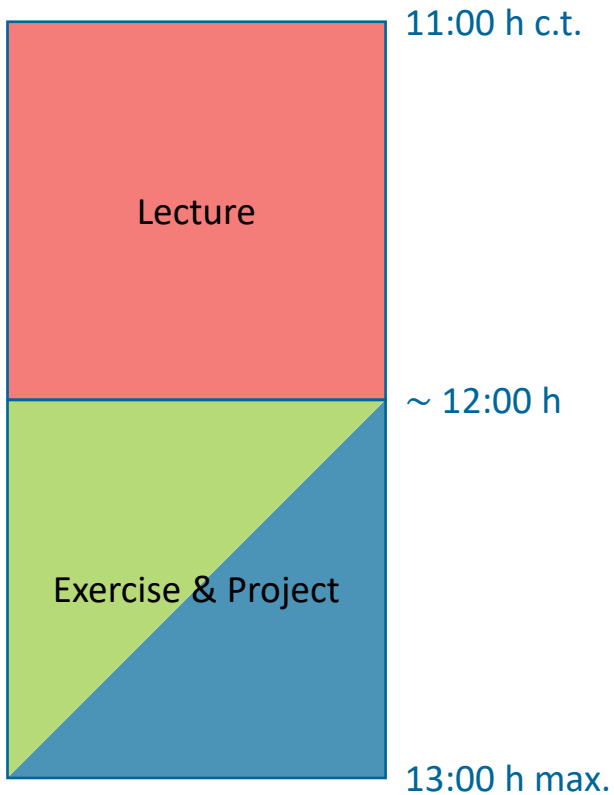
Organization
Course Times

Lecture

› Florian Wolling
› Time: Wednesdays, 11:00 h c.t.
› Location: FAV Hörsaal 3 Zemanek (HH EG 01)
› Weekly

Exercise & Project

› Ambika Shahu
› Time: afterward
› Location: the same
› Weekly



Organization
Contacts

Ambika Shahu
› ambika.shahu@tuwien.ac.at
› Office: FAV HE 02 06

Florian Wolling
› florian.wolling@tuwien.ac.at
› Office: FAV HE 02 07

Florian Michahelles
› florian.michahelles@tuwien.ac.at
› Office: FAV HE 02 09

Please, ask on TUWEL first!

Organization
Course Participation

Requirements

1. Register on TISS
2. Enroll on TUWEL
3. Sign up for a group
4. Hand in the exercises (40 %) – highly recommended!
5. Submit and present at all project stages (60%) – mandatory!

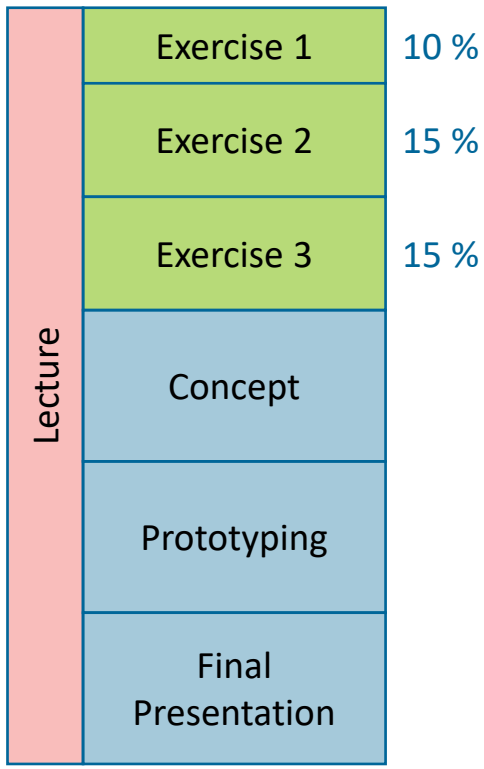
Quitting after signing up for a group: it's a fail!

› Link to the TUWEL course:
https://tuwel.tuwien.ac.at/course/view.php?id=66446

Organization
Evaluation Criteria

Exercises

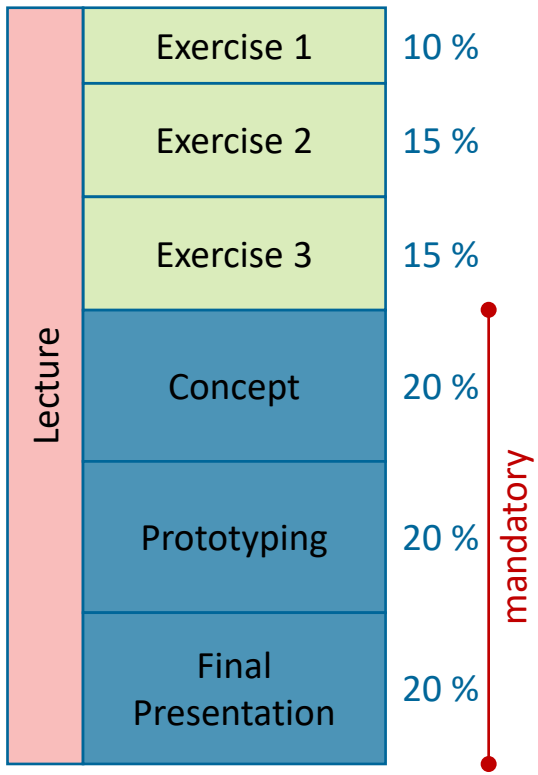
- Individual submissions
- Fulfillment of the task
- Completeness and correctness
- Reflection (~1/2 page)
  - Reflect on your understanding
  - Refer to your own experience and knowledge
  - Identify topics where you need clarification
  - Analyze your learning progress



