Potable Water Testing Device

CSCI 3160: Designing User Interfaces

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1. Introduction

This project consists of designing a user interface for a potable water testing device. The device, which is a rectangular box housing the software to analyze water, meets military standards in order to operate even under rough conditions. Attached to the box is a rechargeable portable sensor which must be inserted into water in order to test it. Both components are connected via Wi-Fi, and recharged by solar panels. The user interface is designed to be used by Non-Governmental Organization employees or trained community leaders to test the water quality in rural areas, crisis areas or other communities. The primary goal of our work on the user interface was to create something as simple and easy to understand as possible. By applying a modified SCRUM process, we were able to achieve weekly improvements as shown in section 2. After testing the device with students of our class, we discovered a few problems, which helped us to understand how users without training might understand our user interface. In this report will present our result, starting with the different prototypes we created during the project. After this, we will present our user profile and task analysis, and then our testing results and the ensuing improvements.

2. Development of the User Interface

The development of our user interface went through several stages. In this section we will describe our three main designs. Our first idea was a big touchscreen mounted on one side of the box. Then, we came up with a second completely different design, where we used no screen. The final design is a combination of the two previous designs.

2.1. Touchscreen only

Our first design concept uses a touchscreen which is attached to the box and a small touchscreen on the portable sensor. Our goal was to design an interface which can be used language-independently. At this point, we do not expect the users to be able to read. Therefore, we used only icons and no words for the interface. Figure 1: Icons for touchscreen shows a first paper draft of the icons for the portable sensor.

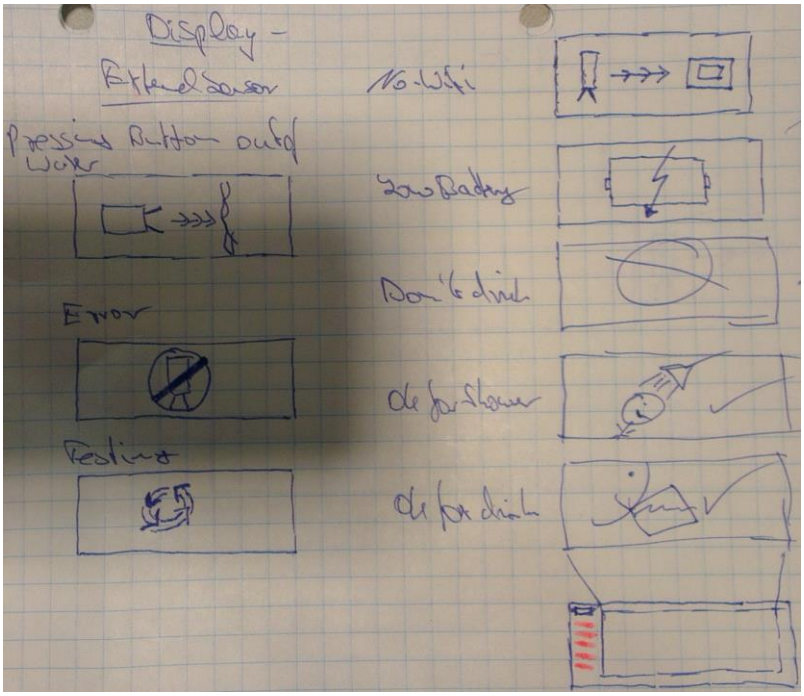

Figure 1: Icons for touchscreen

On the left side the first icon shows that the sensor should be lowered into the water. The second screen will be shown if an error occurred. The last screen will be shown when testing is in progress, and the user has to wait; it will be a 'circulating' icon. Figure 3 shows the same loading indicator on the box. On the right side, the top screen tells the user that the Wi-Fi signal is too weak, and he has to move closer to the box. The second icon indicates that the battery of the sensor is low. The three following icons show the three different outcomes of a water test. First, do not use the water at all; second, you can use the water for washing only; and third, the water is safe to drink.

When the device power is on, the main touchscreen goes through three different stages. Firstly, it tells the user to put the sensor into the water in order to start test process (Figure 2). The icon is similar to the icon we used on the sensor; the one on the sensor is turned because the sensor is held vertically when used.

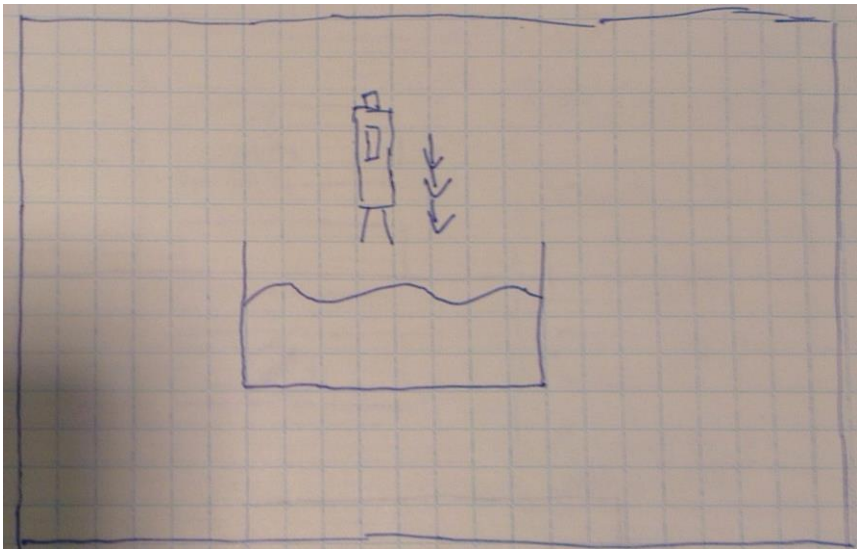

Figure 2: Put device into water, icon on box

The second stage indicates that the device is testing the water, and tells the user that she has to wait.

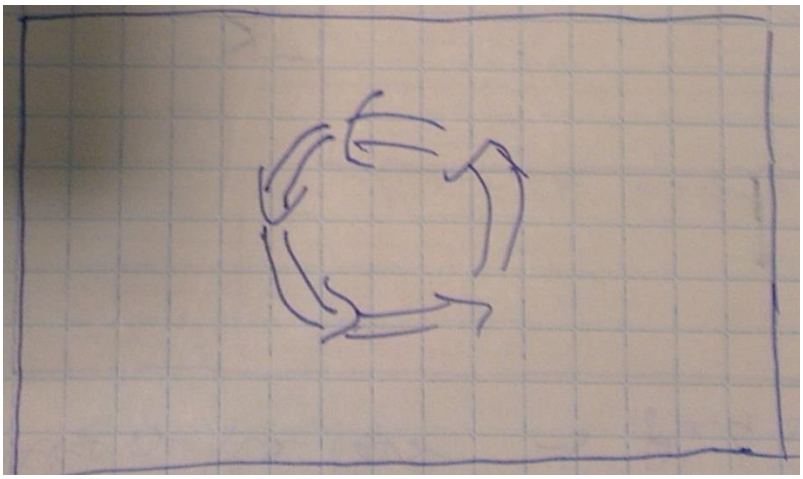

Figure 3: Loading screen on box

The device is in the third stage when the testing process is finished. On the left side of the screen it will display an icon which indicates whether the water is usable for drinking, washing or not usable at all. Here, the same icons as on the sensor are used. On the right side there will be a list of the contaminants, and by clicking on them, a message will tell the user how to treat the selected contaminant. Figure 4 shows an example.

