Overview

The application made is a water diary used to track water usage for one individual. This application can be used by anyone who is literate and can use an android app. The goal of the app is to make the user utilize 50 litres of water per day.

The assumptions made are that people using the app have common taps and appliances at their homes such as washing machines. It is also assumed that users are familiar with the Litre as measuring unit as this is what will be used in the app.

The target audience for the app is therefore very large as the requirements are basic. Young, old, rich and poor people should all be able to successfully use the app.

The 4 additional features are:

1. Visualization for water usage.
2. Variation of calculator.
3. View of dam local dam status.
4. Tips for saving water and feedback.

The goal of visualizing the water usage and variation of the calculator is to make the app more user friendly and easy to use. The target of the 2 remaining features is to provide the user with useful information to encourage and facilitate water saving.

Visualization for water usage.

The goal in adding this feature is to improve the user experience. User experience has been defined as "the combined experience of what a user feels, perceives, thinks, and physically and mentally reacts to before and during the use of a product or service"(Punchoojit and Hongwarittorrn, 2017). By taking the user's perspective, it was clear that it is hard to visualize how much water one uses per day. It is hard for the average human to see how much water a running tap or shower uses per minute. Therefore, implementing a representation of the various activities using water will make the user get a better idea of how much water he/she is using. This will also give the user a better idea on how to manage the water on different occasions and get a better picture of how much the 50 litre goal actually is. Below are screenshots of how the visualization will look. The visualizations are shown when the "New Entry" button is pressed in the overview. The "New Entry" button launches the calculator where the visualizations can be seen.

Overview

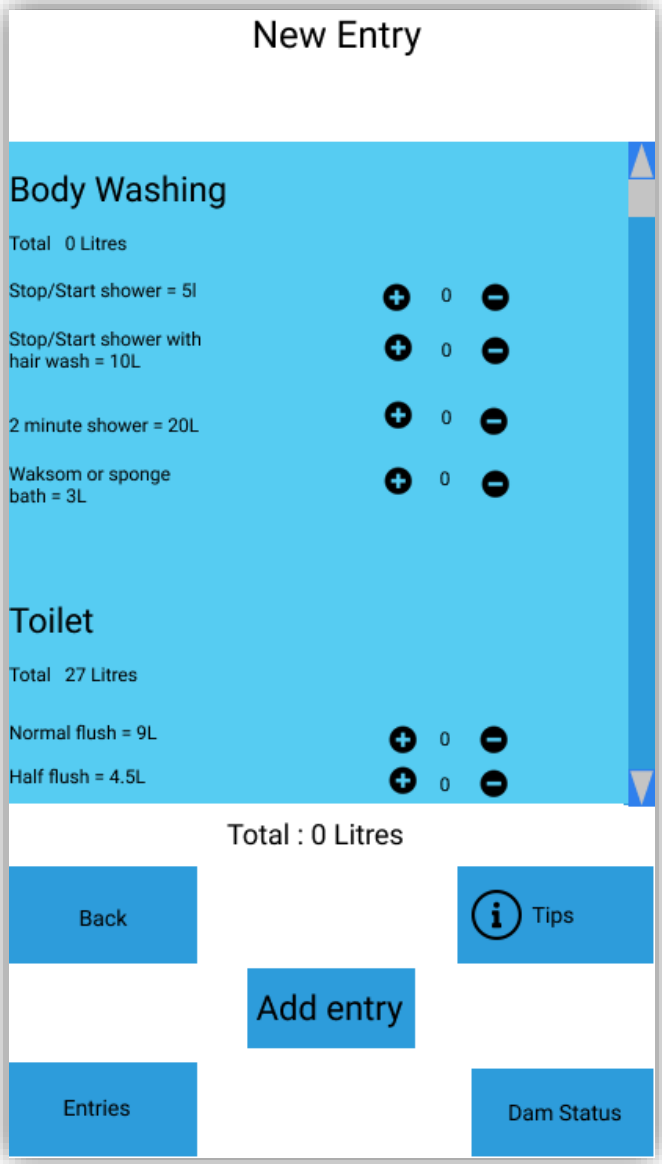
Body washing	0
Toilet	0
Hygiene	0
Laundry	0
Dishes	0
Drinking	0
Cooking	0
Cleaning	0
Other	0
Average	0

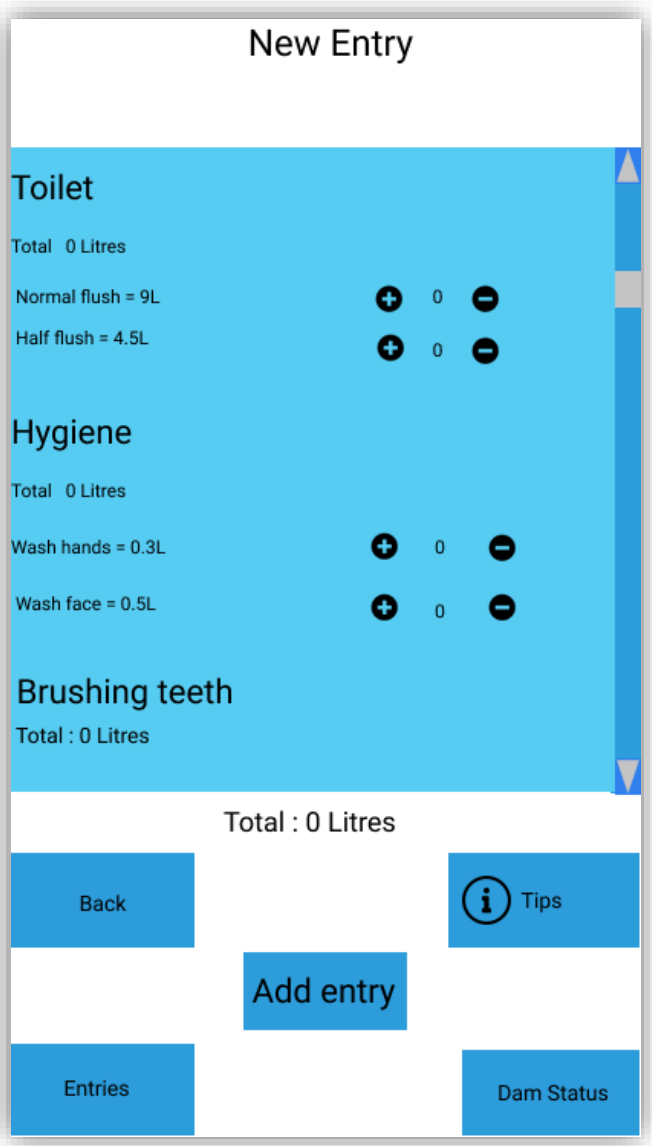
New Entry

Tips

Entries

Dam Status


New Entry
Body Washing
Total 0 Litres
Stop/Start shower = 5l
0
Stop/Start shower with hair wash = 10L
0
2 minute shower = 20L
0
Waksom or sponge bath = 3L
0
Toilet
Total 27 Litres
Normal flush = 9L
0
Half flush = 4.5L
0
Total : 0 Litres
Back
Tips
Add entry
Entries
Dam Status



