**INFOB3IT 2022/23**

**Assignment 1**

**Group #:**

**Student name:**

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**Type: Group work**

**Deadline:**

**Submit: Blackboard**

**Evaluation: Graded**

**Description**

You need to write an 8-to-10-page paper which describes the functional and technical features and details of your smart interactive automatic toilet freshener, including the process of building it and a reflection on its success (or lack thereof). This description allows you to elaborate on the topics covered in your video. Use it to add detail to these topics and/or cover subtopics which could not be covered in the video, time-wise. But please make sure that the description can be read stand-alone: if one only has the description, it should be clear what you’ve built, how you’ve built it, why you’ve built it that way and whether you think building it was a good idea.

**Be sure to include a state diagram of your system** (no specific format required). Please do add pictures to illustrate certain points. For teams of three this is also the place to shine and reflect on your experience with two installations of your system. Report on your user needs gathering exercise (write who your participants were, how you recruited them and how you gathered data). Include your context of use and requirements specifications. Similarly, report on your heuristic evaluation.

NOTE: This is a template that can be used to deliver your work. However, you can use other formats, if you prefer as long as you remember to write your group number and student names and adhere to the description.

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| Context of Use Description |
| User Needs Gathering Explain how you conducted your Context of Use research by eliciting from your first Assignment (0). Describe how you carried out the study and what research questions were asked in the interview/questionnaire. This section describes your research goal and the study setup. |
| Vertel hoe we ons context of use research gedaan hebben door te vertellen uit assignment 0. Vertel hoe we dit onderzoek gedaan hebben en welke onderzoeksvragen gesteld zijn in het interview. Dit deel beschrijft ons onderzoeksdoel en de opzet van ons onderzoek. |
| Target group Explain which groups of users you identify for the prototype. These groups can be the main target groups as well as secondary ones who will interact with the device. Describe what is the context their share and what are their primary activities (e.g., students sharing toilets from the University building). |
| Main target group: Our main target group is primarily people living in a house with a bathroom that is described in the physical-section below heading ‘Environment of the System’. Preferably, the types of people we test on are diverse given that we would like to have as unbiased results as possible. This would mean: families from three to five people, but also student houses with the same capacities. We will only conduct surveys on the adults of the test subject, but this does not exclude other inhabitants from exposure to our prototype  Secondary users: As for the secondary users of the prototype, we are primarily looking at visitors for the main target group. The subjects that fall in the group of secondary users will not be asked about their experience with our prototype. |
| User characteristics Specify your users’ characteristics such as age, height, and gender. You can specify their behavior/habit if relevant to the study. |
| User characteristics:  Physical characteristics: as for the physical characteristics, age is not as much of a problem here. Let’s assume for the sake of it however that the user is of age that they are able to use the restroom by themselves, without any third-party help. Put in a definition, our users are of age that they are potty trained. We are aware of the fact that this does not answer the question, however we want to point out that there is no precise age for which an individual suddenly is potty trained. However, we would prefer if all users are adults which of course would mean that they would be 18+. This would then infer that they are eligible to fill in our questionnaire(s).  When it comes to the height of our users, we require our users to be of a minimum height of 1.30 meters tall.  Gender is not within the scope of what we want to test.  Behavioural characteristics: (We assume that) our users do not use the toilet for comfort time. That means, they do not use the restroom to scroll their phone endlessly, or that they bring a book while serving their private time. |
| Goals and Tasks Explain what are the goals of your prototype development and study. Clearly list what are the features expected from the device and in which scenario context they are needed. |
| * What is the core of the freshener * What did our users want (explicitly)?   For our prototype we had a couple of features in mind. First of all, one of the user-requirements was that the user had to be able to keep track of the amount of sprays left before the canister had to be changed. Therefore, we put a counter of the estimated amount of sprays on the little LCD-screen so that the user can decide when is the best time to change canisters. An additional feature that is related to this feature is that after a change of canisters, the counter should be reset to 2400, therefore it’s also expected that the prototype has a feature that resets this counter.  The base prototype has a standard delay between power-on and spraying of 15 seconds. However we want to be able to have the user decide what the delay should be. If a user is very slow with finishing up and vacating the premises then it could be possible that the user needs more time between the moment of power-on and spraying. Thus, an expected feature from this device is a configurable delay between spraying. This delay won’t get below 15 seconds, however.  In order to easily configure the abovementioned settings, the prototype is expected to have an LCD-screen and two push-buttons for navigation.  The above features are all expected to be manageable through the use of buttons and the LCD-screen.  Furthermore, in case of a malfunction we want to be able to reset the prototype. In that case, the user should be able to press the designated controller-buttons and, after a delay, it will spray once. After this spray the prototype returns to its ‘not in use’ state.  Lastly, our last goal is to make the device more user-friendly towards people without knowledge on electronics. The prototype normally requires the user to tape a wire to the flat end of the battery (appendix A1). In order to improve the user-friendliness of our device, we aim to construct a contraption in which the user should only be required to replace the battery instead of having to mess around with wires and tape. |
