D 1.5 – Analysis of pilot's second test-run with qualitative advices on how to improve specific functions/usability of the robot

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D 1.5

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Del 1.5	Executive Summary
This deliverable describes the methods and performance of the ALIAS robot during the second user trials. It contains a short description of the test environment, conditions and used methods before the results will be evaluated and needs for improvements will be discussed. Based on the user feedback of the first user trials, the software and use cases were revised and improved. Based on the new available functions, a new set of use cases was developed, that was tested during the second user trials. The implemented software architecture of the 2nd ALIAS prototype is described in deliverable 7.3. and milestone 7.	

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Table of Content

1 Abstract

This deliverable describes the activities and results of the second field trial and next steps of work package 1 (WP1). The aim of the second test-run was the identification of weaknesses and improvable components of the ALIAS architecture by testing a second prototype under real life conditions at Johanniter outpatient nursing home in Wilhelmshaven on 18th and 19th September 2012. During the field trial we have tested four scenarios: the self-experience-scenario, the ground-lighting-scenario, the event scenario and the remote-control-scenario. Furthermore we took the opportunity to evaluate the BCI device by members of the research group.

Keywords: User inclusion, test-run, final prototype, workshop results

2 Aim of the Field Trials

The second pilot of ALIAS was developed through a permanent cooperation between the core team of WP1 (TUM-GSing, PME, YOUSE) and the technical partners of the ALIAS consortium. A series of scientific analysis, surveys (e. g. VDI-Seniors, senior students at LMU München), interviews and workshops (four in Berlin, one in Munich) with seniors, relatives and professional caregivers and other activities (information events, fairs) were conducted in advance of the second test-run. In this manner it was possible to include test persons and potential users from the very beginning and give continuous feedback to the technical partners. The tasks and activities of the seniors were analyzed and possible interested user groups identified. The requirements of the seniors and relatives were defined and the most adequate functions and concepts were selected and evaluated. A requirements list regarding the needs and preferences of the user groups (elderly, relatives and caregivers) as an input for other WPs and a list of selected functions and concepts was prepared in the run-up to the second user trial.

Field trials represent an important part of WP1 “user inclusion”, task 1.6 “continuous testing and optimization”: This task is the main task of WP 1 and will provide profound analysis of user-opinions and wishes and their accordant technical realization. In a two-cyclic manner, a refinement of the ALIAS’s functions has been performed to make sure to meet the needs and preferences of the elderly people and to create a marketable relevant robot platform. The first two ALIAS pilots were tested in two user studies with seniors of the Senior Research Group (YOUSE) and caregivers or relatives of seniors clients of PME under realistic and real-world conditions.

The field trials described hereafter represent the second of these two test-runs. Deliverable 1.5 “analysis of pilot’s second test-run” aims on giving qualitative advices on how to improve specific functions as well as the usability of the robot.

3 Test preparation

To define clear test scenarios, detailed descriptions of these were proposed in co-operation with all partners. These scenarios were based on the scenarios already defined in the beginning of the ALIAS project.

- Self-Experience-Scenario
- Ground-Lighting-Scenario
- Event Scenario
- BCI Scenario
- Emergency-Call-Scenario/Remote-Control-Scenario

All project partners were asked to revise these scenarios and comment, which steps are feasible and which are not. Afterwards all comments were integrated and the scenarios were updated/shortened.

By beginning of September 2012 the modules needed for scenarios were integrated at an integration meeting in Oldenburg, Germany. The self-experience-scenario/out of the box scenario, ground lighting and games scenario have been integrated successfully, the e-tickets-scenario was not integrated successfully. Later it ran only as an application.
One day before the field trials a small team of technical partners under the leadership of MLAB and IUT started to prepare the robot at the nursing home in Wilhelmshaven. For this manner two offices in the care facility in Wilhelmshaven were available.