The visualizations are written in the left underneath their categories. The visualizations are in a scrollable interface as depicted. The first image is at the top of the page and the second image is when the user has scrolled down a bit. These pictures show visualizations for only some categories for convenience. The user will be able to scroll all the way down to see all the categories, their activities and the amount of water it uses. Don Norman states that the user should know what to do and figure out what is going on(Norman, 2013).He lists simplifying the structure of tasks as one of the principles of design. The design shown above shows the visualizations and also the calculator (to the right of the visualizations). This simplifies the task of the user when entering data and it follows an intuitive flow. The user is therefore clearly aware of what to do.

Variation of the calculator.

The calculator is at the core of the diary app, thus creating a calculator with good usability is crucial in the design process. Usability is “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use (Punchoojit and Hongwarittorrn, 2017). For increased usability, the calculator has been designed to interact closely with the visualization feature. As stated previously, the user will probably not know how much water he/she is using just by himself/herself. Therefore, the calculator will make use of the visualizations and the user will enter how many of each activities he/she has done that day and a total will be calculated. This will give a better estimate of water used and the user will be able to see the activities that he might perform too often or an activity that uses too much water. This will give the user the chance to adjust his activities to better save water. The calculator is launched when the “New Entry” button is pressed in the overview.

Overview

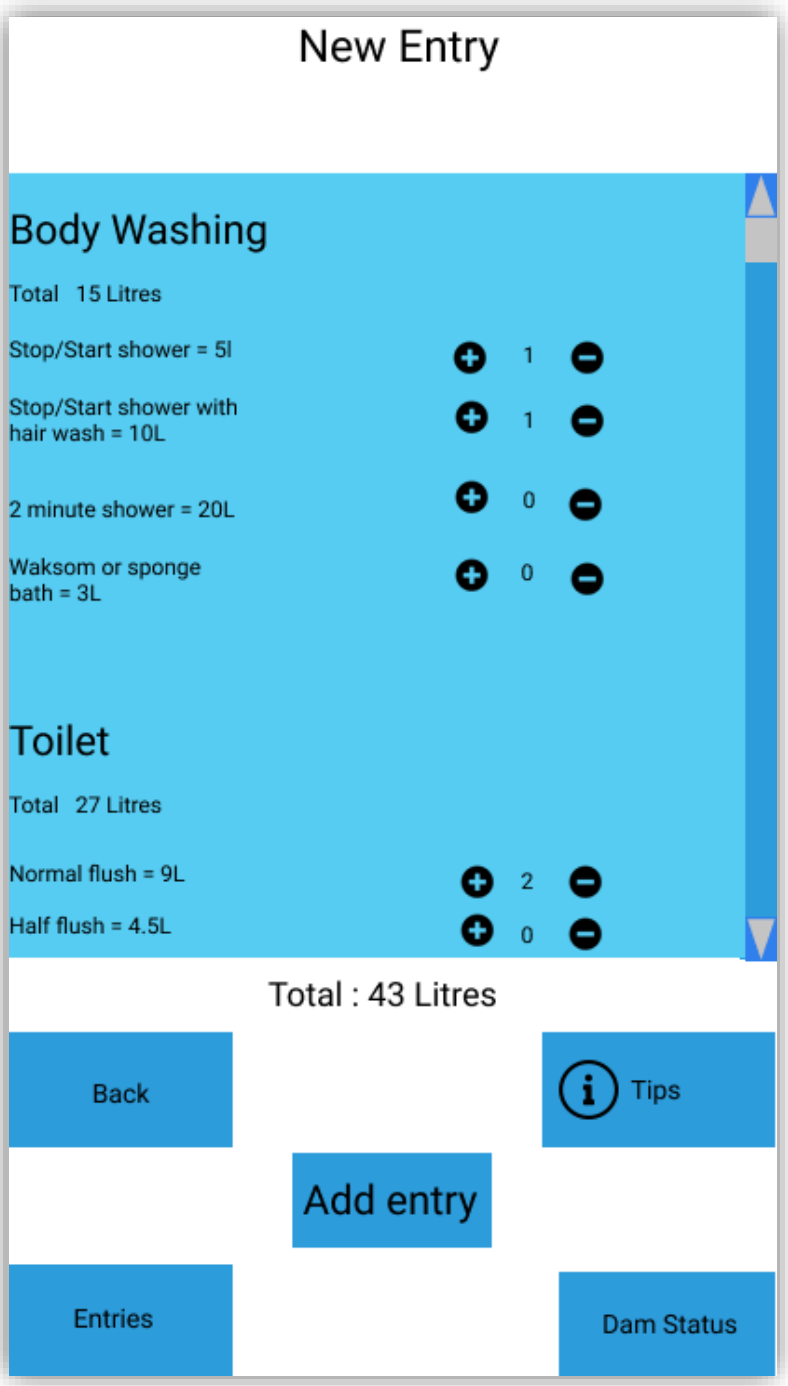
Body washing	0
Toilet	0
Hygiene	0
Laundry	0
Dishes	0
Drinking	0
Cooking	0
Cleaning	0
Other	0
Average	0

New Entry

Tips

Entries

Dam Status



In the calculator, the user will look at the activities and choose how many of them he has done on a particular day. The default number for each activity is 0 and pressing on the “plus” sign will increase it by one. Should the user make a mistake and press it too many times, the user can then press on the “minus” sign to decrease the count by 1. The visual affordances of the signs provide clear clues as to how they are used. After adding the activities, the total water used on that day will be shown below

the calculator. Should the user be satisfied with the data entered, he/she can press “Add entry” to add this entry on that particular date.

