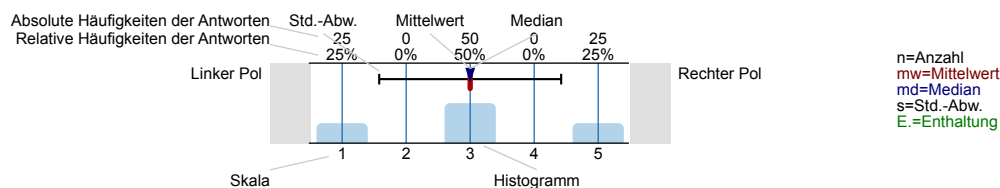


Auswertungsteil der geschlossenen Fragen

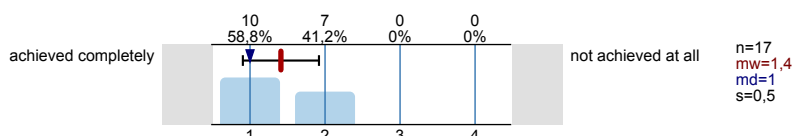
Legende

Fragestext



1. course evaluation

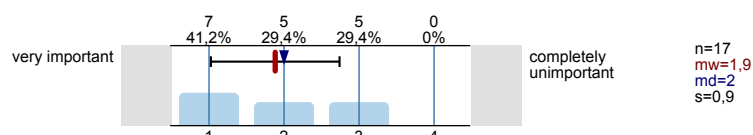
- 1.2) To what extent have you reached your personal learning objective?



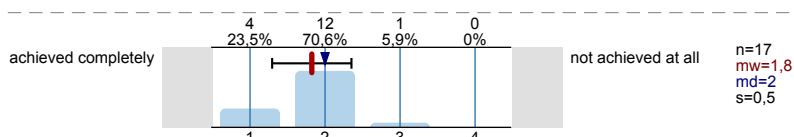
2. Learning objective 1: Understand Industry 4.0 challenges and IEEE 802.15.4

By the end of the course learners are able to explain how TSCH mode of IEEE 802.15.4 helps to achieve strict Quality-of-Service of the industrial applications.

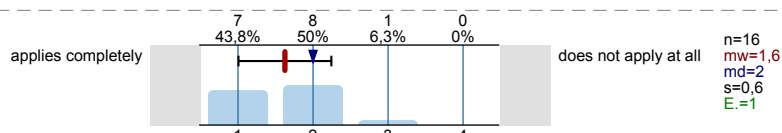
- 2.1) How important was it for you to achieve this learning objective?



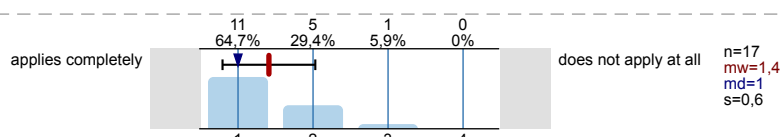
- 2.2) To what extent have you achieved this learning objective?



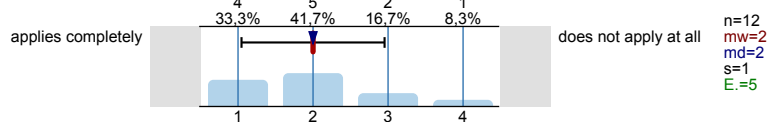
- 2.3) ... because I actively paid attention to the performance evaluation theory



- 2.4) ... because I actively participated in simulations



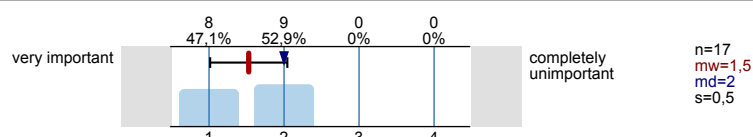
- 2.5) ... because I conducted some experiments on my own



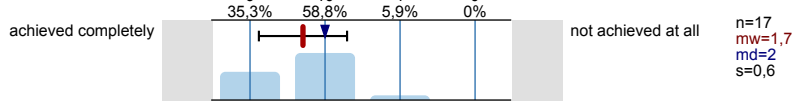
3. Learning objective 2: Think critically about network communication in Industry 4.0

By the end of the course learners will be able to bridge the gap between theory and practice by applying learned methods to real-world challenges, thereby gaining a practical understanding of the concepts of network communication in Industry 4.0. Additionally, students will develop skills in analysing and synthesising scientific research related to it, leading to a broader and deeper understanding of the field.

