

Software Evolution & Developer Productivity

Seminar, HS 2021

Thomas Fritz & Alexander Lill

This course is about...

- Research in software engineering (SE)
 - software evolution
 - developer productivity

- Identifying a research question and determining how to address it

Learning Objectives

- By the end you should
 - have gained a **deeper and broader understanding** of SE research by reading, analyzing, reflecting and discussing current and classic literature;
 - be able to find, review, assess, discuss and categorize relevant related work;
 - be able to **identify and discuss research problems** and questions as well as identify relevant related work;
 - be able to **write a scientific report about and present a proposed research topic** in software engineering.
-

SEDP 2021

- Team

- Thomas Fritz (fritz@ifi.uzh.ch)
- Alexander Lill (lill@ifi.uzh.ch)

www.ifi.uzh.ch/en/hasel/teaching/courses/sedp21.html

(also includes presentation guidelines, examples of reports, and more)

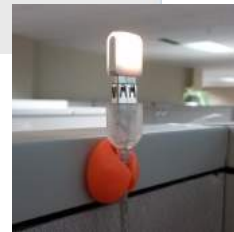
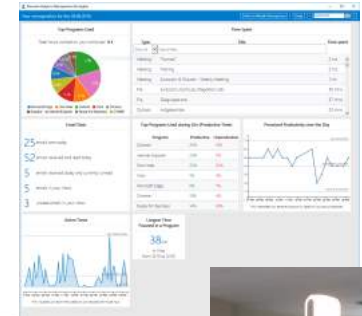
About me (Thomas)



Universität
Zürich^{UZH}



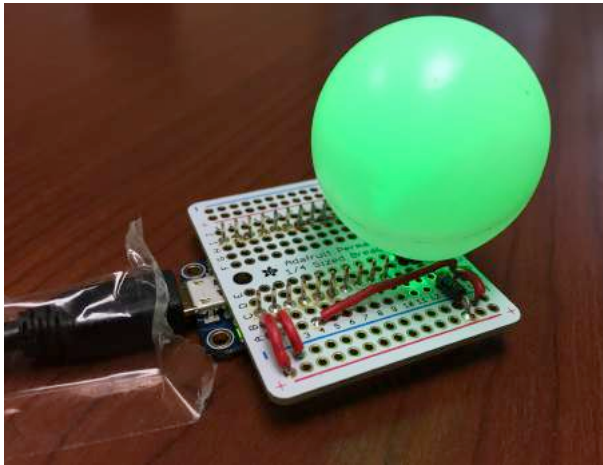
- Associate Professor
 - previously at UZH and University of British Columbia
 - PhD at UBC (originally from Munich)
- Research area: human aspects of SE
 - Developer productivity & retrospection
 - Biometric sensing
 - Developer support



- Room: 2.B.21, Email: fritz@ifi.uzh.ch
- Office hours are by appointment. Email me or contact me after class.

FlowLight – one of our projects

Light status based on user computer interaction
(available, busy, do not disturb)



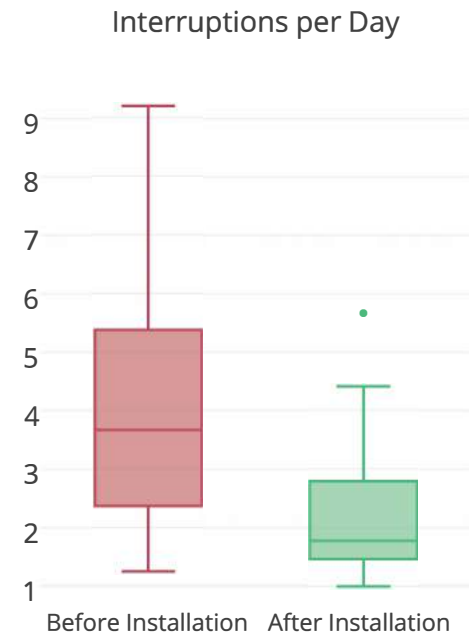
FlowLight – one of our projects

449 participants from 12 countries

183 survey responses, 23 in-depth interviews,
36 self-reported interruption logs

49% less interruptions
per person per day

> 75% of users continue using it
on a daily basis



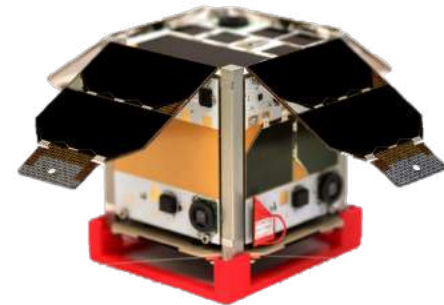
BSc and MSc Thesis & Project...