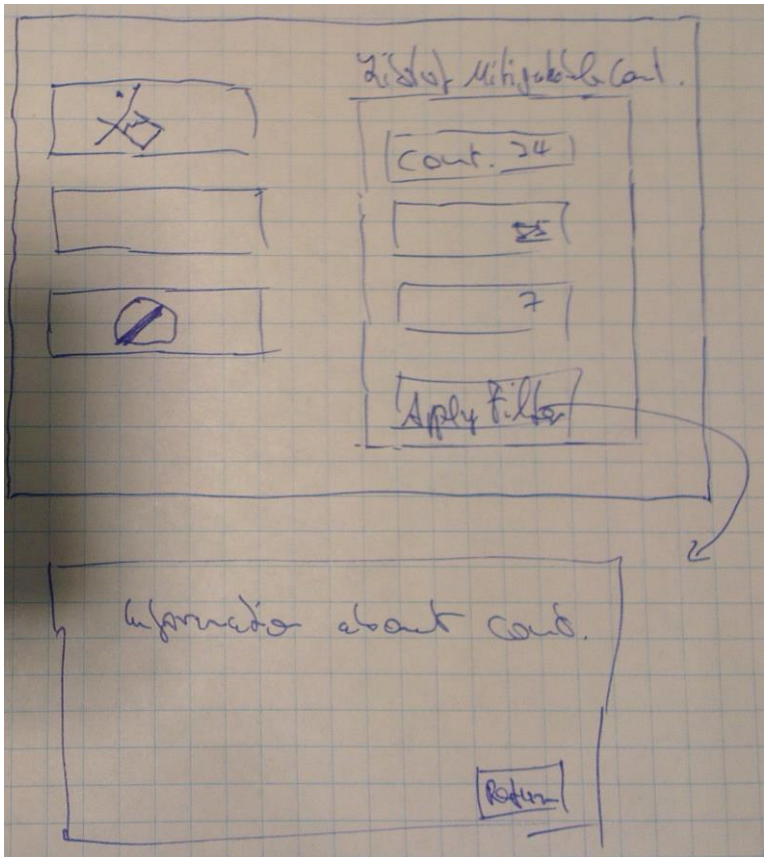

Figure 4: List of contaminants on box

2.2. Physical only

In order to have an alternative to our first design, we designed an interface without a touchscreen. Figure 5 shows our physical design concept for the box.

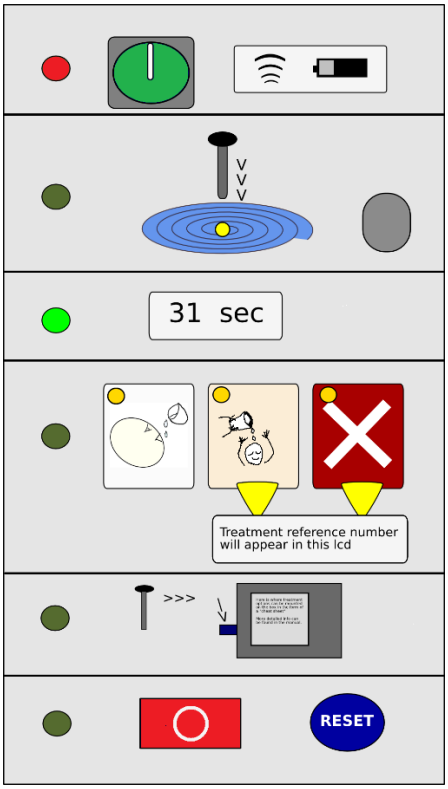

Figure 5: Physical design of the box

The interface is divided into stages, separated by horizontal lines. A green LED light in a stage indicates that the device is currently in this stage (See Fig. 5). In the first stage we can see the power-on button and indicators for Wi-Fi. The red light will light up when the device is turned on. When the boot-up process is finished, the device will go to the second stage, and the first green light will turn on. The icon advises the user to put the sensor into the water. Next to the icon is a speaker, which will support the different stages by different sounds. When the user puts the sensor into the water, the interface will switch to the next stage, which shows a countdown timer. The timer tells the user how long the test will take. After the test is finished, one of the three yellow lights will light up to tell the user if and how the water can be used. If there is a treatment available, a number will be displayed in the small display. The number will refer to a sheet where all the treatment options are explained. The sheet will come with the device. After that, the green light in the next stage starts flashing in order to tell the user that she should store the sensor on the box. When the sensor is returned to the box, the last stage has been reached; the device can be turned off or be reset to test the water again.

As well as the design for the box, we also have a design for the sensor top. Both designs are as similar as possible to provide consistency. Figure 6 shows the physical design of the sensor top.

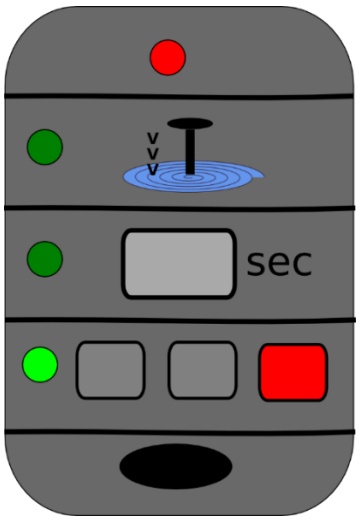

Figure 6: Physical design of the sensor

The first four stages are the same as on the box. The treatment number will only be shown on the box, as well as the instruction to put the sensor back onto the box. This decision was made because the sensor does not provide enough space for all the stages and we wanted to focus on the most important steps. The black symbol at the bottom is a speaker which will make the same sounds as the one on the box, to support the different stages.

2.3. Combination of physical and touchscreen User Interface

We created this version to bring together the best aspects of both designs, as well as to give the user the maximum useful information easily. Figure 7 shows the start screen of the device. In this stage it is waiting until the user puts the sensor into the water.

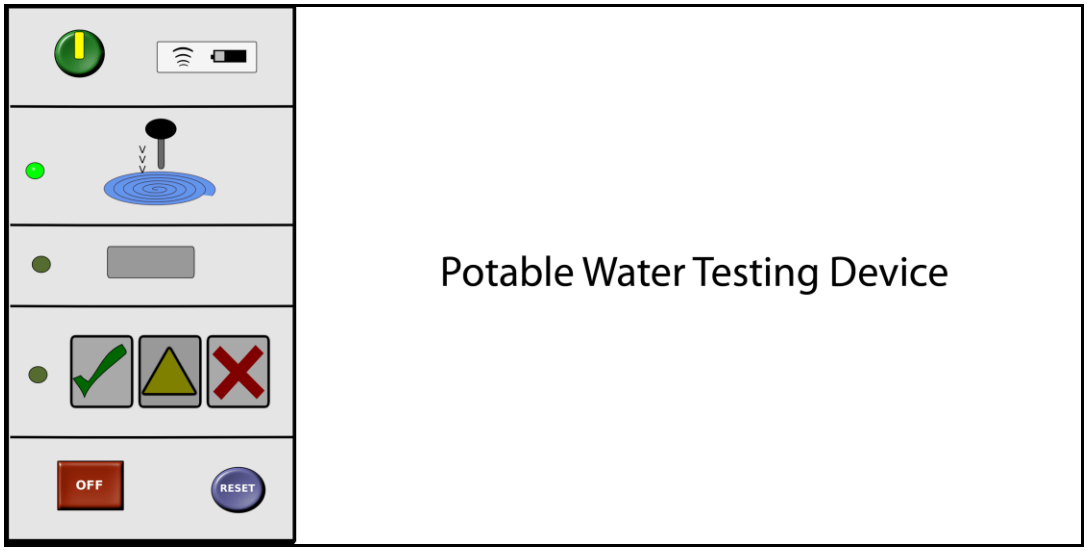

Figure 7: Start screen of final design

When the testing is finished, one of the three test result lights on the left side-panel will light up. For example, when the water is safe to drink, the checkmark will light up and the screen will say the same to support the statement.