4 Test conditions

The second user trial was conducted at the “Insel”, Johanniter outpatient care facility in Wilhelmshaven on 18th and 19th September 2012. Up to 15 elderly people and three care givers visit the care home every weekday. The following floor plan should illustrate the test environment:

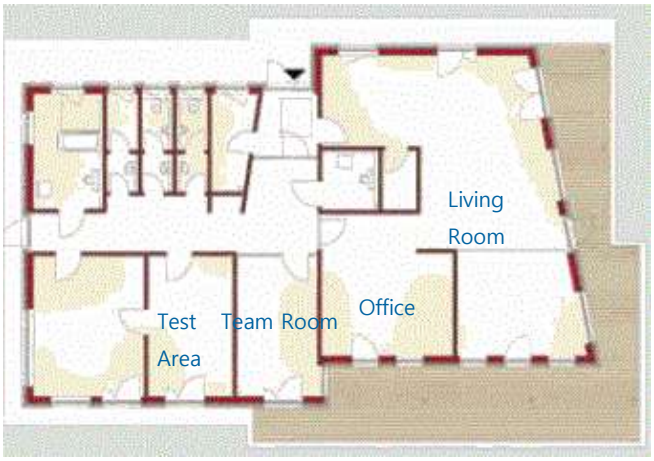

Figure 1: Floor plan

Due to the bad physical and mental health status of some residents only four of them were adequate for the test sessions (two male, two female). Beyond that two care givers (male/female) ran through the test and provide valuable feedback to us.

5 Test Methods

While the first test-run followed a clear and relatively simple storyboard, the second trial was planned closer to the reality. In cooperation with the nursing home management six adequate test persons (four residents/two caregivers: three women, three men) were selected for the test. A detailed time schedule of the test-run is attached (see Annex 10.1).

At the beginning of the test session all test persons received a short instructions on the robot itself, then the procedure started with an out-of-the box test to familiarize each test user with the robot and its functionality and to get feedback on its usability. Therefore task oriented test methods were chosen in order to assure realistic results about how the robot platform works. This kind of test method shows the quality and usability of ALIAS by taking users behaviour and comments into account.

The observation and documentation of the test were based on the natural situation of the investigation. Observers and test persons resided in the same test room. Through the participation respectively the immediate experience of the situation, aspects of action and thinking got observable, which comparatively will not be observable within mere interrogations or documents about these interactions respectively situations. Valuable conclusions about acceptance and the status quo of the robot platform were drawn from observations and action advices for the further development are derived. A sheet of observation was aimed at documenting the behaviour of the users and specialists during the tests (see Annex 10.2).

In advance it was planned that the methods of research are complemented with a standardized interrogation of the participating seniors and specialists before and after the test participation (see Annex 10.3). This was not done, because of the poor health status of the elderly people. Most of them suffer from mild or rather severe dementia.

6 Scenario Description

This section describes the advanced scenarios of the ALIAS project. The scenarios concern short and realistic examples of application areas of the robot platform that show the possibilities from the user point of view. The goal of this procedure is the description of a sequence of events in the living context of users.

The methodology of the ALIAS project follows a user-centred design and focuses on the attitudes and wishes of elderly people. All scenarios, applications and functions of the robot platform are adapted in an iterative process. This is done through the

adaption of the level of abstraction in collaboration with the whole consortium and the users. The scenarios support the development process from conception to the end.

The following scenarios are described:

- Ground-Lightning-Scenario
- Remote-Control-Scenario

The scenarios are carried out in collaboration with the elderly people within the workshops. The stories are based on fiction persons and were not realized yet in this way.

6.1 Security by the Use of a Ground Lighting-System

6.1.1 Objective

Darkness or insufficient illuminations are a main reason for falls in old age (Saup 1993). Therefore the ALIAS project has paid special attention on the lighting and other security issues of the named target groups in the development process.

That has been realized by the integration of a ground lighting system that should make the ways at night safety due to minimize the fall hazard and its consequences.

6.1.2 Scenario Description

6.1.2.1 Hans H.

Even though Hans H. is 75 years old, he is in the thick of life. Only his bladder weakness at night associated with his night blindness is difficult to cope with. In the meantime he has to use the bathroom several times at night. Thereby he always gropes his way ahead carefully.

He had fallen down heavily last year, however, while doing so because he did not cleaned up the laundry basket in the evening as he promised his wife. Thus he bounced his left haunch heavily which was the reason why he took advice about technology opportunities that simplifies life.

By now ALIAS a mobile robot platform has helped Hans H. for three months. Since then Gertrude H. his wife is sleeping better. As soon as Hans H. recognizes at night that he has to visit the toilet he calls ALIAS softly: “ALIAS, please attend me to the bathroom”. ALIAS answers immediately via light signals and comes over. Following a six-week test phase the couple has decided that ALIAS should reply just by a short light signal at night. So Gertrude H. can continue to sleep when her husband has to go to the bathroom. Gertrude H. comments enthusiastically: “Since I know that ALIAS takes care of Hans, I can sleep better!”