- (Biometric) Sensing in SE
- Developer Retrospection & Productivity
- Developers' Information Needs
- ...

...contact us if you are interested

About Alexander Lill

- PhD Candidate / Research Assistant
 - research area in software engineering, particularly
 - developer productivity
 - team coordination & communication
 - agile software development
- Master's Degree from the Technical University of Munich (2018), former member of the MOVE-II CubeSat project (in orbit since Dec. 2018)
- Spent 1.5 years as a Software Engineering Trainee at the European Space Agency



Introduce yourself!

What's your name?

What is your degree and specialization?

Why did you choose to attend this class?

Administrative, structure and more

Organizational Announcements

- 3rd year and up
 - for bachelor and master students
 - prerequisite: Software Engineering
- Language for report and presentation is English
- Work independently on response papers,
Work in teams of two on proposals
- Don't forget to register for the module
("Modulbuchung")

Organizational Announcements

20 students max.

- If you were assigned to it, you got a spot, but please deregister early if you decide to not take it
- If you were **not** assigned, write a motivation letter, we will assign available spots and let you know very soon

Seminar Structure

- Three parts (after tomorrow):

Intro + Part 1 [6 weeks]

Part 2 [5 weeks]

Part 3 [2 wks]

- Today: kick-off
 - Part 1: Group discussions of 5 topics x 2 papers
 - Part 2: Submission of draft proposal, presentation, feedback, working on final proposal
 - Part 3: Submission of final proposal, peer reviews, presentation
-

Seminar Structure: Part 1

- First five weeks: Group discussions in class
(subtopics 1-10, 2 subtopics per week, attendance mandatory)
- Read two papers per topic & find a third one
(e.g. Sept 28th: 2 papers for topic “Productivity”
+ 1 related paper on productivity)

For the two papers, we will use Perusall

- Create an account and join course “**FRITZ-493H4**”
- Actively read the papers on perusall, think about them, adding comments and questions, and respond to other comments/questions

Seminar Structure: Part 1

- First five weeks: Group discussions in class
(subtopics 1-10, 2 subtopics per week, attendance mandatory)
- Read two papers per topic & find a third one
(e.g. Sept 28th: 2 papers for topic “Productivity”
+ 1 related paper on productivity)

If you are one of the assigned moderator teams of 2

- Present papers and moderate discussion
 - max. 15mins presentation** of the 1 assigned + 1 identified paper
(make sure to discuss/present relation of the papers, not just one after the other and major contributions)
 - 25mins discussion** (moderate the discussion, include whole class)

Seminar Structure: Part 1

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(subtopics 1-10, 2 subtopics per week, attendance mandatory)
- Read two papers per topic & find a third one
(e.g. Sept 28th: 2 papers for topic “Productivity”
+ 1 related paper on productivity)

If you are NOT moderator

- Write a short response of the identified 3rd paper
max 200 words not including refs; focus on major contributions,
what you find important or interesting,..
- Discussion of topics in class
actively participate in the discussions!

3 credits (→ 90 hours): 2/5 for part 1 (~40 hours)

Seminar Structure: Part 2

- **In Teams of 2:** identify a relevant research problem / question in the assigned area
- **Perform literature review [Main Part]**
- **Write a draft proposal**
(max. 3 pages double column format plus max. 1 for references; include motivation, research question/problem, related work showing relevance, and approach or study method/design)
- **Present your proposal**
(max. 5 minutes and 3 minutes questions)
- **Actively participate in discussions**

Seminar Structure: Part 2

- **In Teams of 2:** identify a relevant research problem / question in the assigned area
- Perform literature review
- Write a draft proposal
(max. 3 pages double column format plus max. 1 for references; include motivation, research question/problem, related work showing relevance, and approach or study method/design)
- Present your proposal
(max. 5 minutes and 3 minutes questions)
- Actively participate in discussions