Figure 8: Safe screen of final design

In case the water is not safe, meaning it is either usable only for washing or is not usable at all, there may be treatment options available. If there are treatments available, the screen shown in Figure 9 will be displayed.

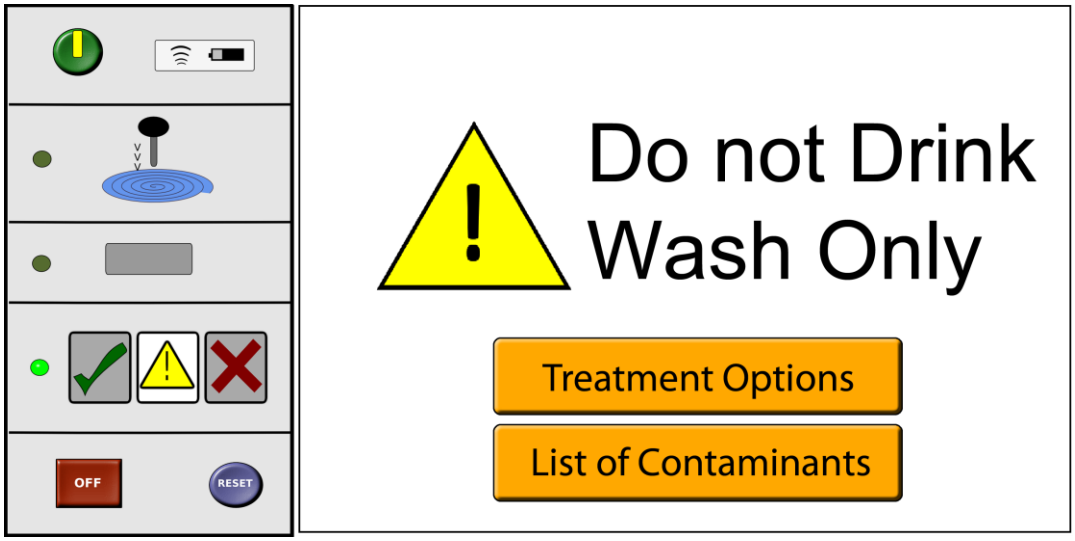

Figure 9: Wash only screen of final design

At this point, the user has the option to view the treatment options or the list of contaminants. The screen with the list of contaminants is shown in Figure 10. They are categorized by biological, chemical and particulate classes. The user now has the option to either go back to the previous screen, or to see the treatment options.

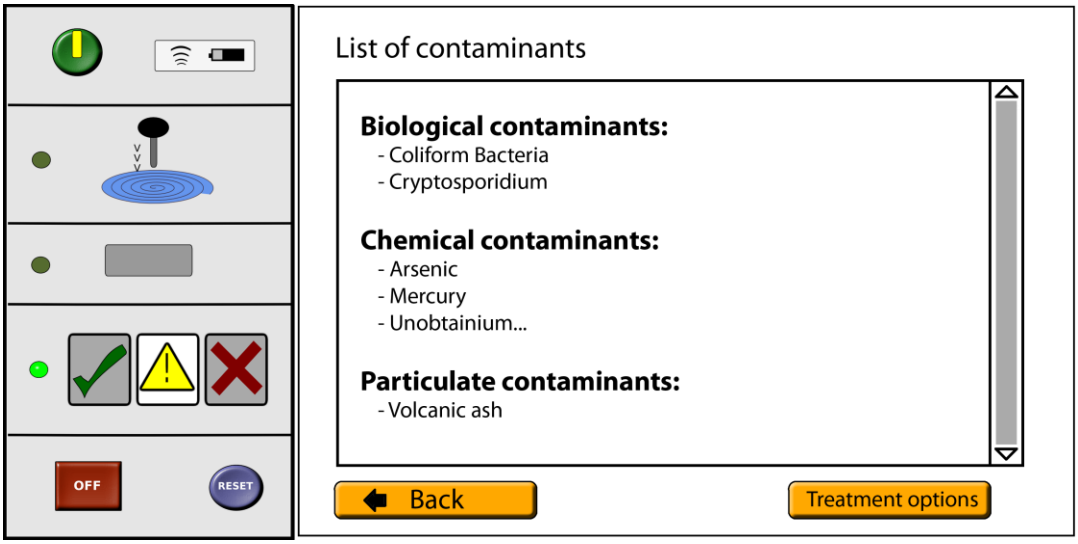

Figure 10: List of contaminants screen of final design

The treatment options are organized in a list with checkboxes. When one is selected, all the other options which would treat the same contaminant will disappear. The user will need to select treatment options to treat every problematic contaminant. When he has selected the needed treatment options, a button linking to the specific treatment instructions will appear (see Figure 12).