Mapping the calculator to the activities visualizations is the main reason for the design. Natural mappings are the basis of what has been called "response compatibility" within the fields of human factors and ergonomics(Norman, 2013). The user can easily determine the relationships between the actions and its effects on the system. By pressing the “plus” button on a given activity, the user will easily guess that it adds one instance of that activity on a given day. Same for pressing the “minus” button. It also decreases the time taken as the user does not have to click on an activity, enter the number of times he has done it then press enter and then repeat for other activities. It makes the calculator more efficient, therefore increasing usability.

View of local dam status.

The whole goal of the app is to save water and retain the dam water. A diligent user of the app will find it useful to be able to visualize his effects, albeit infinitesimal, on the dam itself. The user will be able to see if the dam levels have increased since the past week and the average dam level. Finding the dam level will also give the user an idea of how much water is still required in the dams therefore giving the user an incentive to continue to save water. The dam status is shown when the user presses the “Dam Status” button when available. Below the button is shown in the overview, on the bottom right corner.

Overview

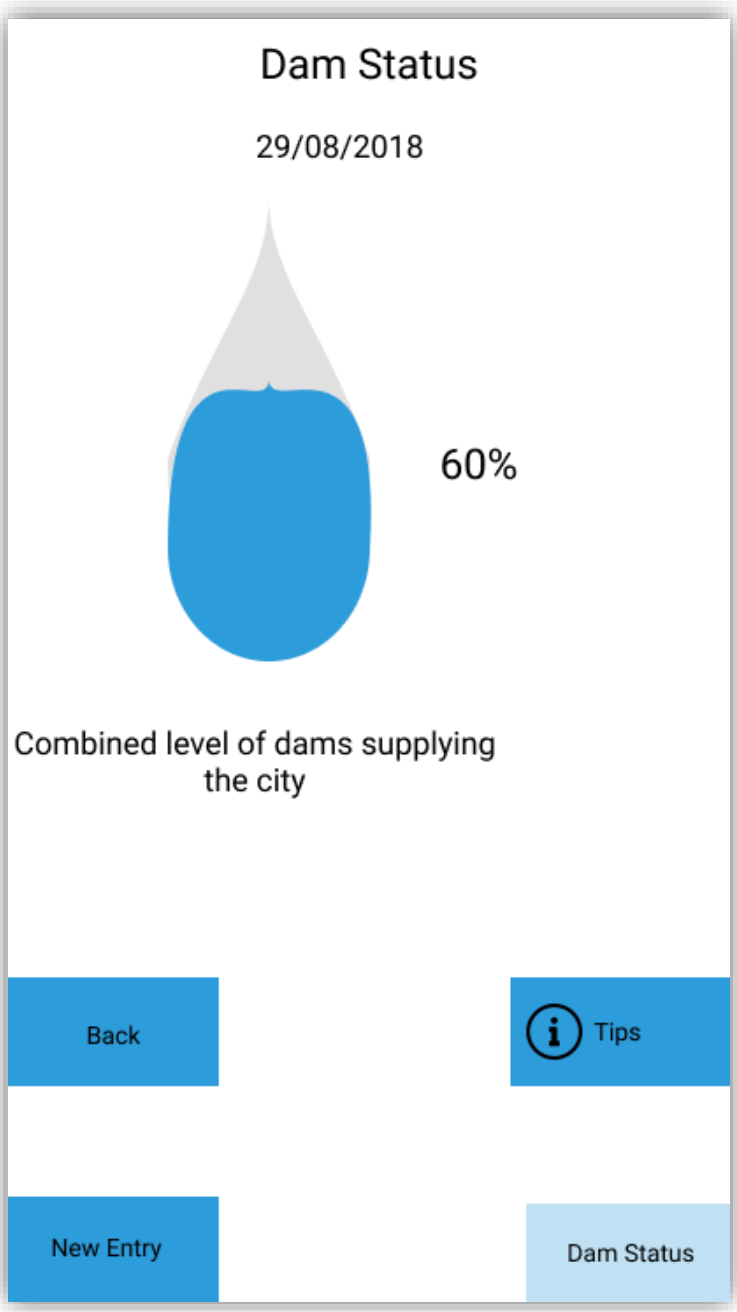
Body washing	0
Toilet	0
Hygiene	0
Laundry	0
Dishes	0
Drinking	0
Cooking	0
Cleaning	0
Other	0
Average	0

