Flow: A Community Sharing System of Greywater and Blackwater

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ABSTRACT

Flow is a water management system designed to facilitate the collective sharing of water in a community. Unlike traditional water systems that focus on water collection, Flow allows users to collect, process and reuse greywater, blackwater and rainwater. The system aims to address increasing water demand while mitigating the effects of water scarcity due to climate change. In our pictorial, we showcase the entire process from idea generation to prototyping, discussing each stage. Through our research, we found that an individual's efforts to reduce water consumption cannot manage to protect the environment. Instead, the participation of the entire community is required.



Connected treated water system



Online dashboard in domestic and community unit

Figure 1: Diagram presents our two design outputs

INTRODUCTION

As we all know in three to five years the amount of water available for consumption will be really limited. Our idea falls under the 6th UN sustainable development goal which is "Clean water and sanitation" and more specifically target 6b which is "Support and strengthen the participation of local communities in the improving water and sanitation management".

Our idea is to enable each household to collect rainwater and filter it for human consumption. At the same time, all home produced grey and black water can be filtered for household use. Additionally, in order to increase people's awareness, we have created a dashboard providing real-time information about the water consumption at each house tap and giving tips for reducing it. The second part of our idea involves the whole community proposing the creation of a market for trading excess rainwater and greywater, where users can send a request to their community to trade water and sell excess rainwater back into the water grid (fig.1,2).



Figure 2: Brainstorming using the fast-thinking method to understand and search for possible ideas and rearranging them to identify water conservation for the benefit of local communities

IDEATION PHASE

IDEATION PHASE`

The idea focuses on the fact that in the future there will be more contaminated than clean water and we need to find a way to reuse wastewater and monitor water usage (Fig. 3, 4,5).

The existing solar panel system was a source of inspiration.







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Figure 4: First idea writing

Figure 5: Expanding our idea

BACKGROUND RESEARCH



Our focus was to find out what the water demand could be in three to five years. The graph in Figure 7 shows that the available supply will be much lower than the actual demand, so rainwater collection and filtration will be necessary.

Additionally, the Newcastle 2028 map (fig.8) shows the areas that will flood, demonstrating the abundance of rainwater in the coming years. Based on this data our idea of collecting rainwater, filtering and reusing it seems very viable.



HOUSEHOLD UNIT





When it is raining, water can be colllected into a tank



Water is then filtered and can be consumed. It can also be used for various activities such as -



Showering



Doing the dishes



Gardening

HOUSEHOLD UNIT SCENARIO

First, we created some scenarios of what the future would be after the implementation of our idea in a household unit (fig.9).



The whole family can monitor and assess their water consumption



Excess water can be shared and traded

HOUSEHOLD UNIT

IMPLEMENTATION IN HOUSEHOLD UNIT

In the household level rainwater is collected and grey and black water is filtered for reuse as shown in figure 10. The water usage at each point is tracked using sensors and shown in the dashboard.



HOUSEHOLD UNIT

DESIGNING A PROTOTYPE FOR HOUSEHOLD UNIT

The final step of our concept for the household unit is the design of an actual household prototype that shows individual home water usage and the available amount for each unit (fig..11).



COMMUNITY LEVEL

COMMUNITY SCENARIO

In the second part of our idea we implemented another scenario about sharing water in a community level (fig.12)



User is washing his car



The flow of the water slows down and they realise that the water reserve is empty



The user opens the dashboard to ask their neighbour to send the water



The neighbour gets the notification and she accepts the request



Once approved the water is transferred and can be utilised by the user



The neighbour receives the extra points and moves up on the leaderboard

COMMUNITY LEVEL



DESIGNING A PROTOYPE FOR THE COMMUNITY

The prototype we created for the community is a single dashboard (Leaderboard) that includes all types of water (the amount stored and the amount consumed), manages requests for grey and clean water from the community and monitors the progress of each house in the community (fig.15).

Collected Rain water Collected Rain water

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15TH

Leader

board

COMMUNITY LEVEL





USER JOURNEY MAP

HOUSEHOLD UNIT AND COMMUNITY LEVEL

The implementation of our idea is shown through a user journey map (fig.16) where the steps from both sides of the system are identified - that is, the user making the request for water and the user sharing its surplus water.



HOUSEHOLD UNIT AND COMMUNITY LEVEL

WATER JOURNEY MAP

The various uses of each type of water as shown in the figure 17 make our proposal very beneficial for each household unit as well as for the whole community.



Figure 17: Water journey diagram [2, 3]

DISCUSSION, CONCLUSIONS, REFLECTION AND CONTRIBUTION

DISCUSSION

The idea we propose seems plausible to be implemented soon. Although our scenarios seem feasible, we recognize that many households will not be able to afford the required filters and monitors.

Furthermore, although in three to five years a large amount of filtered and grey water will be in daily use, a rather limited number of people will be able to make use of this procedure.

However, we believe that our idea will become necessary in the future since, as we mentioned, the demand for water is increasing but the water supply is decreasing.

CONCLUSION

Further improvement in low-cost sensor design, widespread adoption of digital meters, and improvement in filtering technology are some of the barriers to adopting this design in everyday household and community life. Community awareness in adopting the proposed application for the utilization of such a precious resource as water is very important and requires discussion and further study.

REFLECTION

During the process of this work we learned how important but also difficult is cooperation within a group work, because not everyone works at the same pace. Additionally, during our collaboration we learned the importance of feedback especially between people from different backgrounds.







CONTRIBUTION

Loukia: Brainstorming, Ideation, Prototype, Text

Mohit: Water journey, Domestic scenario and Community scenario

Shakthi: Brainstorming, Ideation, Text

Sutakorn: Brainstorming, Ideation, Diagram of background research and User Journey and domestic and community unit, Text

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