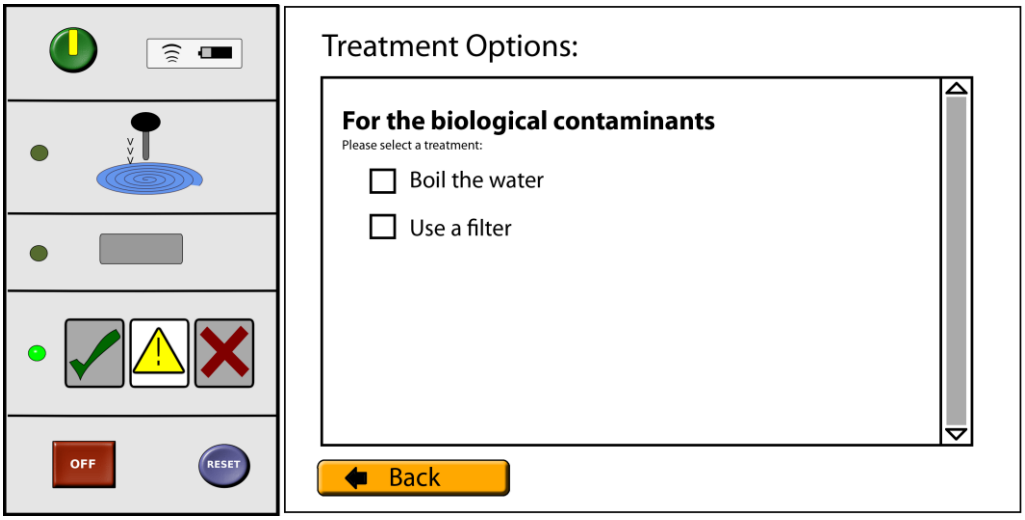

Figure 11: Treatment options screen of final design

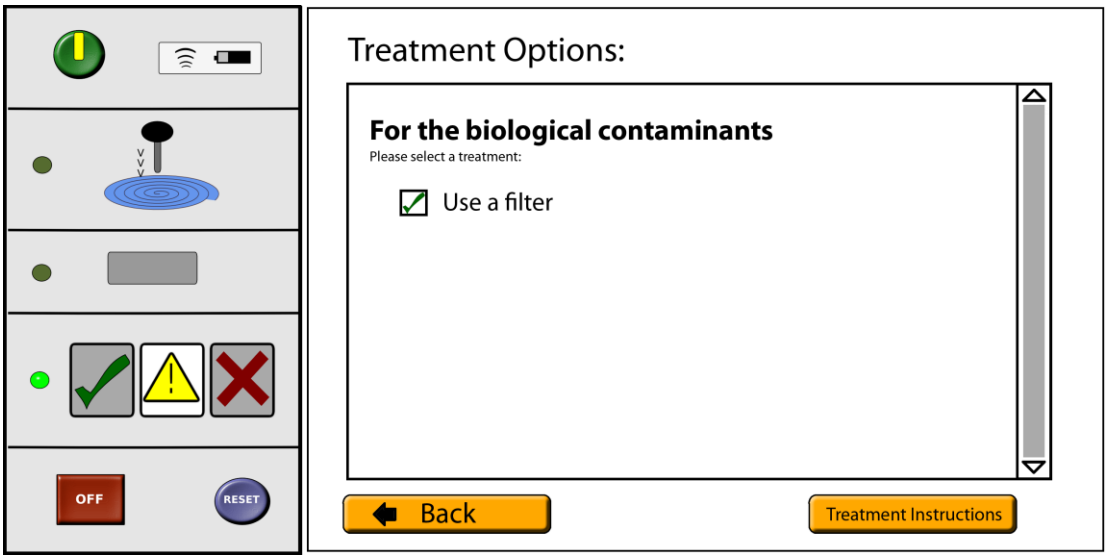

Figure 12: Treatment options selected screen of final design

The instructions will give detailed information on how to apply them to the water. When the user has applied all of them, the water will need to be re-tested; this can be done by re-starting the testing cascade by pressing the button “Test again”, as shown in Figure 13. This will reset the device to the stage where it waits for the user to put the sensor into the water.

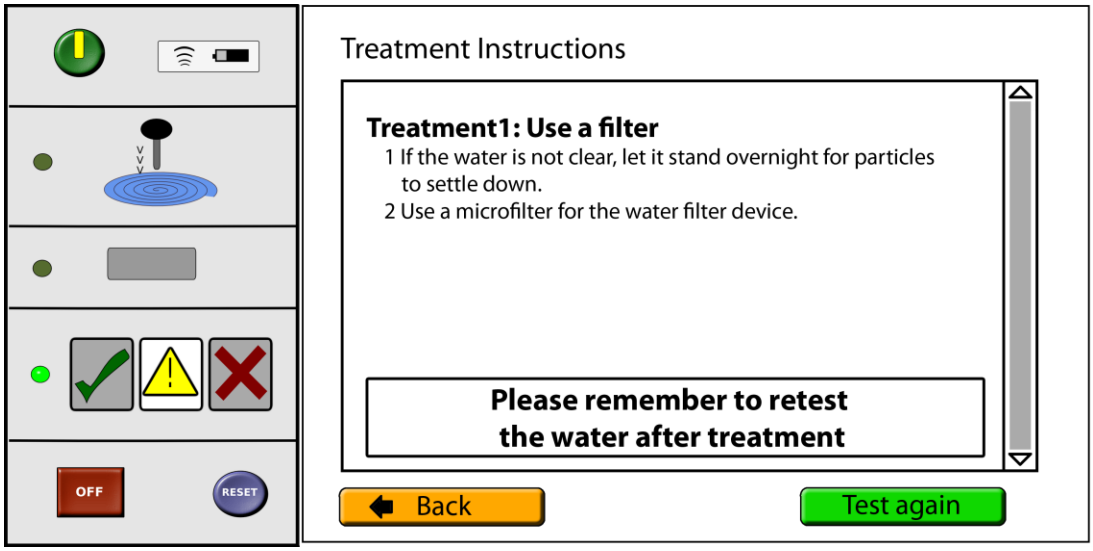

Figure 13: Treatment instructions screen of final design

The final design of the sensor top is (as in the previous design concept) as similar as possible to the design of the box side-panel. Figure 14 shows the interface on the sensor top. It does not provide any user-controlled functions; its only purpose is to provide feedback to the user.

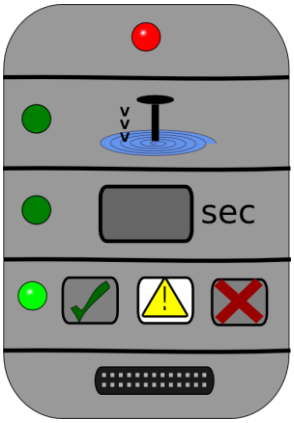

Figure 14: Sensor interface in the final design

Using the same icons on the sensor and the box makes it easier for the user to build a conceptual model of the testing cascade, and makes interpretation of the feedback on both the sensor and the box panel parallel. We designed the interface to let the user meet their goal in an efficient and effective manner, keeping it as simple as possible in order to achieve a product which is easy to use. Applying natural mapping (the horizontal stages on the box and the sensor) are intended to guide the user through the testing cascade. We did not include detailed information, such as exact measurements of each contaminant, in our display screens, as this would be information of interest mainly to technicians and researchers, not our normal users. This detailed information for each test will be available to the specialists by downloading the data from the device's database.

3. User Profile Analysis

We built our user profiles to give us a better and more complete picture of the kind of person we might be designing for, and what kind of needs and skills could be present.

User characteristics	NGOs	Technicians	Community leaders
Age	18 and above	18 and above	25 and above
Sex	Male, female and others	Male, female and others	Male, female and others
Physical limitations	The user will have some visual ability and some fine motor control	The user will have some visual ability and some fine motor control	The user will have some visual ability and some fine motor control
Educational background	Basic NGO training	Technical background in this instrument	May have little to no educational background
Computer/IT use	Basic knowledge	Technical training	Little to none
Motivation	Highly motivated to use the device because of the importance of safe drinking water	Probably motivated to maintain the integrity of the device	Highly motivated by concern for the health of the community
Attitude	Attitude will vary depending on the ease of use	Attitude will vary depending on the reliability of the device	Attitude will vary depending on the training given

Figure 15: User Profile Analysis

User characteristics	UI requirements
The user may have reduced visual ability	Controls should be large and recognizable enough to distinguish their function, feedback should be visual and sound
The user may have reduced fine motion control	Controls must be easy to operate
May have little or no education	Rely on a non-language interface
May have no experience with computers/IT	Provide an intuitive interface, make affordances obvious

Figure 16: Requirements according to user characteristics

We developed user stories for people that would represent the kind of users our interface is meant to serve, comprising NGO members, community leaders and technicians.