New Entry

Tips

Entries

Dam Status

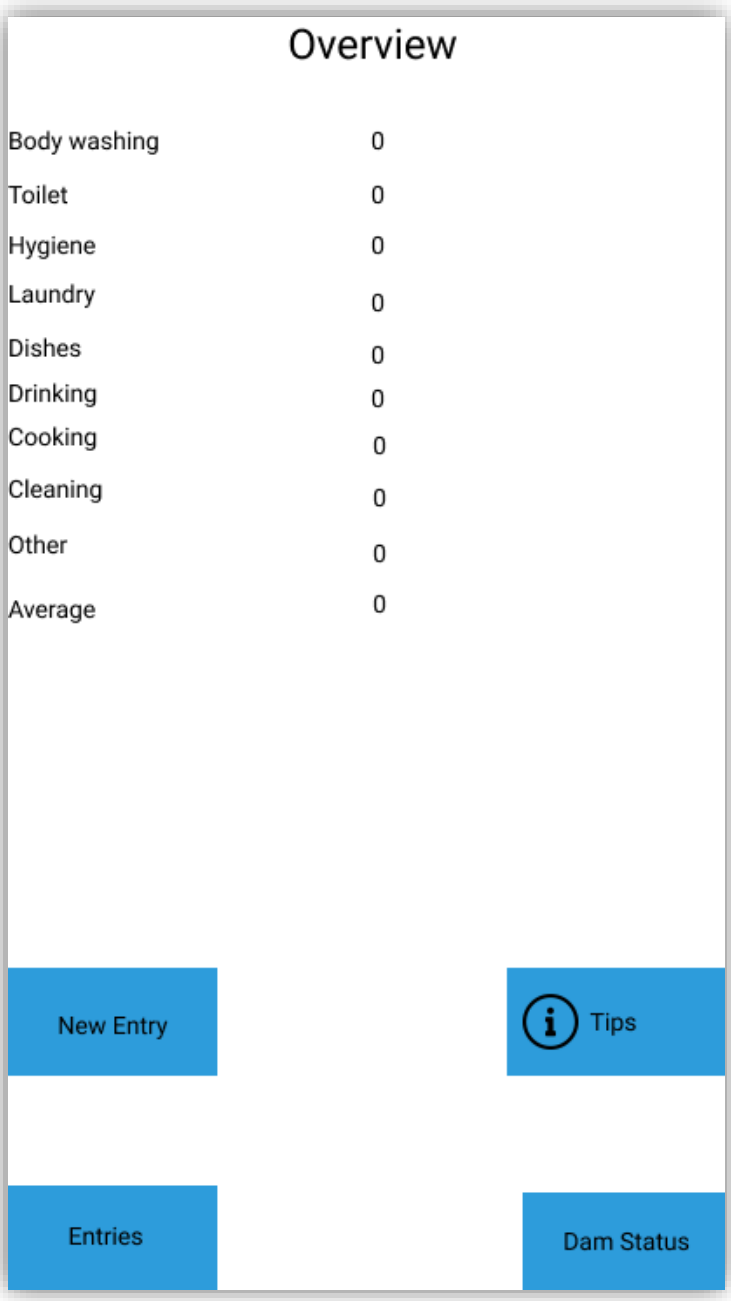


To depict the level of the dam, a visual representation is used as well as the percentage. It has been proved that visual metaphors increase the ease of use. It has been shown that diagrammatical representations facilitates learning and is more interesting than text based representations (Huang, 2009). This type of design is appreciated by people new to mobile technology and this achieves the goal of making the app more usable. Images are very important in HCI for information visualization and the “water drop” design of the dam representation provides a familiar view as the application deals with water. This creates a sense of coherence and togetherness in the application.

Tips for saving water and feedback.

Providing informative feedback is a core principle of design. For this application, the user needs feedback to see if he/she is saving the water as required. Studies have shown that feedback improves efficiency and user experience. Without feedback, users have less confidence on the consequences of their actions which eventually compromise system usability. The goal of the application is for the user to monitor his/her water usage and ultimately use 50 litres of water or less. Therefore, when achieving the goal of using an adequate average the user will receive feedback and when using too much water, the user will receive a different feedback. This is to ensure that the user acts responsibly and makes use of the app to save water better.

Tips are also offered in the app. The tips are obtained from the South African government website, this ensures that the tips are particularly useful in a South African context. The tips are here to help the user save water and are especially useful if the user is using an excessive average amount of water.



The display above shows the overview of the app when first opened. The next image will show the same overview after the user has used an average of less than 50 litres.

The image above shows that the user has used an average of 32 litres per day so, the display is green.

Now we will see the case when the user has used more than 50 litres per day.

This case, we can see that the user has used more than 50litres per day, therefore the average is displayed in red. Also notice that the symbol for tips is the “i” enclosed in a circle. This symbol will appear next to the average if the user has used more than the limit. When pressing the symbol, this will open a new activity where the tips for saving water are displayed. The user can also access those

tips at any time when pressing on the “Tips” button located at the botom right. Below is the activity opened when pressing the “Tips” button.

This design is used to maximize the user's feedback experience. Don Norman states that "Design is a way of communication" (Norman, 2013) and this is what is achieved by showing the user that he/she is using too much water and then giving them tips to improve.

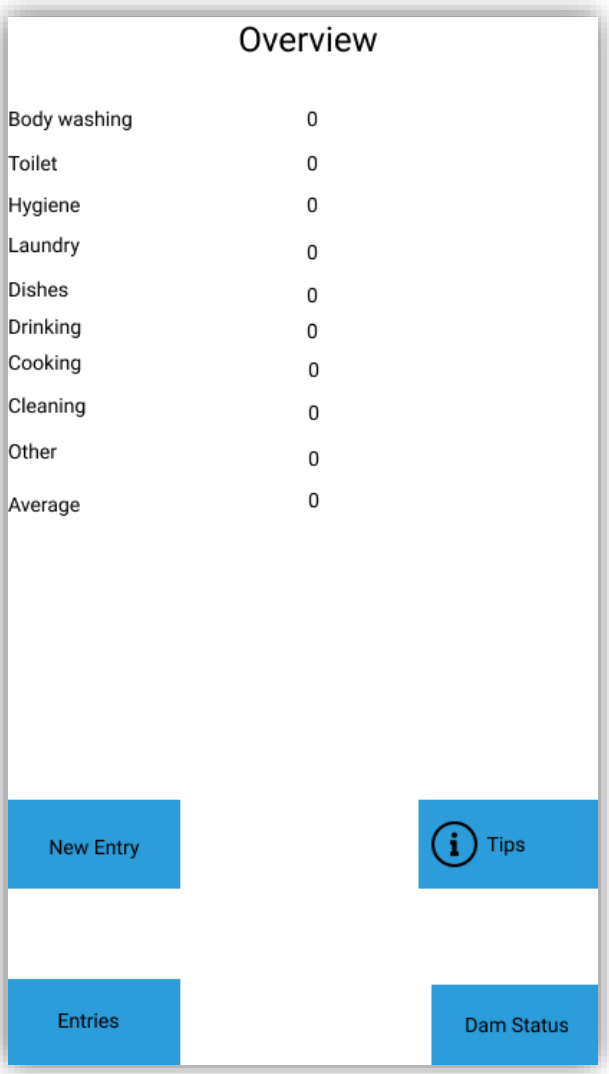
Without good feedback, the user will never know if what he/she is doing is right (Norman, 2013). That is why the average is coloured depending of the water usage. If the colour is red, that is the average is higher than it should be, the "Tips" symbol will appear next to it. This feedback will prompt the user to click the symbol which will then show tips on how to save water.

Using colour has been shown to facilitate Human Computer Interaction (Chien-Hsiung, 2018), this is why colours are used. The colour green is associated with peace and well-being, this is why this colour is used to shows a "good" daily average. Red causes an instinctive response that makes it attention grabbing. This is why that colour is used when the user has an average above 50 litres. The user then will easily find that his average is too high and will use the tips.