As soon as ALIAS arrives at Hans H.´s bed it switches on the follow-me illumination on the back. Hans H. puts on his slippers standing beside the bed and gives ALIAS the command: “You can start now”.

ALIAS drives slowly to the bathroom while it is illuminating the floor. In particular this kind of illuminating Hans H. feels comfortable: “The lighting is not too bright, my eyes can adapt to the illumination in the bathroom very well. Perfect!”

Since Hans H. has installed motion detectors the light switches on automatically when ALIAS is on the way to the bathroom. In the meantime the eyes of Hans H.s get used to the brighter environment his eyes have any problems with the changing light.

ALIAS waits for the senior in front of the bathroom. After the robot platform has brought him safely back to bed, ALIAS drives to its charging station waiting for its next usage.

6.2 Help by the Use of a Remote Control System

6.2.1 Objective

The robot platform ALIAS ensures that even risk patients can feel well and secure at home as they would feel in a hospital or nursing home. There are already technical solutions for integrated medical care and emergency aid of cardiac insufficiency patients as well as asthma patients. The integration of a monitoring application has been important from the very beginning of the project that even risk patients can stay at home independently for a long-term.

6.2.2 Scenario Description

6.2.2.1 Wolfgang Z.

Wolfgang Z., living alone, is suffering from hypertension for years and had recently his second heart attack. Since then the heart of the 74 years old patient is monitored by particular software of ALIAS.

The software has been adapted to Wolfgang by his cardiologist, Dr. Claudia W. It alerts the emergency service if his blood pressure is exceeding or falling below a critical value or if he gets a heart attack.

Wolfgang Z. feels safe again and enjoys his autonomy at home since he is accompanied by the robot platform ALIAS. He has to carry only a small sensor with him around the clock that monitors the heart data. But that is not a problem for him. So he said recently to his technophile friend Jürgen M.: “It is really cool, in ALIAS is more techniques insight than in your new smartphone.”

Also his daughter Ingrid T. lives with her family 500 Miles away is less concerned about his father since ALIAS is with him. She sees that he blossoms again.

During Wolfgang Z. takes care of his cactus collection – his favourite hobby – he suddenly feels that he gets dizzy. A few seconds later he sinks down on the floor of his hobby room.

At the same time ALIAS, staying in the living room and waiting for the next command of its user, registers the case of emergency. It starts immediately the installed security program and alerts loudly: “I will alert help in ten seconds” and it counts “10, 9, 8, …” – interrupted by the message: “PLEASE SAY STOP TO STOP THE COUNTDOWN” – “3, 2, 1”.

Wolfgang Z. doesn’t answer, so that ALIAS makes an emergency call. The person on duty takes full responsibility for ALIAS – after he alerts the action force – and navigates ALIAS via remote control in order to properly assess the situation.

He navigates the robot platform through the apartment of Wolfgang Z. Suddenly he recognizes the patient lying on the floor. Carefully he controls ALIAS towards the place. In the meantime Wolfgang Z. regains his consciousness. The administrator talks friendly to the patient: “Stay calm, I have informed the emergency team already and help is on the way.” The patient still lying on the floor replies: “What happens to me?” The administrator answers: “ALIAS reported a case of emergency, stay calm please.”

Minutes later the doorbell rings shortly. Immediately afterwards Wolfgang Z. hears a noise, such as turning a key in the lock. "I think the ambulance men are already here," he says wearily to the clerk. He answers: "Well, I'm still waiting for a moment, until I know you are in good hands."

At that time, the officer in charge answers already in order to take the case.

6.2.2.2Gertrude H.

Gertrude H. living alone is 73 years old. Last December, she fell hard on the way to the letterbox because of black ice and has cheated her left hip. Since then, she feels unsafe walking and rarely leaves her apartment. From her orthopaedic Heinz L. she has been prescribed a walker, but she only uses it outside the apartment. At home she prefers to take their cane. That’s why her son, Ralf H., is very concerned whether his mother is in good hands living alone at home.