Persona for the user group “NGO member”

Brunhilde is 43 years old. During her biochemistry studies she joined UNICEF, when she was 20 years old. She has been to many third world countries where she participated in several development aid projects. In her opinion potable water is one of the biggest issue in these projects. As a result she gained experience with providing potable water. Two weeks ago, Brunhilde joined a project in Mundri West in the South Sudan where she is the assistant of the project leader. Her main tasks are training local representatives in using the potable water assessment tool and analyzing the results. This is the first project of UNICEF using this device.

Persona for the user group “community leader”

Matafa O. is a 59 year old midwife and grandmother in the sub-tropical Okumba village of Central Carnage. She has become a respected community leader. She is literate and owns a smartphone, which she uses to help others do banking, dealing with government service agencies and for general communication. Most of the other villagers are able to read and write at an elementary level, but rely on Matafa to help them fill out forms and deal with bureaucratic red tape.

Matafa has arthritis and has some loss of visual acuity, but is otherwise energetic and mentally sharp. The controls on the water tester must be easy for her to read. She will use the removable testing probe (WiFi enabled), as her arthritis makes the 'Black Box' difficult to move around.

She is very concerned with the villagers' health, and knows that the water quality is not always good, due to periodic toxic effluent from a Chinese-owned textile dying plant upriver from the village, as well as due to sewage that occasionally seeps into the river. She is highly motivated to do whatever will improve the water situation in Okumba.

Everyone in the village knows and respects Matafa. She decides to train to use the new Potable Water Assessment Tool. The manuals for the tool are printed in English, which she can read a little, but after her training, she has no difficulty operating the new tool. As a result of her leadership, the villagers put aside their general suspicion and distrust for strange new tools brought in by outsiders, and have a more secure water supply.

Persona for the user group “Technician”

Frank is a 25 year old technician engineer from the Dalhousie University. He has good eyesight with glasses. Ever since he was a child he wants to make the world a better place. Therefore he joined the UNICEF organization to provide help in his area of expertise. He survived hurricane Katrina in New Orleans and was impressed by how important clean water was.

As a technician he would want to keep the machine working. He enjoys playing with machines, and he would have extensive knowledge of how to trouble shoot the device and repair it.

4. Task Analysis

A task analysis (Figure 17) was done early in the project. It was quite difficult to do a proper task analysis for such an uncomplicated task. (More practice in writing these analyses would have resulted in a very different HTA, as would writing one now, at the end of our main design phase.)

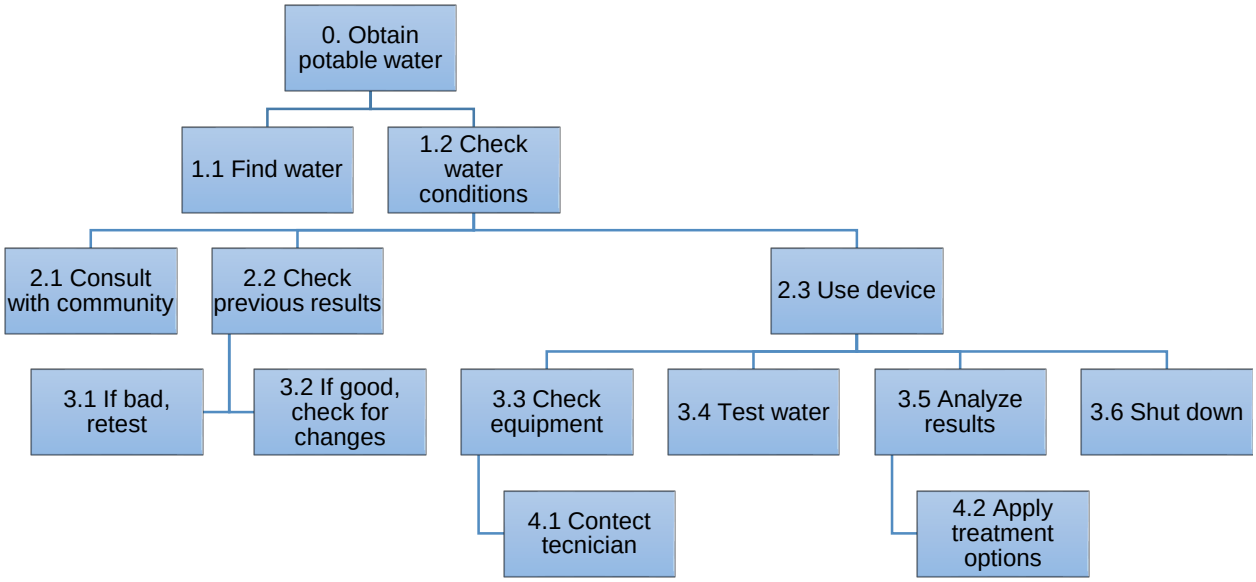

Figure 17: Task Analysis

Identification	**Location in hierarchy**	**Input and output**	**Others**
0. Obtain potable water	Top level goal	This is the main goal of the device	None
1.1 Find water	Subunit of 0., no subtask	Find a water body to test, output: water	None
1.2 Check water conditions	Subunit of 0., three subtasks	Input: water, output: analysis	None
2.1 Consult with community	Subunit of 1.2, no subtask	Consult with community leader or NGO to establish schedule for water testing, output: schedule	None
2.2 Check previous results	Subunit of 1.2, two subtasks	Check recent results to determine if action should be taken → 3.1 or 3.2	None

2.3 Use device	Subunit of 1.2, four subtasks	Input: schedule and water, output: analysis	Complex task
3.1 If bad retest	Subunit of 2.2, no subtask	Continue with 2.3	None
3.2 If good, check for changes	Subunit of 2.2, no subtask	It is the user's responsibility to retest the quality of the water	None
3.3 Check equipment	Subunit of 2.3, one subtask	Check testing equipment for functionality and check treatment supplies for availability	None
3.4 Test water	Subunit of 2.3, no subtask	Trained user carries out the testing procedure according to instructions, output: test results	None
3.5 Analyze results	Subunit of 2.3, one subtask	Measure contaminants and determine which, if any, are present in hazardous quantity, in order to decide whether water is drinkable, for washing only, treatable, or beyond remedy. Output: analysis and treatment options	None
3.6 Shut down	Subunit of 2.3, no subtask	Shut off and store testing equipment clean and dry	None
4.1 Contact technician	Subunit of 3.3, no subtask	If the device isn’t working properly, contact a technician	None
4.2 Apply treatment options	Subunit of 3.5, no subtask	Input: treatment options, output: potable water	None

Figure 18: Table for Task Analysis

5. Preparation for Testing

Prior to testing, we first had to gain approval from the Dalhousie Research Ethics Board. This required multiple submissions of the ethics approval application, which ultimately delayed our testing. While awaiting approval, we created the necessary documents for our testing process - a consent form, a training document, and an evaluation survey - all of which are included as appendices. We also created a poster to be used to find participants for our study, which was used in conjunction with word of mouth to find our participants.