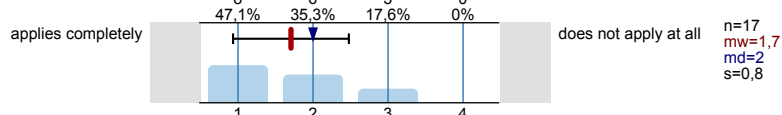
- 3.1) How important was it for you to achieve this learning objective?



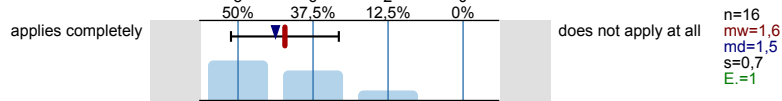
3.2) To what extent have you achieved this learning objective?



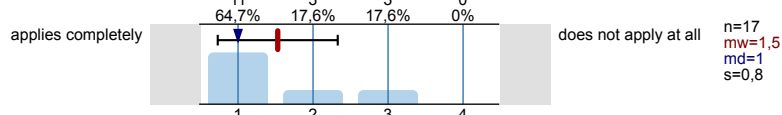
3.3) ... because I attended the online lectures that covered the basic theoretical knowledge



3.4) ... because I was repeatedly requested to discuss what I understood and what not



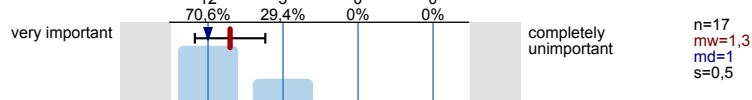
3.5) ... because I participated in peer-assisted inquiries



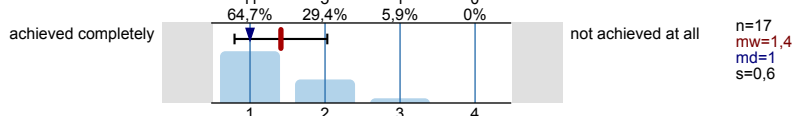
4. Learning objective 3: Work in international, interdisciplinary teams

By the end of the course students learn how to work in international, interdisciplinary teams in terms of: knowing about the different roles, reflect on team dynamics, get to know tools for efficient online collaboration and how to provide constructive peer-feedback.

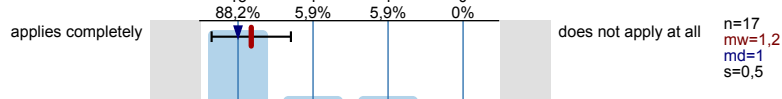
4.1) How important was it for you to achieve this learning objective?



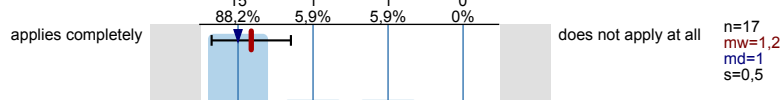
4.2) To what extent have you achieved this learning objective?