However, he knows his mother's negative attitude toward nursing homes and assisted living. He would never place her in such an institution against her will. So Ralf H. has given her the robot platform ALIAS three months ago. Since then his mother feels safely again staying alone in her apartment.

Today it happened on the way to the bathroom: Gertrude H. was just careless for a moment and she slips out. Thereby she falls again on the pre-damaged side. Curled up in pain lying on the ground she whines: "Ouch, ouch. Help me, ALIAS, I need help". ALIAS comes to the senior and replies immediately: "I will alert help in ten seconds" and counts per second reverse "10, 9, 8, ..." - interrupted by the message

"SAY STOP TO INTERRUPT THE COUNTDOWN" - "3, 2, 1 ". Gertrude H. laments goes on.

Seconds later, Gertrude H. is connected to the operations centre of the local emergency service. The dispatcher gets the emergency message from ALIAS at the same time. He can read message on the screen: case of emergency by Mrs. Gertrude H., Dinkelgasse X, XXXXX P. He switched on the live stream in order to assess the situation with the lady better.

Then Gertrude H. appears on the live stream sitting on the floor while she is busy with her cane. Facilitated the dispatcher speaks reassuringly to the patient: "Help is already en route, for your best you should remain sitting on the floor that relieves your cardiovascular system". Gertrude H. still whimpers: "Ouch, my hip hurts so much." The dispatcher tells her: "I just get the message that the team is on your doorstep, so every moment help is coming, never fear."

The bell rang briefly, then immediately the emergency team unlocks the front door of Gertrude H. and enters the apartment. The officer in charge, Rainer F., says comfortingly, "Mrs H., here's help" and contacts his officer in the headquarters: "We are here now and take over, thank you," the dispatcher briefly says goodbye: "Well, see you later ".

6.3 Implementation

Short descriptions of the scenarios of the second field trials are presented below:

- **Self-experience-scenario**: calling the robot, starting a phone call, starting a game, using speech input, using touch screen
- **Ground-lighting-scenario:** asking the robot to bring the user to the bathroom with ground lights illuminating the floor
- **Event scenario:** starting event finder, finding events that match users age and interests, finding the way to the venue
- **Remote-control-scenario:** calling for help, establishing a connection to care person, care person spots the user via camera, talking to the user

These scenarios also included testing the speech recognition (based on an extended set of predefined phrases), the motion and the face recognition of ALIAS.

From a technical point of view, the following software modules were integrated and used during the user trials:

- Camera configuration (IUT)
- New microphone amplifier (FhG)
- Face Detection/Identification (TUM-MMK)
- Dialog Manager (COG)
- Graphical User Interface (FhG)

- Speech Recognition (FhG)
- BCI (gtec)
- Event search website (EURECOM)

7 Results and Recommendations

7.1 Self-Experience-Scenario

During the self-experience-scenario the users had the opportunity to test various functions of ALIAS (telephone, games e.g.) that can be used by speech commands or touch screen. Speech control worked more or less well without using a headset. This was an important improvement compared to last field trials. Nevertheless further efforts will be needed to improve speech control, so that female voices and natural speech can be integrated. Particularly the last point is important to include new user groups (people with dementia e.g.).

7.2 Ground-Lightning-Scenario

The ground lighting-scenario runs very well. ALIAS found predefined routes without any problems and the tested lights on its body were strong enough illuminating dark environments. But there are still needs for improvements: The rooms have to be equipped with automatic door-openers, sometimes a wrong action was triggered since a wrong speak command was recognized.

7.3 Event Scenario

The usability of the event scenario was still very restricted because of several bugs and the English language of the user interface. The state of implementation still did not allow going through the scenario as defined, so it can be tested only by members of the research group. Also the module is not integrated in the general ALIAS menu until now, so the handling was quite complicated and not adequate for most elderly people. At the moment the event search is only available for past events, what has to be improved to take care of future events too.

7.4 Emergency/Remote-Control-Scenario

Particularly caregivers were interested in the functionality of the remote-control-scenario. The remote control was quite easy to use for them, even though it would be desirable that the camera angle is wider to see all obstacles in the room. Skype and navigation interface should be integrated (so far both programs have to be started separately).