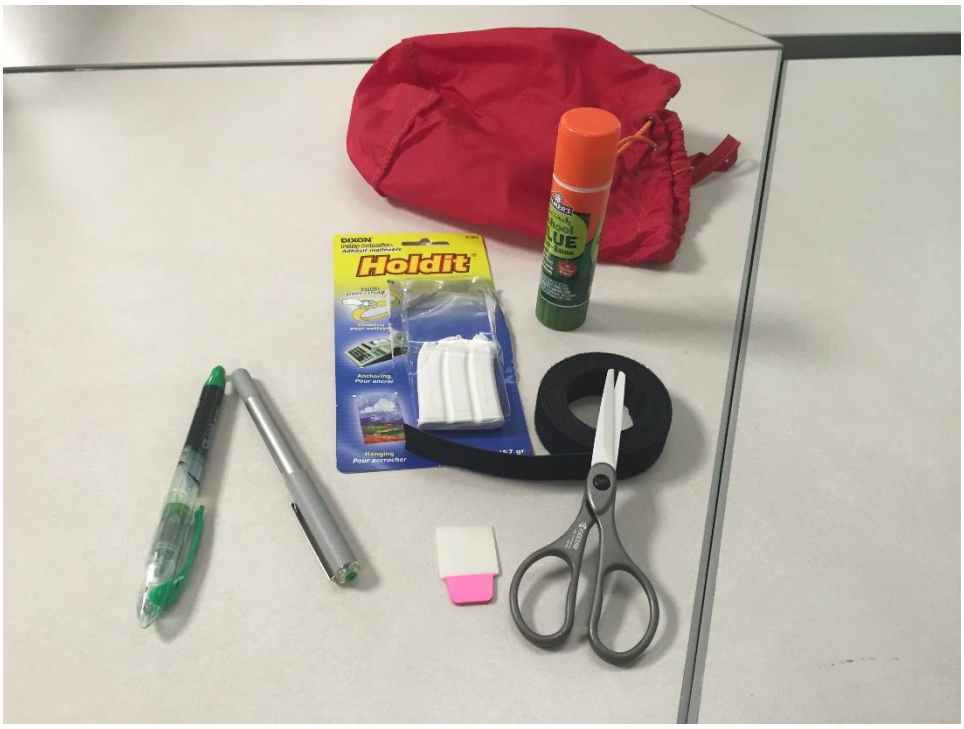

Figure 19: Materials for building the mockup

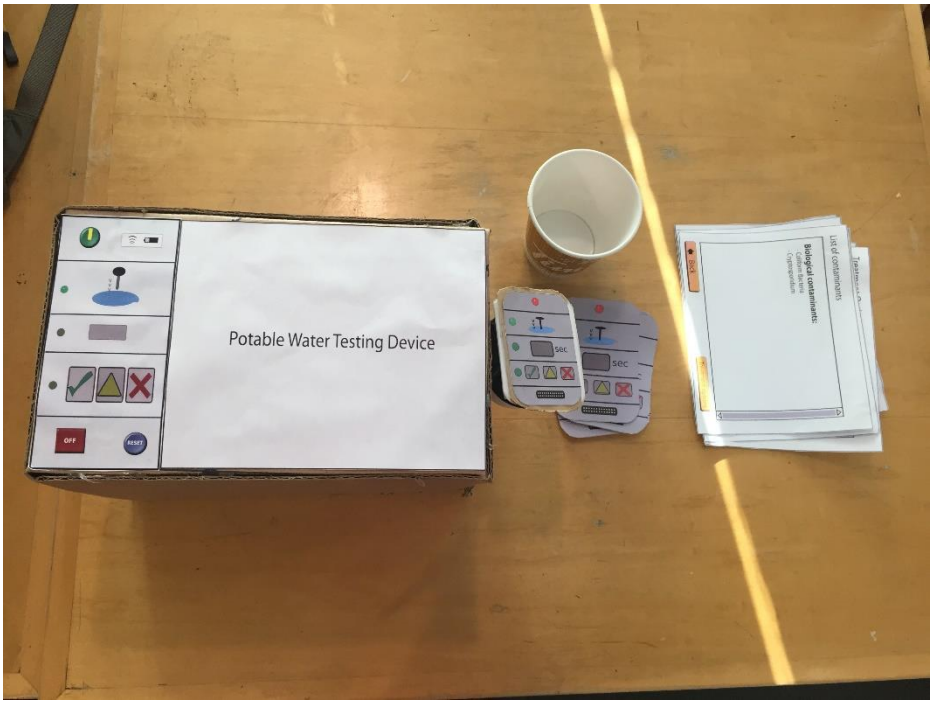

Figure 20: Mockup of the box and the sensor

Along with the aforementioned documents, we created a paper prototype with a physical representation of the box and sensor. Each potential screen was printed separately, as well as the left side panel for the physical box and the external sensor top panel. Figure 19 shows the materials used in the production of the mockup, and Figure 20 shows the mockup of the box and the sensor.

After producing our mockup, we came to a consensus on questions we wished to answer through testing. They are as follows:

1. Are there tripping spots where the user loses track of where they are going or gets confused?
2. Is the user able to reach the goal (find out if the water is safe to drink and if it is not, find out how to treat it)?
3. Do the users build the same conceptual model of the system as we have as designers of the system?
4. Does the user use the contaminants list or only the treatment options?
5. Is our training adequate?

We also created a list of steps to define the testing process:

1. Identify the volunteer with a unique number
2. Introduce the equipment
3. Provide the tester with the training document, and ask them to read it aloud
4. Provide the tester with a task
5. Observe, take notes, and ask neutral questions when required
6. Ask the volunteer to fill out the survey

With this information, we went on to begin our testing phase.

6. In class testing

The results of user testing consist of protocol and comments per test and a conclusion. We do not think the in class surveys will give us good information, because of the close working relationship to the students from class.

6.1. User 1

Protocol:

- The user reads the provided training document out loud. No confusions
- User turns device on, no difficulties
- Uses the external sensor to test the water sample (as instructed in the training document)
- User waits for the countdown
- Result of water testing: NOT USABLE
- Result of test seems to be understood clearly
- User uses reset button to reset the device for testing the second water sample
- Uses again the external sensor
- And waits for the countdown to finish
- User stores the probe in the provided retainer
- User presses the button “Treatment Options” with his finger
- User selects the treatment “boil the water” and presses the “Treatment Instruction” button
- After “applying” the treatment the user presses the test again button
- The user retests the water without difficulties

User comments:

- The yellow stripe on the power button affords turning
- There is no list of contaminants available when there are no treatment options

6.2. User 2

Protocol:

- User reads the provided training document out loud. No confusions
- User inspects the device
- The User turns on the device
- The User picks up the external probe and sticks it in to the provided water sample
- The User waits for the countdown
- Result is: “NOT USABLE”
- User stores the probe in the designated retainer
- The User presses the OFF-Button to turn the device of
- The User turns the device back on, in order to test the second water sample
- User uses the external probe
- And waits for the countdown to finish
- User stores the probe in the designated retainer
- The User is curious about the “List of Contaminants” and presses the button
- After briefly inspecting the list the user presses the button “Treatment Options”
- User selects the “Use a filter” option and presses the button “Treatment Instructions”
- After “applying” the treatment the user uses the “OFF” button to turn the device of

The second user gave no comments.