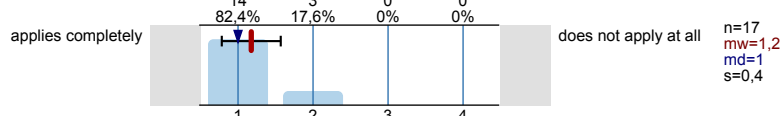
4.3) ... because I discussed with my team and learned from their different perspectives doing the team based assignments



4.4) ... because I had to do tasks with Cooja simulator and hardware in a team



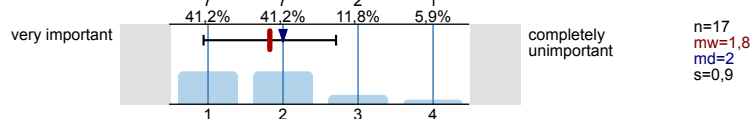
4.5) ... because I met my peers at TUHH campus and we had fun together

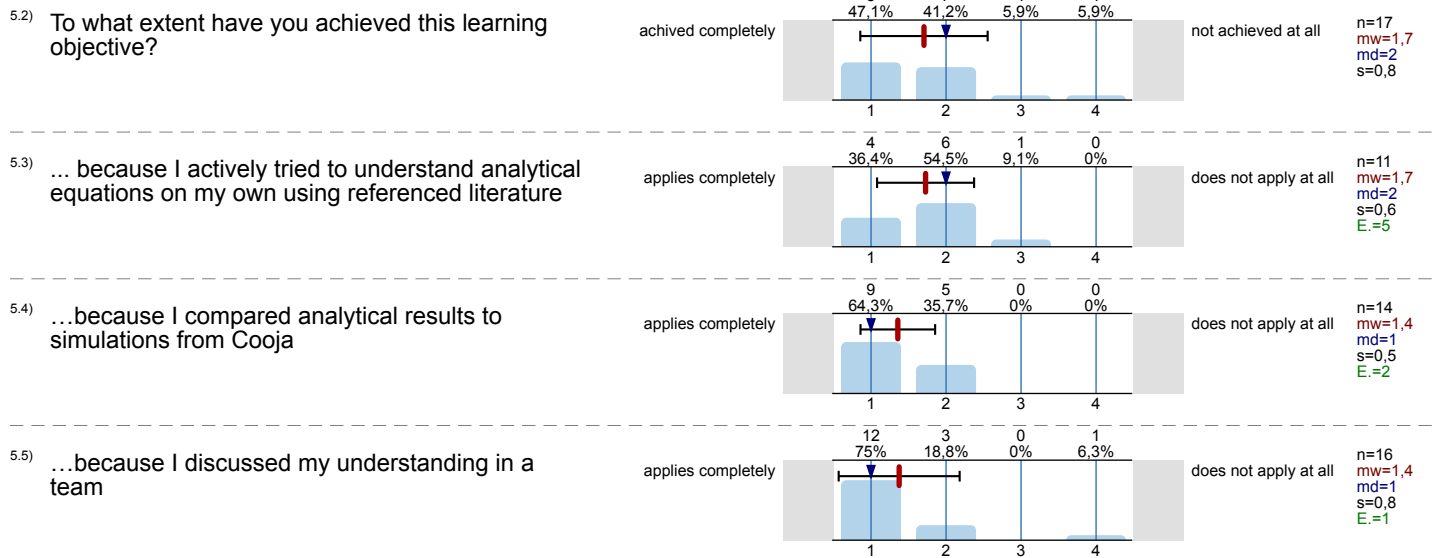


5. Learning Goal 4: Learn how to evaluate communication protocol performance

By the end of the course learners are able to explain common performance metrics and to apply analytical modeling and simulations in Cooja. By conducting experiments in a real testbed learner need to compare measured results to expectation.

5.1) How important was it for you to achieve this learning objective?





Auswertungsteil der offenen Fragen

1. course evaluation

1.1) With which personal learning objective did you start the course?