3 credits (→ 90 hours): 2/5 for part 2 (~40 hours)

Seminar Structure: Part 3

- Write final research proposal
(max. 6 pages double column format plus references; **complete related work section [main part]**, more detail on how to address/answer the research question, i.e. study design/approach design, and motivation)
- Review two reports
- Present your findings
(approx. 8 minutes and 4 minutes questions)
- Actively participate in discussions

Seminar Structure: Part 3

- Write final research proposal
(max. 6 pages double column format plus references; more complete related work section, more detail on how to address/answer the research question, i.e. study design/approach design, and motivation)
- Review two reports
- Present your findings
(approx. 8 minutes and 4 minutes questions)
- Actively participate in discussions

3 credits (→ 90 hours): 1/5 for part 3 (~10 hours)

Assessment / Grading

- Active reading of assigned papers (Perusall):
 - Reading all assigned papers, interactive (and collective) annotations, thoughtful comments and questions as well as responding to others
 - Short responses, active class participation
 - Moderation (including presentation)
 - Proposal draft and presentation
 - Reviews of other reports
 - Final proposal and presentation
-

Topics

1. Productivity
2. Sensing
3. Socio-technical nature of development
4. Task Context
5. Developer Communication and Coordination

1. Productivity

- What affects productivity?
- How do we perceive productivity?
- What impedes productivity and how to tackle it?

2. Sensing Developers

- Better understanding the developer in the process and her/his experiences
- Better understanding code comprehension and quality

3. Socio-technical nature of development

- How do the social aspects affect the technical artifacts?
- How much do the social networks overlap with technical ones and how does this overlap affect productivity?

4. Task Context

- Which context is needed to perform a change tasks?
- How to provide easy access to task context?

5. Developer Communication and Coordination

- How do developers communicate and what do they exchange on different media?
- What are communication challenges and how to address them?

Finding Relevant Work

- search online by author, keyword, topic, etc. on personal web sites, Google Scholar, ACM Digital library, Citeseer, IEEE Digital Library
- Look through proceedings of main conferences (ICSE, FSE, CHI, ASE, MSR, ICPC, ICSME)
- Browse and follow references/citations in relevant papers and read related work sections
- If you found a relevant and older paper, look for papers it is “cited by”

Code bubbles: rethinking the user interface paradigm of integrated development environments

Full Text: PDF

- Authors: [Andrew Bragdon](#) [Brown University](#)
[Steven P. Reiss](#) [Brown University](#)
[Robert Zeleznik](#) [Brown University](#)
[Suman Karumuri](#) [Brown University](#)
[William Cheung](#) [Brown University](#)
[Joshua Kaplan](#) [Brown University](#)
[Christopher Coleman](#) [Brown University](#)
[Ferd Adeptura](#) [Brown University](#)
[Joseph J. LaViola, Jr.](#) [University of Central Florida](#)



Bibliometrics
 · Downloads (6 Weeks): 13
 · Downloads (12 Months): 258
 · Citation Count: 11

Published in:



· Proceeding
[ICSE '10](#) Proceedings of the 32nd ACM/IEEE International Conference on Software Engineering - Volume 1
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11 Citations

- [Robert DeLine](#) , [Gina Venolia](#) , [Kael Rowan](#), [Software development with code maps](#), [Communications of the ACM](#), v.53 n.8, August 2010
- [Robert DeLine](#) , [Gina Venolia](#) , [Kael Rowan](#), [Software Development with Code Maps](#), [Queue](#), v.8 n.7, July 2010
- [John Hardy](#) , [Christopher Bull](#) , [Gerald Kotonya](#) , [Jon Whittle](#), [Digitally annexing desk space for software development: NIER track](#), [Proceeding of the 33rd international conference on Software engineering](#), May 21-28, 2011, Waikiki, Honolulu, HI, USA

Reading a Research Paper

- Read *critically*: be suspicious and ask appropriate questions:
 - e.g. are the authors solving the right problem, what are the limitations, are the assumptions reasonable
- Read *creatively*: critical is easy, reading creatively is harder:
 - e.g. what are the good ideas, how would you extend it, are there applications or extensions the authors haven't thought of
- Take *notes (annotate)*!
- After reading, try to *summarize* the paper (for yourself)
- *Compare* to other works

Active Reading (Perusall)

- Encouragement to **read and reflect**
 - Class discussions work better if everyone has read and thought about the paper
- Annotate papers with comments and questions you have (these can be seen by peers) and respond to peers
- Think of the contributions of the papers, what they did well or how it could be extended / improved (NOT just more participants!!!)