Organization
Evaluation Criteria

Project

- Group submission (4 members)
- Concept and creativity
- Rationale of decisions and choices
- Stringency and consistency
- Feasibility
- Features and implementation
- Allocation of Work (e.g. as a text file)
  - Which tasks were taken over by whom?
  - Can be a single sentence per group member

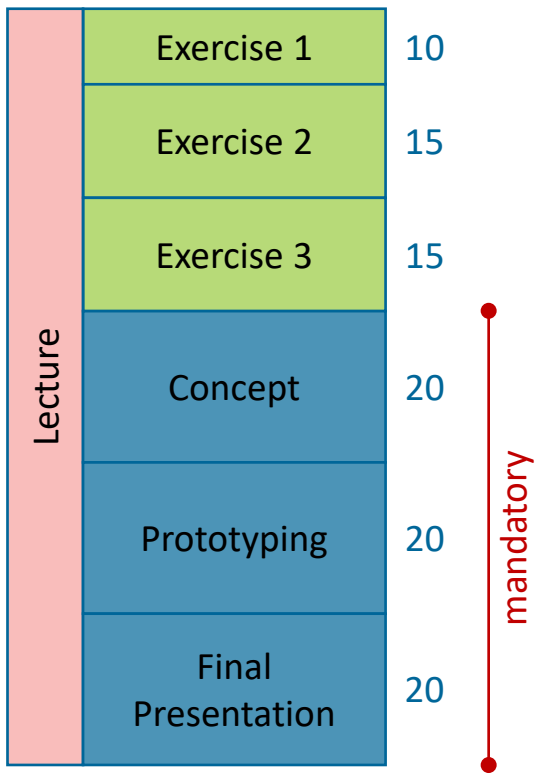


Organization
Evaluation Criteria

General

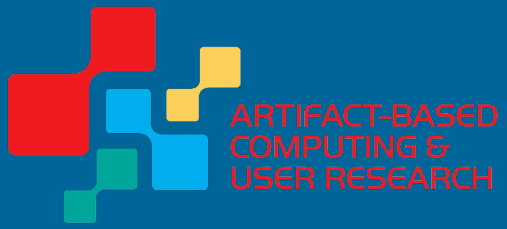
- Maximum total of 100 points
- Formal criteria:
  - Following the guidelines
  - Appropriate volume of submission
  - Appropriate writing / presentation style

- Deadlines are strict!
  Late submissions are not considered.



Organization
Questions?

What are your questions?



TU WIEN

Exercise & Project

Tutoring

Ambika Shahu

Short Bio

- TU Wien (since 2021)
- Google India - UX Researcher (2019 - 2020)
- PEAT GmbH - UX Researcher
- International Institute of Information Technology, Hyderabad

Research

- Skillab - A Multimodal Augmented Reality Environment for Learning Manual Tasks [1]
- Scenario-based Investigation of Acceptance of Electric Muscle Stimulation [2]
- Nudgit - Reducing Online News Consumption by Digital Nudges [3]

[1] Shahu, A., Dorfbauer, S., Wintersberger, P., & Michahelles, F. (2023, August). Skillab-A Multimodal Augmented Reality Environment for Learning Manual Tasks. In IFIP Conference on Human-Computer Interaction (pp. 588-607). Cham: Springer Nature Switzerland.

[2] Shahu, A., Wintersberger, P., & Michahelles, F. (2022, March). Scenario-based Investigation of Acceptance of Electric Muscle Stimulation. In Proceedings of the Augmented Humans International Conference 2022 (pp. 184-194).

[3] Shahu, A., Melem, A., Wintersberger, P., & Michahelles, F. (2022, September). Nudgit-Reducing Online News Consumption by Digital Nudges. In Adjunct Publication of the 24th International Conference on Human-Computer Interaction with Mobile Devices and Services (pp. 1-5).

Exercise & Project

Tutor

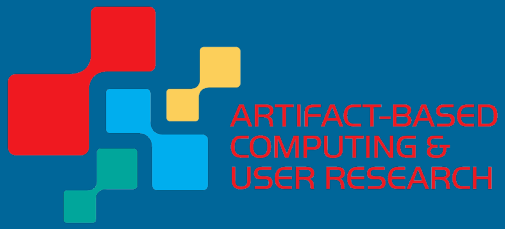
Thomas Mantschko

thomas.mantschko@tuwien.ac.at

Exercise & Project
Tutoring Consultations

TUWEL

Tutoring Consultations



TU WIEN

Project
Grouping

Are you a free or rational thinker?

Are you a hands-on or mind-based person?

Identify one common thing!

Project
Grouping

05:00

Project
Grouping

Find a group name!

Project
Grouping

Project
Group Registration

“Make friends” on TUWEL.

(Sign up for your group by Tuesday, October 15 at 23:59 h.)

Project Group Registration

Organization
Questions?

What are your questions?

ARTIFACT-BASED COMPUTING & USER RESEARCH

TU WIEN

Design & Fabrication

M.Sc. **Florian Wolling** (Lecture), M.Sc. **Shahu, Ambika** (Exercises),
B.Sc. **Thomas Mantschko** (Tutor), Prof. Florian Michahelles

Technische Universität Wien
Artifact-Based Computing & User Research (http://media.tuwien.ac.at)
florian.wolling@tuwien.ac.at, ambika.shahu@tuwien.ac.at