- Discover wireless communications in Industry 4.0
- Familiarize with technologies used and connected to Industry 4.0
- For my seminar presentation skills and understanding few concepts of Industrial IOT
- In order to get an idea about how Industry 4.0 works in the current world with the use of 6TiSCH
- I started this course with the objective to deepen my understanding of deterministic wireless networks and how they support industrial applications, particularly within the context of Industry 4.0. I wanted to understand key protocols such as IEEE 802.15.4 and 6TiSCH, and learn how communication networks can be made more predictable and energy-efficient for time-critical industrial tasks.
- I started this with course just to discover about industry 4.0 as it isn't the subject of my studies but i might find it useful in the late future.
- I wanted to discover the way that systems in a factory communicates with each other, because my degree in mechatronics focuses on the way they work not communicate.
- I wanted to have an introduction to Industry 4.0 standards and explore a field of studies which is not my own.
- I wanted to see if I could follow an all-english course and not be lost. Also to start thinking about industry 4.0 challenges that we will have to face. My objective was to learn to work with cooja and to understand how about tsch mode
- Learning the basics about the protocol IEEE 802.15.4
- My first personal objective was to learn more about new communication technologies, especially for the industrial sector, which has many opportunities of improvement. Secondly, i also wanted to have the experience of taking a class in another country, to train my communication skills
- My main personal goal was to find out more about the IEEE 802.15.4 protocol and its applications, which were all very new to me.
- My objective was to be more informed about the communications used in Industry 4.0. Why some good theoretical and practical activities demonstrating a system working and its internal parts
- To get a basic understanding of 6TiSCH and also to get hands on experience through simulations and testbeds.
- To learn about Industry 4.0 and simulation tools
- To communicate with international students
- To learn more about the network concepts in devices.
- Understanding the functionality of wireless network how they communicate.

1.3) From your point of view, what was the reason why you did not or could not achieve your learning objective?

- As i didn't have much expectation, It wasn't hard to achieve my learning objective.
- Course covered topics not so much familiar o my knowledge, however I still could find out about things that were interested to me
- Everything I expected I was able to do
- It was because of the communication between the groups and the feedback of the teachers
- I was not able to dedicate more time for the module
- I would say my objectives were achieved successfully, but of course time is always a big constraint I think. There is only so much you can teach/ learn in a set amount of time , but for sure the the in-person meeting was a decisive factor in the success obtained in the course. All the simulations and assignments really highlighted the topics learned in the theory lessons.
- Maybe this new subject can be hard at the first glance.
- Not applicable — I was able to fully achieve my learning objective. The course structure, content, and interactive discussions were highly effective in supporting my learning goals.

2. Learning objective 1: Understand Industry 4.0 challenges and IEEE 802.15.4

By the end of the course learners are able to explain how TSCH mode of IEEE 802.15.4 helps to achieve strict Quality-of-Service of the industrial applications.

2.6) From your point of view, what was the reason why you did not or could not achieve this learning objective?

- fully achieved
- I think this objective needed to have a good understanding how it works before telling why it is good.
- I was not able to perform experiments on my own.
- I was not familiar with the network communication from the beginning. However I acknowledged issues regarding Industry 4.0
- NA
- Not applicable — I was able to fully achieve my learning objective. The course structure, content, and interactive discussions were highly effective in supporting my learning goals.
- We achieve our goals because the teachers were leaving free will and enough time to learn on our own, instead of simply having lectures
- We didn't go too deep into how things work, like routing. However, since we were time-constrained, I think we learned the most important parts

3. Learning objective 2: Think critically about network communication in Industry 4.0

By the end of the course learners will be able to bridge the gap between theory and practice by applying learned methods to real-world challenges, thereby gaining a practical understanding of the concepts of network communication in Industry 4.0. Additionally, students will develop skills in analysing and synthesising scientific research related to it, leading to a broader and deeper understanding of the field.

3.6) From your point of view, what was the reason why you did not or could not achieve this learning objective?

- Because of the point mentioned earlier
- Course well defined the structure between theory and practice
- For me, personally, theory is always a little harder to understand than practice. Of course the base of the practical part is always in the theory, but it's hard for me to bridge the gap sometimes, and instead of that I just abstract it into my brain and do not look deeper into the details (which I think is ideal for a short course), but when it comes to the "analysing and synthesising scientific research related to it" part, I wouldn't go as far as saying that I achieved that. Perhaps the knowledge I gathered from the course will serve as a first step, like a guiding light towards deeper understanding
- I think I did manage to get a good grasp on the application possibilities with the simulation assignments
- I was not able to dedicate time to theoretical concepts.
- NA
- none
- Not applicable — I was able to fully achieve my learning objective. The course structure, content, and interactive discussions were highly effective in supporting my learning goals.