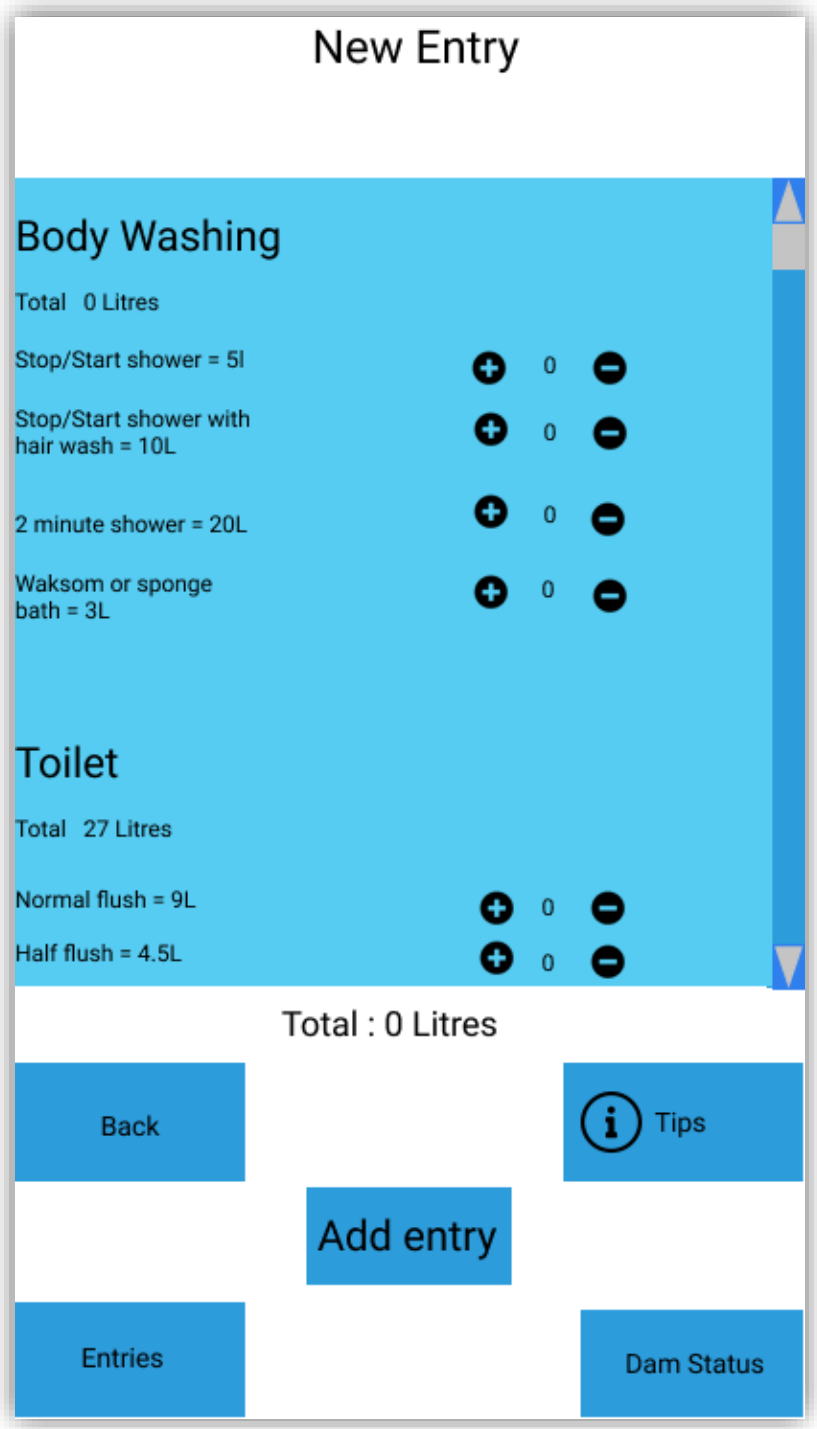
The tips page shown above has a scrollable interface that will allow the user to see the full tips page.

Overall design and layout.

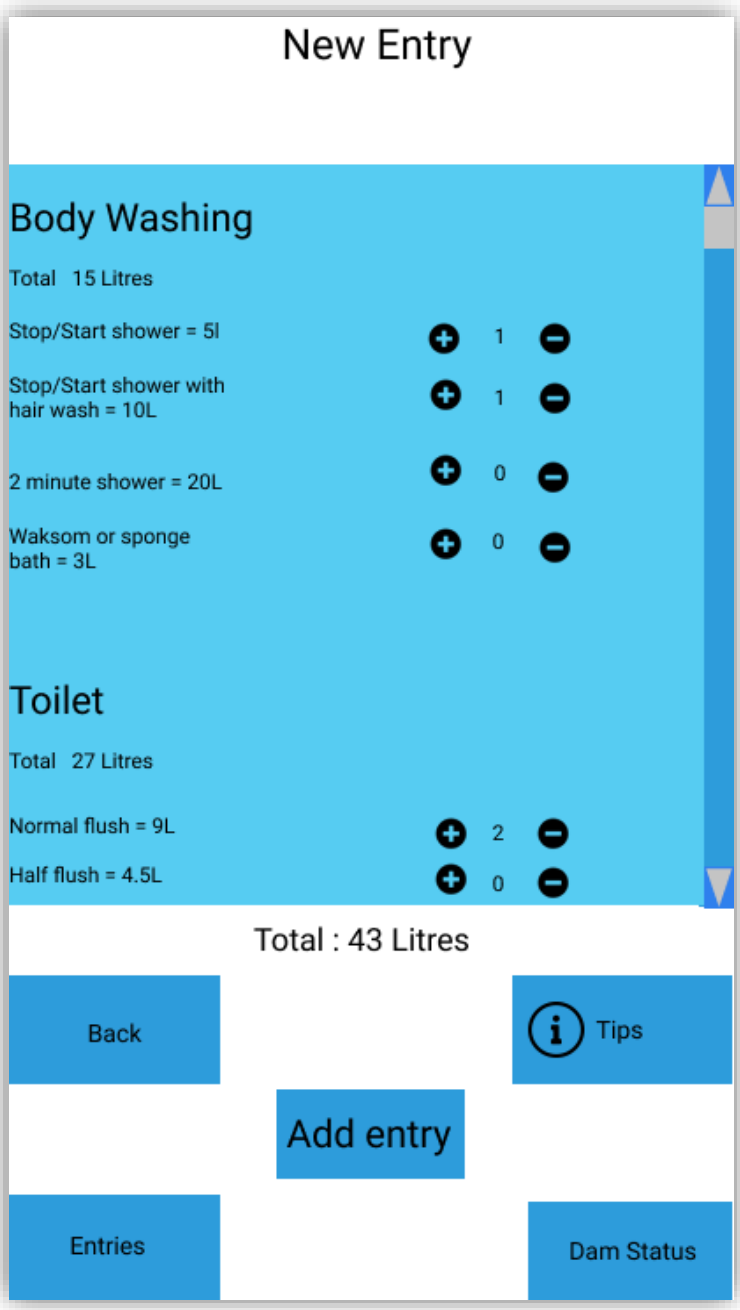
Opening the app will launch the overview. When running the app for the first time, the view will be as such:



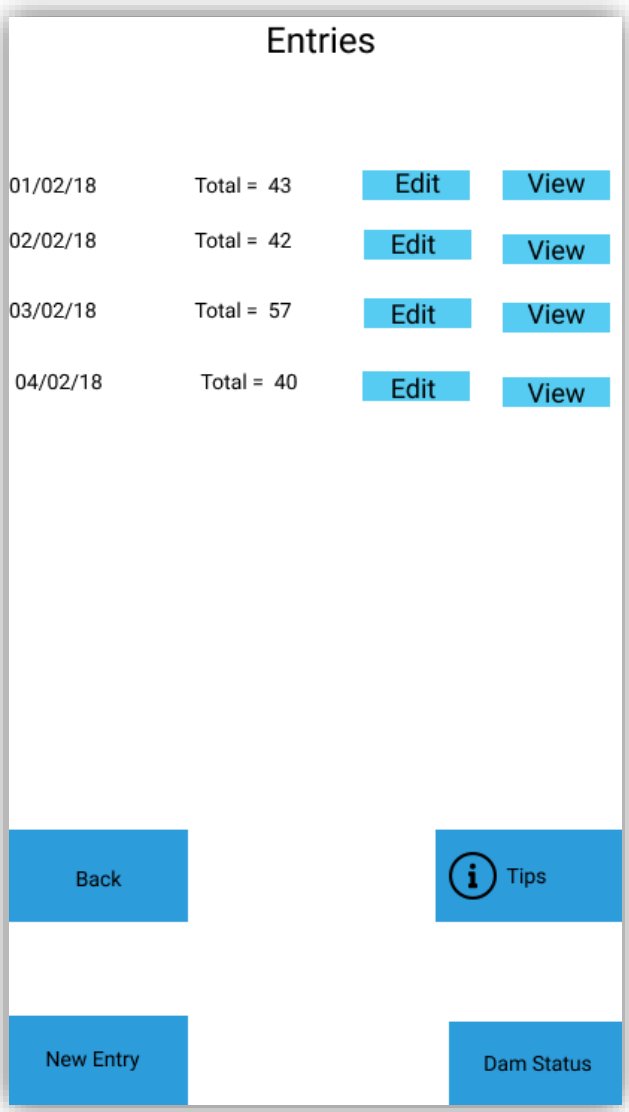
The user will have the option to create a new entry for the date, look at all the entries(which at this time will be empty), look at the dam status or look at the tips for saving water. Let us assume the user has pressed the “New Entry” button.



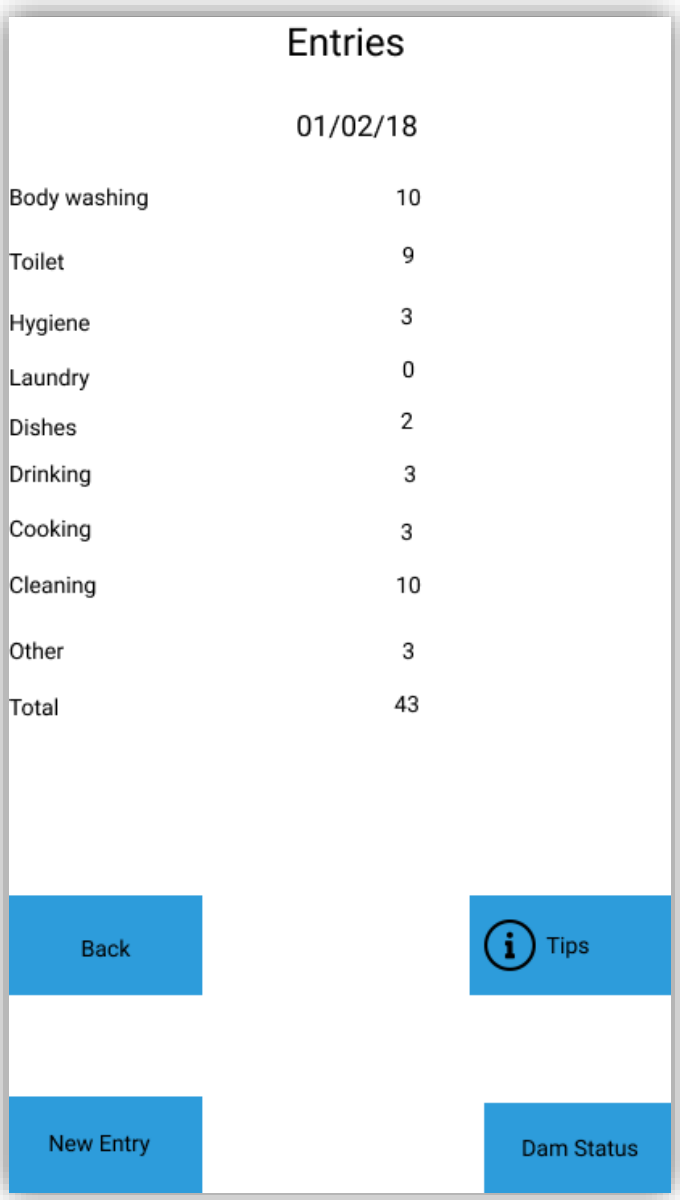
This will now be the display. The user will use the calculator to add the values to the entry. When all the values have been added, the user can press “Add entry” to add a new entry to the journal. Below is the display with some added values.