| Environment of the System Write about the 1) technical, 2) physical, and 3) social constraints of developing the toilet freshener considering the context of use, users, and target groups. You can write a paragraph for each of these three aspects of your product development. You can support your description with figures and schematics of the environment of the system. |
| Technical: For our technical constraints, we assume a maximum time of 15 seconds that is required to open and close the door. We do this in order to be able to distinguish between the use cases of a number one and two, and cleaning.  Use: the device needs constant power supply in order to be functional. One difficulty in this matter is that the room either needs an electrical outlet,  Physical: Our first physical constraint is about the size of the room. We will conduct the experiment in small bathrooms, measuring between two and six square meters. Furthermore, for our design we also have the constraint that the bathroom is only lit by non-natural lighting that only comes from the room itself.  Another physical constraint is that the door remains open whenever the toilet is cleaned. Given that the space for a toilet is relatively small, we figured that it would be rather difficult to clean the toilet whilst the door is closed.  The third physical constraint is about the placement of the device. The device will be placed above ground-level.  Social: Our first social constraint is that we assume that all users of the toilet almost always close the door and turn off the lights after their use. This has as primary reason that it is easier to reason about the program logic and distinguish between the different use cases (not in use, number 1, number 2 and cleaning). Besides, it’s not comforting to have the smell of the restroom somewhere else in the house. We assume that this happens in about 97-99% of the cases.  Not per se a constraint, but something we still want to address nonetheless: we do not limit the number of users in these bathrooms, as this might influence the comparison with the regular experience. |
| Requirement Analysis List 1) client requirements (functional needs of the users e.g., not spraying when cleaners are working), 2) usability requirements and objectives (e.g., system designed to be intuitive, reliable. Possible ways to gather more usability needs from users), 3) requirements derived from user needs and context of use (summary of the system features evaluated by the study participants). |
| 1: client requirements  For our users, it would be trivial that they would not appreciate it to be sprayed on while they are doing their private business. Therefore, the device will not spray whenever there is someone in the room. Also, there should be a delay between the end of a use (i.e. a user leaving the room), and the spraying.  Another functional need the users have, is that the toilet is not sprayed when the cleaners are working (or afterwards, when they are finished cleaning).  2: usability requirements and objectives:  We want our system to be designed in such manner that it takes no or not much effort in order to get used to working with the prototype.  3: user needs and context of use:  In order to actually find out what our users would like to see most in the product, we conducted a survey to gather the needs of our users. |
| Functional and Technical Features Describe how the system addresses the above-mentioned requirements and what other features it provides. You can make use of tables to describe the system states and how they are mapped by the prototype sensors/actuators (e.g., LED color/pattern). |
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| Building process Explain what choice you made to determine the use of the components available to you and the logic that you followed (e.g., Early on, we made the choice to use the light sensor as an indicator for when the user would enter or leave the toilet since it is an instant visual clue.) You can explain how you designed the menu system aided by screenshots and photos. |
| When we started the process of working on the system, we scanned through the requirements and the sensors that we were required to use. We thought about the different possible uses for the magnetic contact sensor. We eventually made the choice to use the magnetic contact sensor to indicate that someone flushes.  As for our distance sensor, we thought about using that for recognizing if the door is opened or closed. The distance to the door is a set distance, therefore if that distance changes with a certain proportion, there is action with doors.  Our motion sensor is used as an interrupt. Simply put: when motion is detected and the spray timer is counting down, the spray timers is halted and stopped.  Furthermore, we use the light sensor as another indicator of occupation as this is an instant clue that someone interacts with the room.  The building of the board:  The menu:  The system:    Menu system… |
| Heuristic Evaluation Explain how you carried out the heuristic evaluation and the results you collected from it. You can use a table to list the heuristics and the results of the severity ranking for each according to the experts. Following, summarize the results and discuss potential improvements and ways to address issues. |
| We showed our prototype to three other students who also followed the course. These are our heuristic experts.  How did we carry out the heuristic evaluation?  Summary of results and potential improvements:  How to address these potential improvements |
| Reflection on success This section is dedicated to your reflection on the prototype development process and study design. |
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| Appendix: Diagrams and additional material such as dataset and questionnaires. |
| Appendix A1: |