Short responses on 3rd paper

- Find one more suitable paper. Note, the additional paper has to be a full paper (i.e. ≥ 9 pages) and from a top tier conference, such as ICSE, FSE, CHI.
- **NOT just a summary** of the paper. Think of it this way
 - If I asked you what you thought about a movie you recently went to, you wouldn't just summarize it
 - Write it in your own words.
 - Grading based on “thoughtfulness”
 - **max 200 words** not including refs; focus on major contributions, what you find important or interesting,...
- Due by **midnight** before class
- Naming: LASTNAME_FIRSTNAME_WEEK.pdf

Short responses (200 words)

- Questions of interest
 - What did you think about it and what did you find important or interesting?
 - What are main contributions of the paper?
 - What are strengths or weaknesses of the paper/research?
 - How could you imagine extending the work?
 - Do you agree or disagree with the findings?
 - ...
- Express your perspective, draw connections between readings

Expectations to Research Proposal

- Identify a relevant research question and motivate it well

<Major Part>

- Summarize current state of the art
- Provide a good overview of the area, categorizing related work (not just listing it!!!), finding commonalities, specialties, differences,...

<End Major Part>

- Describe how to address the research question/problem
 - Could be a tool you develop or a study you perform
 - Specify study design/method
- Describe how your idea is different / extends related work
- Critical and creative thinking, some reflection on your own

Expectations to Proposal (2)

- Find good structure / outline / categorization and present in a coherent and consistent way
 - Abstract, Introduction, Related Work (2 or more pages), Approach, Study Method, Discussion, Conclusion, References, Word of Honor
- **Don't just enumerate related work!**
- **Use correct and understandable English,** presentation is very important (proof-read?)
- Phrases such as “I like this paper” should not be in it
- **Cite and quote correctly to avoid plagiarism!**

Word of Honor

- At the end of your report, include a note on a separate page which you sign, stating:

I, [first and last name], hereby declare that I have produced this work independently and have used no other than the listed tools and sources
- This does not count towards the pages
- Only required in the final report

Review a Report

- Start with a brief summary of the report (2-3 sentences)
- Technical quality, originality/novelty and significance:
are the arguments in the paper correct, how original/novel is the report, how significant is the research question the author poses, is the research area well covered, what is good about the report, are there any problems/issues, what could the author improve
- Logical structure, presentation and style:
is the paper coherent, well-written and are concepts and approaches well-explained, are graphics/tables used appropriately, is it easy to follow and clear, how could it be improved
- Be constructive, polite and professional!
- Start with summary, pros/cons and go from high granularity to lower

Review a Report

- You will receive a review form through EasyChair
- Provide your review and a grade from the following options:
 - accept
 - weak accept
 - weak reject
 - reject
- Examples of good reviews are on the course website

Presentation (5 and 8 mins)

- Several guidelines on website
- Some more:
 - **Don't exceed the time limit**
 - Practice the talk
 - Check your presentation with the beamer
 - Don't ignore the audience
 - Avoid too many slides, too many bullets, fonts too small, too much text
 - Have a flow / story line
 - Motivate topic, explain concepts, provide overview,...

Deadlines (tentative on web site)

Frequently check the course page for updates!

Thursday 23.9 @ 10am paper preferences (≥ 2 , more is better) and partner

Next steps

- Choose topic & partner and let Alexander Lill know
- Create a Perusall account and send me your email you used for it
- Read 2 assigned papers on Perusall, actively annotate (comments/questions) and interact
- Identify a 3rd related paper

- If you moderate: prepare presentation & discussion (send slides to me)
- If you don't: write short responses (200 words max), send it to me `LASTNAME_FIRSTNAME_01.pdf`

Details & More Information

- www.ifi.uzh.ch/en/hasel/teaching/courses/sedp21.html
(also includes presentation guidelines, examples of reports, etc.)

- Contact:
 - Thomas Fritz (fritz@ifi.uzh.ch)
 - Alexander Lill (lill@ifi.uzh.ch)