4. Learning objective 3: Work in international, interdisciplinary teams

By the end of the course students learn how to work in international, interdisciplinary teams in terms of: knowing about the different roles, reflect on team dynamics, get to know tools for efficient online collaboration and how to provide constructive peer-feedback.

4.6) From your point of view, what was the reason why you did not or could not achieve this learning objective?

- Because the student organised activities outside of the university we could be more comfortable to ask and learn and help each other
- Few more discussions and interactions would have increased the achievement of this learning objective.
- fully achieved
- I was a lot harder than I thought to speak in English for so long with a technical vocabulary. But I think that by the end of the week I did manage to adapt and I was on the right slope
- NA

- none
- Not applicable — I was able to fully achieve my learning objective. The course structure, content, and interactive discussions were highly effective in supporting my learning goals.
- Not exactly familiar with network communication and simulator.

6. Recommendation

6.1) What would you recommend to future students of this course?

- Be open minded and have a good level in english
 - Concentrate on the tasks and discuss your results as a team
 - Get familiar with the topic and content of the course. Get solid foundation before attending the course. Module was still interesting and contained valuable activities.
 - I would recommend future students to stay engaged from the very beginning — reviewing the lecture slides ahead of each session really helped me understand the complex topics better, especially around TSCH mode and 6TiSCH scheduling. The team-based discussions were one of the highlights for me; I learned a lot by sharing perspectives with peers from different backgrounds.
- Make sure to explore the Cooja simulator early, even if just out of curiosity — it can seem a bit technical at first, but it's a great way to connect theory with practical applications. During the physical meeting week, the hands-on activities and the industrial visit really tied everything together and made the concepts more concrete.
- From my experience, being proactive, asking questions, and collaborating openly are key to getting the most out of this course.
- I would recommend that they carefully follow the theoretical lessons as a foundation for running the Cooja simulator. Particularly, I encourage them to actively collaborate within their team—and to enjoy the experience!
 - Maybe install cooja simulator in individual laptops using VM
 - the analytical part was the absolute hardest to me, I am sure I will not remember much of it after a week. The only way that I would be able to retain this specific knowledge was if I actually worked with those equations for a looong time. It felt pretty confusing to me, because there is no way I can learn math by just listening. I would need to do it myself in small little steps before knowing what I'm doing. Also, my work team was as confused as me, so we couldn't really help each other.
 - To dedicate more time for the concepts before practical sessions.
 - To discussion in their group, I really understood when trying to do the assignments with my group
 - Yes, definitely

Profillinie

Teilbereich: ECIU

Name der/des Lehrenden: Dr.-Ing. Koojana Kuladinithi

Titel der Lehrveranstaltung: Enabling Industry 4.0
(Name der Umfrage)






Verwendete Werte in der Profillinie: Mittelwert

1. course evaluation

1.2) To what extent have you reached your personal learning objective?	achieved completely		not achieved at all	n=17	mw=1,4	md=1	s=0,5
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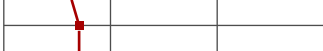



2. Learning objective 1: Understand Industry 4.0 challenges and IEEE 802.15.4

By the end of the course learners are able to explain how TSCH mode of IEEE 802.15.4 helps to achieve strict Quality-of-Service of the industrial applications.