8 Conclusion

Customers, in particularly elderly people, have usually high demands concerning new technical products. Due to this, they have high expectations e.g. regarding

speech control. This has to be taken into account when developing or optimizing ALIAS. WP 1 has presented several optimization ideas up to now:

- Touch screen: bending forward to screen is uncomfortable; screen should be movable (mounted to flexible arm) towards user and away from user; participants would like to take the touch screen onto their lap for better touch control (screen too distant)
- Body Design/Direction of eyes and touch screen: front or back of ALIAS difficult to tell apart for testers; participants have the impression that ALIAS approaches them backwards due to monitor and eye position
- Speech Recognition: should understand free speech; should recognize commands with high certainty; should not be disturbed by background conversations; pre-voice check with testers in combination with face detection might help to adjust ALIAS to tester's voice level and volume
- Online Help/Manuals: ALIAS should provide descriptions of functions (e.g. call function, game instructions) online, preferably also as video or oral presentation
- Identification of user: needs to be more certain; process for taking pictures of users at first encounter should be standardized; maybe camera needs a fish eye focus and higher resolution to provide more certainty
- Motion of robot/approaching user: robot should not infringe feet space.

The second field trial has shown that caregivers are particularly interested in the remote-control-scenario, since it provides more safety for users and less efforts for carestaff when checking users health state. But there are still needs for improvements especially concerning the event scenario and speech recognition. Users with, for instance, dementia will need support to benefit from the good features of ALIAS (e.g. communication with others). Even if all ideas cannot be realized in the short period of remaining project time, they should be taken into account because they are important for the focused target groups. The detailed results of the second field trial were fed back to the technical partners.

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9.2 List of Figures

10 Appendix

10.1 Time Schedule

Time schedule – 18.09.2012

09:00 – 10:00	Welcome/Breakfast
10:00 – 10:20	Self-Experience Scenario – Test Group 1
10:20 – 10:40	Self-Experience Scenario – Test Group 2
10:00 – 11:00	Self-Experience Scenario – Test Group 3
11:00 – 11:10	Break/Puffer
11:10 – 11:20	Ground Lighting Scenario – Test Person 1
11:30 – 11:40	Ground Lighting Scenario – Test Person 2
11:40 – 11:50	Ground Lighting Scenario – Test Person 3
11:50 – 12:00	Ground Lighting Scenario – Test Person 4
12:00 – 12:10	Ground Lighting Scenario – Test Person 5
12:10 – 12:30	Break/Puffer
12:30 – 01:15	Lunch
01:15 – 01:30	Event Scenario – Test Group 1
01:30 – 01:45	Event Scenario – Test Group 2
01:45 – 02:00	Event Scenario – Test Group 3
02:00 – 02:15	Event Scenario – Test Group 4
02:15 – 02:30	Break/Puffer
02:30 – 03:30	Coffee Break
03:30 – 04:00	If there is enough time: BCI Scenario – Test Person 1
04:00 – 04:30	If there is enough time: BCI Scenario – Test Person 2
04:00 – 05:00	Pick Up Service

10.2 Observation sheet

GENDER STUDIES in Ingenieurwissenschaften

ALIAS

ALIAS Field Trials II
18th/19th of September 2012

General			
Name of observer			
Number of observers			
Date			
Location	☐ room 1	☐ room 2	
Start of observation			
End of observation			
Duration of observation	hour(s)	minute(s)	

Test subject			
Number	person(s)		
Sex	female	male	
Physical fitness	☐ good	☐ medium	☐ bad
Specifics			

Other attendants			
Number	_____ women	_____ men	
Sex	☐ female	☐ male	
Behaviour	passive listeners	active participants	
Specifics			

Formal procedure			
According to the script	☐ yes	☐ no	
Deviations			
Specifics			

Time	**Observations**	**Interpretation**

10.3 Questionnaire

GENDER STUDIES in Ingenieurwissenschaften

ALIAS robot

Questions about the Robot Platform

1. Will you use the robot platform?

   in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

2. How do you assess the operating characteristics of the robot platform?

   easy ☐ ☐ ☐ ☐ ☐ ☐ difficult

3. Will you need training or other forms of support to use the robot platform?

   in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

4. Are the various functions of the robot platform well integrated?

   in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

5. Do the functions work very well together?

   in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

6. Can you imagine that the seniors you know will learn to use the robot platform very quickly?

   in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

7. Do you find the usage of the robot platform comfortable?

   in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

8. Do you need to learn a lot of things before using the robot platform?

   in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

9. What do you like particularly about the robot platform?

   _____

   _____

   _____

10. Which suggestions do you have to improve?

    _____

    _____

    _____

Internal code:_____

Questions about the Event Scenario

11. Will you use the robot using the event search?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

12. How do you assess the operating characteristics of the event search?

easy ☐ ☐ ☐ ☐ ☐ ☐ difficult

13. Will you need training or other forms of support to use the event search?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