6.3. Conclusion

Although we only tested with people from class so far, we found several problems. The changes we are considering the following. First, we might add a “START” button to the external probe, because for some users it was unclear whether they should stick the probe in to the water sample before or after hitting the retest button. However, there might be further inconsistencies when it comes to the meaning of the “TEST AGAIN” button, the “START” button and the “RESET” button that would need to be resolved. In order to clarify this context we are also considering changing the instructions given on the bottom of the “Treatment Instruction” page. One of the users mentioned that the current design of the “POWER” button affords turning instead of pressing. A real button would only afford pushing and not turning. Furthermore, we realised during user testing that someone would want to test again after getting the “NOT USABLE” result. At this point the user would have to use the reset button to do that. We are considering integrating a “TEST AGAIN” button into the result screen. One of the testers mentioned that he would be interested in the “List of Contaminants” in all cases. In order to address that, we might provide the “List of Contaminants” button on every result screen.

7. User Testing

After we achieved our ethics board application approval, we tested with three Dalhousie students, which do not attend CSCI 3160. The test results consist of protocols, comments, the survey and a conclusion.

7.1. User 1

Protocol:

- User presses the on button (Couldn't see the on button because it's on top - user was sitting)
- User puts sensor into the water
- Water is not drinkable
- Forget to clean the sensor
- Click on Treatment options
    - Clicks on boil the water
    - Click on treatment instructions
    - User puts the sensor into the water again
        - Unsure if the computer does the treatment
- Wash only, not drinkable
    - Put the sensor in the box again
    - Turn off the device

User comments:

- Unsure about what to do on “Do not use – treatment options/list of contaminants” page
- Unclear on treatment instructions – assumed computer would apply the treatment options
    - Unsure of what exactly the computer does

Time Taken: 4:57.91 minutes

7.2. User 2

Protocol:

- User turns on the device
- Device is testing - countdown is counting down
- Don't drink, wash only
- Forgot to clean the sensor while putting it back to the device
- Click on Treatment Options
    - Click on Boil the water (is there a continue button??)
- Turn off the device

User comments:

- Question: Is there a continue button after you select the option on the treatment options page?
    - Having a greyed out continue button may show the user that there are more pages after this page (not obvious that they are supposed to select a treatment option)
- Did not test again after applying treatment, despite the test again button

Time Taken: 10:05.96 minutes

7.3. User 3

Protocol:

- User turns the device on (presses the button)
- Puts the sensor in the water
- Do not drink
- Reattach sensor to the box
- Wrong intention of the battery symbol on the box
- Click on treatment options
    - Click on use a filter
    - Click on treatment instructions
    - Click on Test again
    - Forgot to put the sensor into the water
    - **Help by Computer**
    - Screen is confusing because it says it's loading but it's waiting for the probe to be placed into the water
    - Safe water!

User comments:

- Some hesitation in locating the on button
- Unsure about buttons on “Do not use – treatment options/list of contaminants” page
- Did not put the sensor back in the water when retesting
    - Confused by the “not enough water” icon
    - Does not think that having the default screen rather than the loading screen would have made it easier to understand

Time Taken: 12:43.18 minutes

7.4. Survey results

Question 1: Your experience with the UI was …

Unsatisfactory:	0
Satisfactory:	0
Good:	1
Excellent:	2

Question 2: How easy was the UI to use?

Very difficult:	0
Somewhat difficult:	1
Not difficult:	1
Easy:	1

Question 3: Did you experience any frustration during your use of the UI?

Yes:	0
No:	3

Other comments:

- User 2: Inserting a “continue” option to the bottom of the treatment options may improve interface.
- User 3 (on question 2): It took some explaining!

7.5. Conclusion

After testing with users outside of class, we found several ways in which the interface could be improved, although the limitations of the paper prototype might account for some of the problems. Further user testing with a functional prototype is indicated.

Visibility for the user was hampered by the paper screen and sensor covers, as the printed LEDs were almost invisible, compared to real LEDs that go on and off.

Our attempt to provide an almost language-free interface by using icons to guide the user in each step was only partially successful. The icon image for the second step (put the sensor into water) did not seem to be totally comprehensible. Perhaps more than our very minimal training information would remedy this. Audio feedback from the sensor and perhaps extra support on the screen seem to be necessary.

To eliminate confusion when retesting, it would probably be useful to add a start button to the sensor. Providing audio and visual feedback during the testing process may also assist the user.

Absolute unfamiliarity with the interface resulted in some hesitation and confusion on the part of our testers. Some did not know how to proceed from the screen in Figure 9. Real training would eliminate much of the hesitation.

The survey results make our interface look very good, but we are not convinced that they are entirely trustworthy. Our observations of their performance, and their answers on the survey form, were not consistent.

8. Appendix

8.1. Poster

Volunteers Wanted

We are Dalhousie University students running a research study for Designing User Interfaces (CSCI3160). This study is about testing a user interface designed for a potable water testing unit. In order to be eligible to participate, participants must have normal (or corrected to normal) eyesight and no serious motor impairment.

The study consists of a session lasting approximately 15-20 minutes. You will use a mockup of our water testing device to test water quality.

Participation in the study is voluntary and there is no compensation.

Contact
If you are interested in participating in this study, please contact one of the following by email:

Jens Weidmann - jdw@dal.ca
Corrie Watt - corriewatt@gmail.com

8.2. Consent form

DALHOUSIE UNIVERSITY
Inspiring Minds

CONSENT FORM

Project Title: Potable Water Project

We invite you to take part in a research study being conducted by Jens Weidmann, Emily Cross, Cole DeMan, Markus Wiktorin, David Luhmer, Corrie Watt who are students at Dalhousie University, as part of their CSCI 3160 course for their undergraduate degrees. Taking part in the research is up to you and you can leave the study at any time. There will be no impact on your studies if you decide not to participate in the research. The information below tells you about what you will be asked to do and about any benefit, risk, or discomfort that you might experience. You should discuss any questions you have about this study with Jens Weidmann or Jamie Blustein.

Who Is Conducting the Research Study:
Phase Leader: Jens Weidmann
Professor: Jamie Blustein
Research: Markus Wiktorin, Cole DeMan, Emily Cross, Corrie Watt, David Luhmer

Purpose and Outline of the Research Study:
The goal of our research study is to improve our user interface design based on the results of user testing. We will investigate how well users can use the device with a minimum of training. We will supply a prototype of our potable water testing device (PWTD) to you and we would like to ask how you would use it. Please remember, we are testing our user interface design, not you!

Who Can Participate in the Research Study:
Any adult with normal (or corrected to normal) eyesight and at least average motor skills.

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What You Will Be Asked to Do:
To help us understand how to modify our user interface, we will ask you to test water with the mockup of the potable water testing device.

We are testing in a public area (university) a single time (15-20 minutes).

Possible Benefits, Risks and Discomforts:
There are no benefits for participants.

Risks:
The risks are no more than those of everyday life.

Compensation / Reimbursement:
There will be no compensation or reimbursement.

Privacy and Confidentiality:
Information that you provide to us will be kept private. Only the research team at Dalhousie University will have access to this information. We will describe and share our findings in class presentations. We will be very carefully talking about the results without naming any persons so that no one will be identified. This means that ***you will not be identified in any way in our reports***. The people who work with your information have an obligation to keep all research information private. Also, we will use a participant number (not your name) in our written and computerized records so that the information we have about you contains no names. All your identifying information will be kept in a separate file, in a locked cabinet, in a locked room. All electronic records will be kept secure in a password-protected excel-sheet on the researcher's (Jens Weidmann) personal computer.