2.1) How important was it for you to achieve this learning objective?	very important		completely unimportant	n=17	mw=1,9	md=2	s=0,9
2.2) To what extent have you achieved this learning objective?	achieved completely		not achieved at all	n=17	mw=1,8	md=2	s=0,5
2.3) ... because I actively paid attention to the performance evaluation theory	applies completely		does not apply at all	n=16	mw=1,6	md=2	s=0,6
2.4) ... because I actively participated in simulations	applies completely		does not apply at all	n=17	mw=1,4	md=1	s=0,6
2.5) ... because I conducted some experiments on my own	applies completely		does not apply at all	n=12	mw=2	md=2	s=1


3. Learning objective 2: Think critically about network communication in Industry 4.0

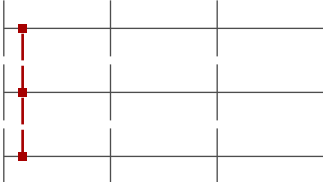
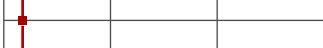
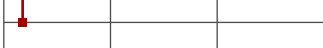
By the end of the course learners will be able to bridge the gap between theory and practice by applying learned methods to real-world challenges, thereby gaining a practical understanding of the concepts of network communication in Industry 4.0. Additionally, students will develop skills in analysing and synthesising scientific research related to it, leading to a broader and deeper understanding of the field.

3.1) How important was it for you to achieve this learning objective?	very important		completely unimportant	n=17	mw=1,5	md=2	s=0,5
3.2) To what extent have you achieved this learning objective?	achieved completely		not achieved at all	n=17	mw=1,7	md=2	s=0,6
3.3) ... because I attended the online lectures that covered the basic theoretical knowledge	applies completely		does not apply at all	n=17	mw=1,7	md=2	s=0,8
3.4) ... because I was repeatedly requested to discuss what I understood and what not	applies completely		does not apply at all	n=16	mw=1,6	md=1,5	s=0,7
3.5) ... because I participated in peer-assisted inquiries	applies completely		does not apply at all	n=17	mw=1,5	md=1	s=0,8

4. Learning objective 3: Work in international, interdisciplinary teams


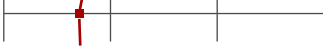
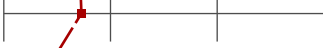
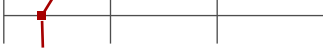

By the end of the course students learn how to work in international, interdisciplinary teams in terms of: knowing about the different roles, reflect on team dynamics, get to know tools for efficient online collaboration and how to provide constructive peer-feedback.

4.1) How important was it for you to achieve this learning objective?	very important		completely unimportant	n=17	mw=1,3	md=1	s=0,5
4.2) To what extent have you achieved this learning objective?	achieved completely		not achieved at all	n=17	mw=1,4	md=1	s=0,6

4.3) ... because I discussed with my team and learned from their different perspectives doing the team based assignments	applies completely		does not apply at all	n=17	mw=1,2	md=1	s=0,5
4.4) ... because I had to do tasks with Cooja simulator and hardware in a team	applies completely		does not apply at all	n=17	mw=1,2	md=1	s=0,5
4.5) ... because I met my peers at TUHH campus and we had fun together	applies completely		does not apply at all	n=17	mw=1,2	md=1	s=0,4

5. Learning Goal 4: Learn how to evaluate communication protocol performance

By the end of the course learners are able to explain common performance metrics and to apply analytical modeling and simulations in Cooja. By conducting experiments in a real testbed learner need to compare measured results to expectation.

5.1) How important was it for you to achieve this learning objective?	very important		completely unimportant	n=17	mw=1,8	md=2	s=0,9
5.2) To what extent have you achieved this learning objective?	achived completely		not achieved at all	n=17	mw=1,7	md=2	s=0,8
5.3) ... because I actively tried to understand analytical equations on my own using referenced literature	applies completely		does not apply at all	n=11	mw=1,7	md=2	s=0,6
5.4) ...because I compared analytical results to simulations from Cooja	applies completely		does not apply at all	n=14	mw=1,4	md=1	s=0,5
5.5) ...because I discussed my understanding in a team	applies completely		does not apply at all	n=16	mw=1,4	md=1	s=0,8