14. Are the various functions of the event search well integrated?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

15. Do the functions work very well together?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

16. Can you imagine that the seniors you know will learn to use the event search very quickly?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

17. Do you find the usage of the event search comfortable?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

18. Do you need to learn a lot of things before using the event search?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

19. What do you like particularly about the event search?

_____

_____

_____

20. Which suggestions do you have to improve?

_____

_____

_____

Internal code:_____

Questions about the Ground Lighting Scenario

21. Will you use the robot using the ground lighting function?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

22. How do you assess the operating characteristics of the ground lighting function?

easy ☐ ☐ ☐ ☐ ☐ ☐ difficult

23. Will you need training or other forms of support to use the ground lighting function?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

24. Are the various functions of the ground lighting function well integrated?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

25. Do the functions work very well together?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

26. Can you imagine that the seniors you know will learn to use the ground lighting function very quickly?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

27. Do you find the usage of the ground lighting function comfortable?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

28. Do you need to learn a lot of things before using the ground lighting function?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

29. What do you like particularly about the ground lighting scenario?

_____

_____

_____

30. Which suggestions do you have to improve?

_____

_____

_____

Internal code:_____

Questions about the Emergency Scenario

31. Will you use the robot using the emergency function?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

32. How do you assess the operating characteristics of the emergency function?

easy ☐ ☐ ☐ ☐ ☐ ☐ difficult

33. Will you need training or other forms of support to use the emergency function?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

34. Are the various functions of the emergency function well integrated?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

35. Do the functions work very well together?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

36. Can you imagine that the seniors you know will learn to use the emergency function very quickly?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

37. Do you find the usage of the emergency function comfortable?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

38. Do you need to learn a lot of things before using the emergency function?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

39. What do you like particularly about the emergency scenario?

_____

_____

_____

40. Which suggestions do you have to improve?

_____

_____

_____

Internal code:_____

GENDER STUDIES in Ingenieurwissenschaften

Questions about the Remote Control Scenario

41. Will you use the robot using the remote control?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

42. How do you assess the operating characteristics of the remote control?

easy ☐ ☐ ☐ ☐ ☐ ☐ difficult

43. Will you need training or other forms of support to use the remote control?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

44. Are the various functions of the remote control well integrated?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

45. Do the functions work very well together?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

46. Can you imagine that the seniors you know will learn to use the remote control very quickly?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

47. Do you find the usage of the remote control comfortable?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

48. Do you need to learn a lot of things before using the remote control?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

49. What do you like particularly about the remote control scenario?

_____

_____

_____

50. Which suggestions do you have to improve?

_____

_____

_____

Internal code:_____

Questions about the Brain-Computer-Interface (BCI)

51. Will you use the robot using the BCI?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

52. How do you assess the operating characteristics of the BCI?

easy ☐ ☐ ☐ ☐ ☐ ☐ difficult

53. Will you need training or other forms of support to use the BCI?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

54. Are the various functions of the BCI well integrated?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

55. Do the functions work very well together?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

56. Can you imagine that the seniors you know will learn to use the BCI very quickly?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

57. Do you find the usage of the BCI comfortable?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

58. Do you need to learn a lot of things before using the BCI?

in **no** case ☐ ☐ ☐ ☐ ☐ ☐ in **any** case

59. What do you like particularly about the BCI-scenario?

_____

_____

_____

60. Which suggestions do you have to improve?

_____

_____

_____

Internal code: _____

Socio-demographic data

61. Sex: ☐ female ☐ male

62. Date of Birth: Year: 19 ☐

63. What school did you attend?

☐ elementary school ☐ middle school
☐ graduation from high school ☐ college/university

64. What professional background do you have?

_____

65. How many people live in your household?

☐ I'm living alone ☐ two persons
☐ three persons ☐ more than three persons

66. Do you have any comments, requests or suggestions regarding the development of the robot?

_____

_____

_____

Thank you for your cooperation.

Internal code:_____