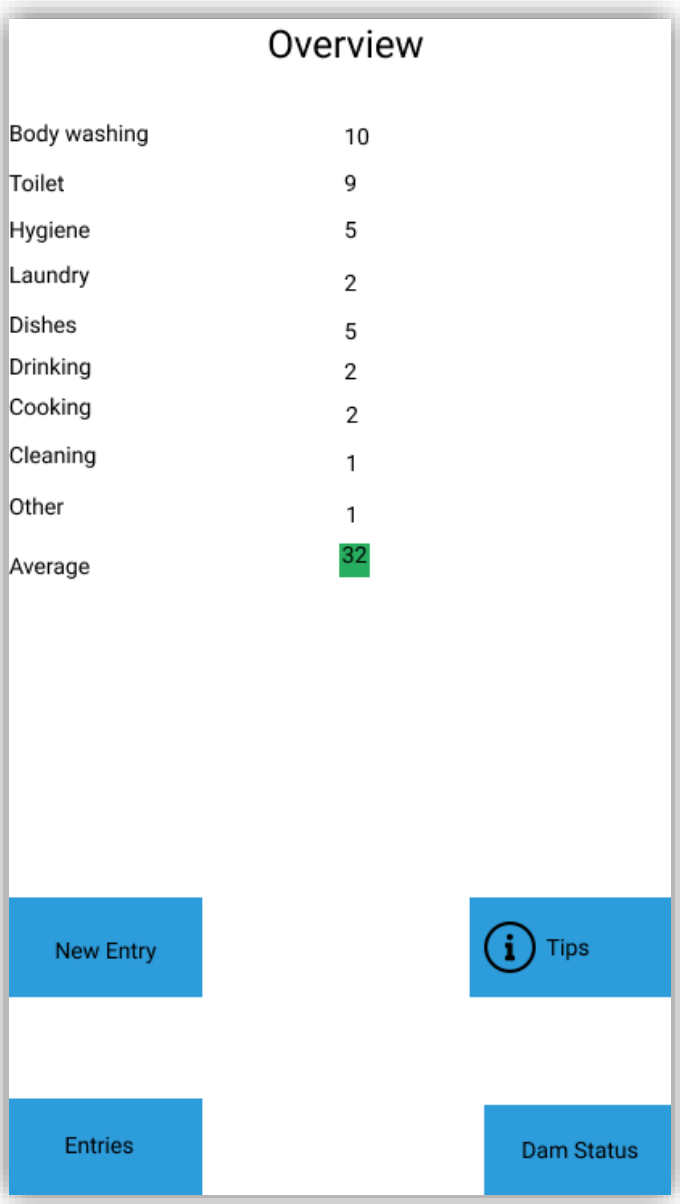
Let us assume that the user has entered this data, now the user presses the “Add entry” button.
This will direct the user to the entries page where the user can see all the entries and their date. It will also add the current entry.



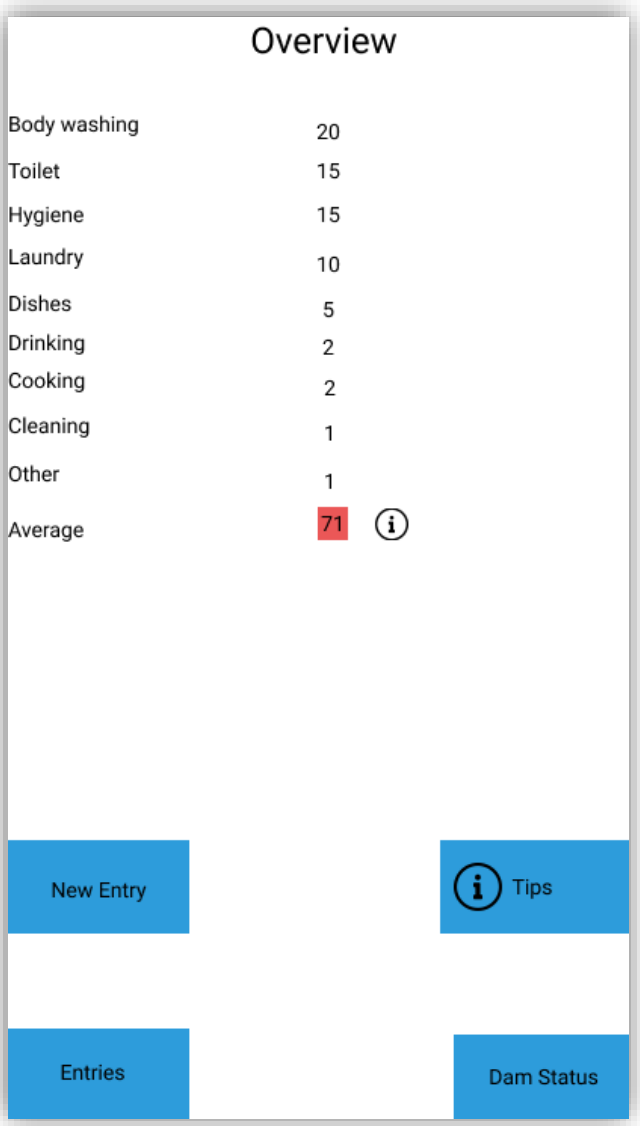
This is the Entries page. It shows all the entries date and their respective totals. The user has the option to view or edit each entry. Pressing the ”Edit” button will return the user to the calculator where the user will be able to edit his entries. The calculator page is already shown above. The user may also press the “View” button which will allow the user to view the detailed water use of that entry. It is depicted below.