Confidentiality:
The data will be aggregated and no personal identifiable information will be attached. Consent forms and other identifying data will be stored by our professor in a locked cabinet. Only our professor will have access to that cabinet. Five years after the end of the course, the consent forms and identifying data will be destroyed. Non-identifying data may be retained for longer than five years.

Anonymity:
Each person will be respresented by a number. No names will be written down on any materials except for the consent form.

If You Decide to Stop Participating:
You are free to leave the study at any time. If you decide to stop participating at any point in the study, you can also decide whether you want any of the information that you have contributed up to that point to be removed or if you will allow us to use that information. You can also decide for up to 1 months if you want us to remove your data. After that time, it will become impossible for us to remove it because it will already be analysed.

How to Obtain Results:
We will provide you with a short description of group results when the study is finished. No individual results will be provided. You can obtain these results by including your contact information at the end of the signature page.

Questions:
We are happy to talk with you about any questions or concerns you may have about your participation in this research study. Please contact Jens Weidmann (jdw@dal.ca) or Jamie Blustein (jamie@cs.dal.ca) at any time with questions, comments, or concerns about the research study. We will also tell you if any new information comes up that could affect your decision to participate. If you have any ethical concerns about your participation in this research, you may also contact Catherine Connors, Director, Research Ethics, Dalhousie University at (902) 494-1462, or by e-mail at <ethics@dal.ca>.

Signature Page

Project Title: Potable Water testing device

I have read the explanation about this study. I have been given the opportunity to discuss it and my questions have been answered to my satisfaction. I agree to take part in this study. However I realize that my participation is voluntary and that I am free to withdraw from the study at any time.

I agree to let you directly quote any comments or statements made in any written reports without viewing the quotes prior to their use and I understand that the anonymity of textual data will be preserved by using pseudonyms.	Yes ○	No ○

Signature (Participant) _____ Date _____

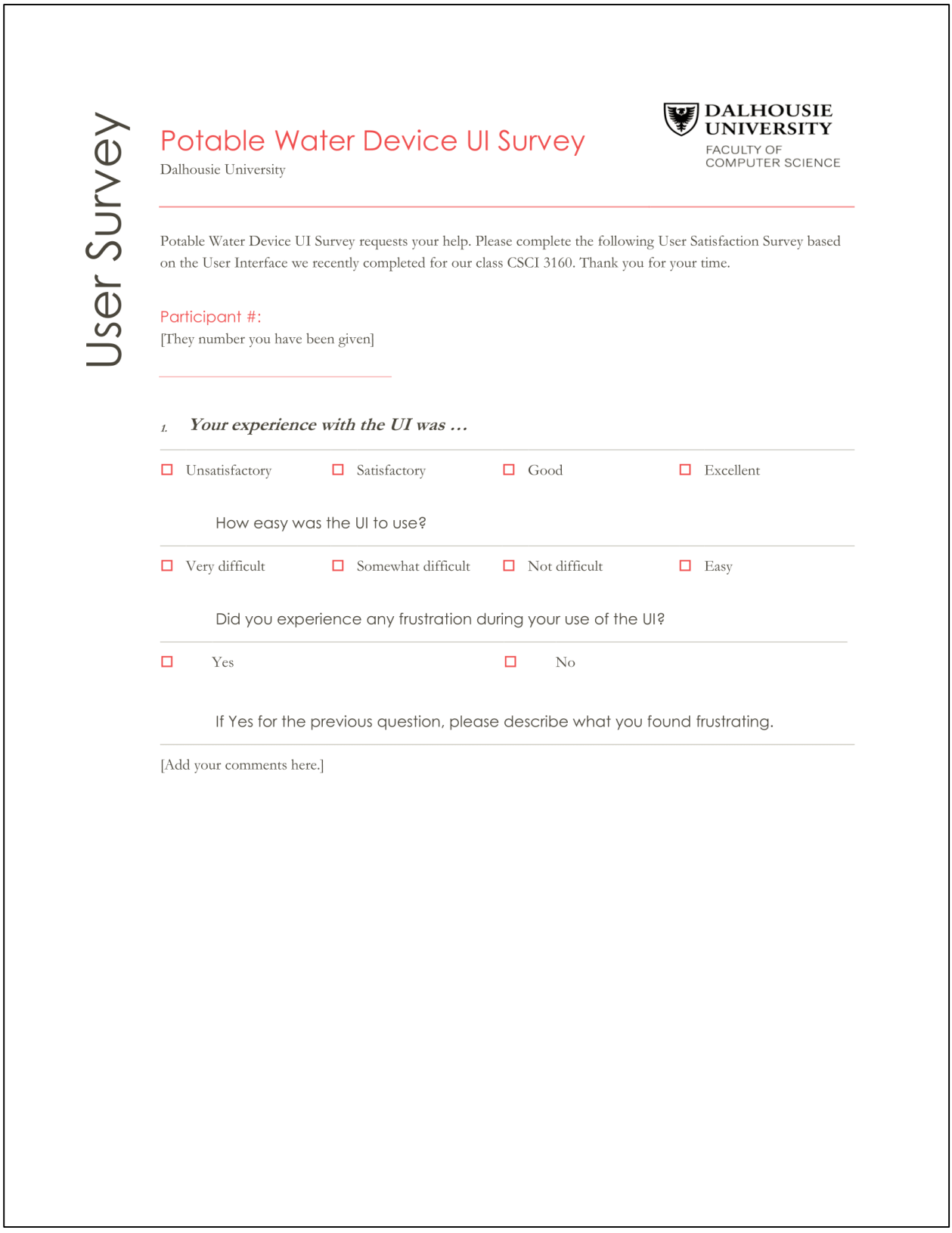
Signature (Representative) _____ Date _____

8.3. Training document

User Training

- This device is a potable water testing device. It consists of a box (containing the computer and solar panels, and a display screen on its side) and a detachable sensor, which is used for testing the water.
- Turn the device on. Check that the battery level is adequate and that the wifi is connected.
- The detachable sensor must be placed in water for the duration of the testing phase which will be 20-40 seconds.
- When finished testing the water, reattach the sensor to the box to let it recharge its battery. Make sure the sensor is clean and dry.
- This device will determine if the water is safe to drink or wash with, and will show treatment options to make it safe, if available.

8.4. Survey form



User Survey

Potable Water Device UI Survey

Dalhousie University

DALHOUSIE UNIVERSITY
FACULTY OF COMPUTER SCIENCE

Potable Water Device UI Survey requests your help. Please complete the following User Satisfaction Survey based on the User Interface we recently completed for our class CSCI 3160. Thank you for your time.

Participant #:

[They number you have been given]

1. ***Your experience with the UI was …***

☐ Unsatisfactory ☐ Satisfactory ☐ Good ☐ Excellent

How easy was the UI to use?

☐ Very difficult ☐ Somewhat difficult ☐ Not difficult ☐ Easy

Did you experience any frustration during your use of the UI?

☐ Yes ☐ No

If Yes for the previous question, please describe what you found frustrating.

[Add your comments here.]

2. ***Other Comments / Suggestions:***

[Add your comments here.]

Thank you very much for taking the time to complete this survey. Your feedback is valued and very much appreciated!