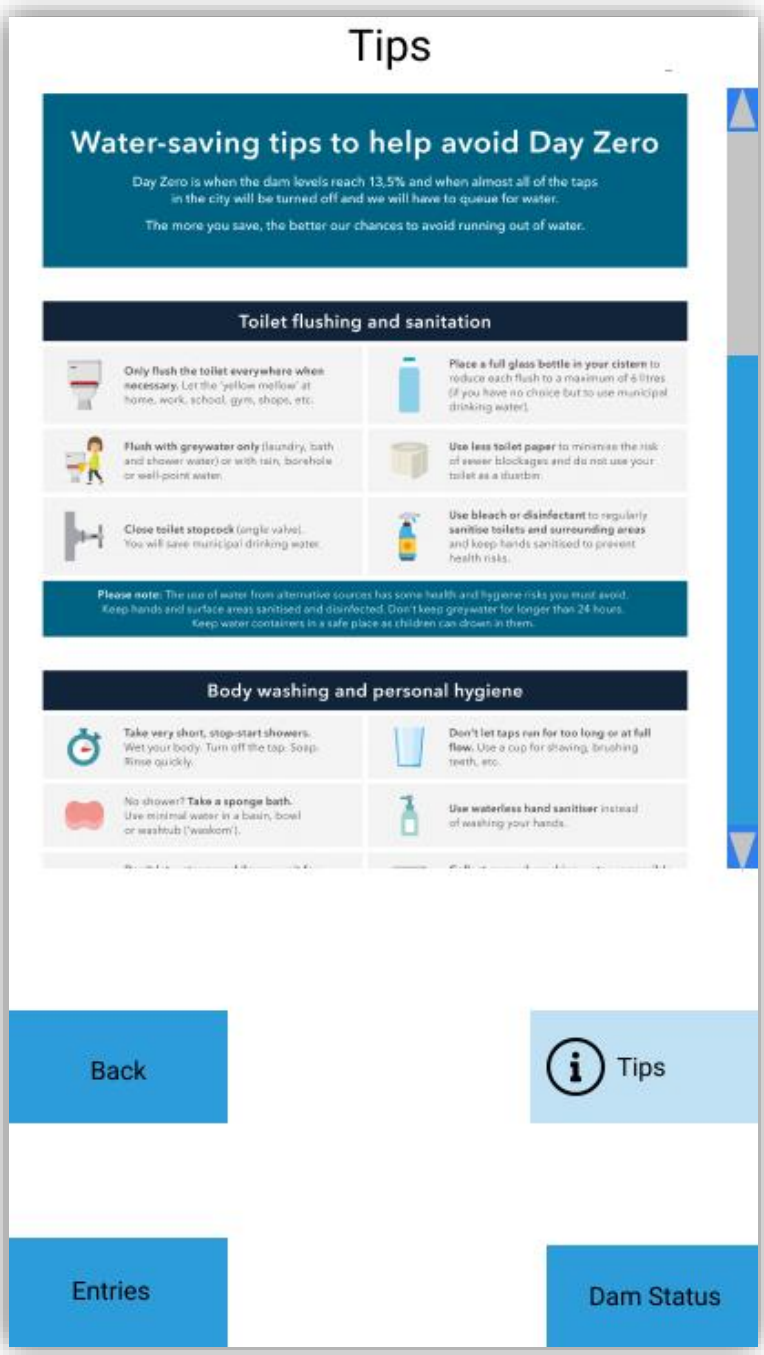
Now let us assume that the user has used the app for a while, the overview can have 2 different looks.



The view above is when the average water used is below 50 litres. The average is in green.

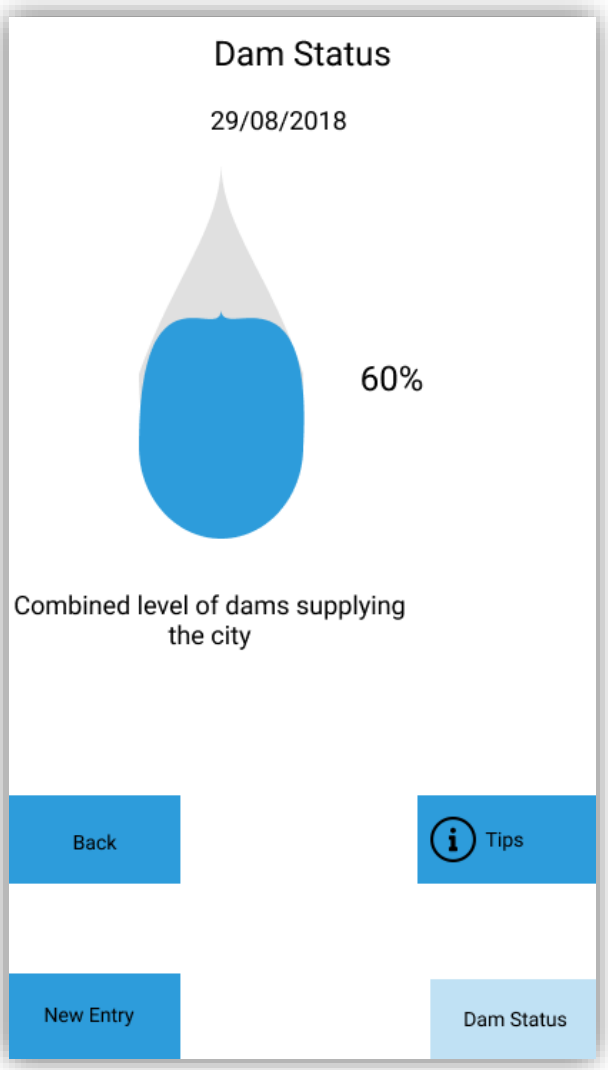


The display above is when the user has an average of more than 50 litres. It is in red. Also, the “Tips” icon is shown beside the average. Pressing on this icon or the “Tips button” will open a new window as shown below.



Here the user can navigate the tips page and find useful methods to save water.
Note that the “Tips” button is now unusable since we are already on the Tips page.

Now the user may want to check the dam status. It can be done by pressing the “Dam Status” button located at the bottom right. This will open the window shown below.



This shows the dam percentage. The dam level is also depicted by the level of blue on the water drop image. Also note that the “Dam Status” button cannot be pressed now as we are already in the page.

The user can now press the “Back” button to return to the previous activity. In this case, it will be the “Tips” page.

The target audience of this application is mainly South African people since the dam levels are obtained from the South African government website. This application can run on android devices running up to the latest version of android.

References:

Norman, D. (2013). The Design of Everyday Things. New York: Basic Books, p.188,210,106.

Punchoojit, L. and Hongwarittorrn, N. (2017). Usability Studies on Mobile User Interface Design Patterns: A Systematic Literature Review. *Advances in Human-Computer Interaction*, 2017, pp.1-22.

Chien-Hsiung, C. (2018). *Color in human-computer interaction*. University of Kansas Lawrence, KS, USA.

Huang, K. (2009). Challenges in Human-Computer Interaction Design for Mobile Devices. *Proceedings of the World Congress on Engineering and Computer Science*, 1, p.4.