

ABSTRACT

A lot people in India still do not have privilege of access to safe drinking water in various scenarios. Several attempts have been made and are still being made to provide potable water to various user groups in India but still the expected results are not achieved. Moreover potable water problem is not just associated with just access to safe water; several other problems also govern its use by the target consumers.

This project is an attempt to look into the bigger picture that lies within the system associated with water and various other factors which indirectly affect the consumption of safe water and perception of people about it.

Looking for opportunities in some of the problems associated with water in various contexts, this project proposes a water storage cum filtration kit for temporary stay scenario in India. The term “Temporary stay scenario” here represents the scenario consisting of life style of students, hostellers, frequent travellers, etc. who do not stay in an environments that have permanent water filter facility and are often very prone to using water unfit for drinking purpose. The project proposes an equipment that assures the user group safe drinking water and also takes into account the ease with which one can achieve that.

Several other factors considered during the design process were ease of use, cost effectiveness, use of available products and technology, handling and consumer behavior. The design process starts with wide search for problems and then narrows down to specific domain for which the kit is proposed.

existing product	cost	pathogen reduction	shortcoming
life straw	6\$	99.90%	too personalized, people's attitude
life saver bottle	160\$	99.99%	low storage, usability issues
steripen	30\$	99%	limited use.



Fig 10: Comparison of Existing Products

User study

After the problem area was fixed and available products were studied online, the direction I moved along was interacting with users. During this study, I moved to railway stations for general observation usage of public taps by people, and the usage of plastic bottles by them. Several of my observations were related to the problems faced by them in using public taps and water available at stations and the concerns related to it. The other part of the observation give me a key idea about what promotes the usage of plastic bottles or packaged drinking water in Indian scenario.

The following picture collages show the status of public taps at Indian railway stations. One can easily find the garbage lying round here and there around eatables and drinkables. Moreover the habits of people in India are also quite annoying as they have a tendency to spit around after having guthkha and pan masala. Some people have tendency to wash utensils and other stuffs in the public taps. These all things arise due to the

different habitats, cultures, backgrounds and economical and financial levels in India. People come from different background and they have different hygiene habits. Moreover this occurs because of the tendency of people to consider usage of public taps as temporary source of water. They take the cleanliness for granted and therefore this leads to further unhygienic conditions.

In order to understand the perception of the water quality available in these public taps and the public taps itself, I talked to several of the passengers about the issues related to public taps and drinking water. The results of the same are elaborated below.

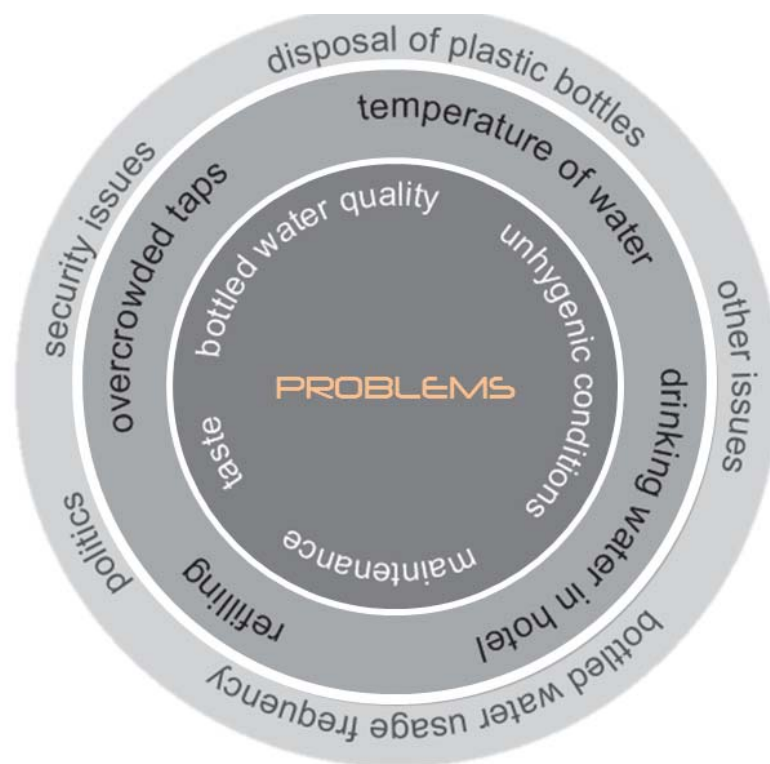


Fig 11: Graphic Segregation of Problem

For the ease of understanding of the problems the above graphic divides the problem into three categories

- Primary or the direct problems
- Secondary or the indirect problems

- Tertiary or the problems which are not directly related to water quality in stations but affects people's consumption of the same.

Primary problems

These are the problems like taste of the available water in stations, unhygienic conditions , maintenance level in stations, bottled water quality.

We all are well aware of the maintenance issues in station. Most of us have never witnessed the water filters or the storage tanks being maintained at stations. The poor status of maintenance activity makes us feel that the drinking water quality at stations is compromised. The low cleanliness levels and the laid back attitude of people towards maintaining the hygiene in public taps leads to the unhygienic conditions. People do not flush properly at such taps and very often they throw the polythene bags and plastic bottles over there itself. Several reasons for this behavior are mentioned above already.

A few of the users whom I talked also mentioned that they generally buy the bottled water because they do not like the taste of water available at stations. As per their concern, the different taste of water at different stations makes them think about the water quality at the stations being compromised and not properly filtered. Also they mention that bottled water has a given taste that remains same throughout the country given that it is of the same brand.

kind of scene arises mostly in colleges which do not have very good infrastructure and facilities and are mostly evident in small towns and cities.

The students who usually face this problem usually become conscious about it once they witness spreading of diseases like jaundice. Once such a disease spreads in hostel students gain the tendency to drink packaged drinking water and thus the same is promoted among students. Same kind of situation is present in schools as well.

The hygiene related issues are also evident in hostels and schools. Some students particularly in local small schools have general habit of washing their tiffin in the same tap that is used for drinking water. This mostly leads to the accumulation of food material in the basin which gradually spoils there and creates bad smell and unhygienic conditions.

Miscellaneous users

Apart from this basic user group, people who frequently go out on trips, to restaurants etc. also suspect the water quality and use bottled water. in all the above scenarios there are problems related to availability of pure and safe water which pushes people to buy bottled water. if a person goes to a hotel he makes it by the looks of the hotel about it's food and water quality. All this is based upon the aesthetics and condition of the place he is in. so higher class people mostly prefer to drink mineral water in hotels.

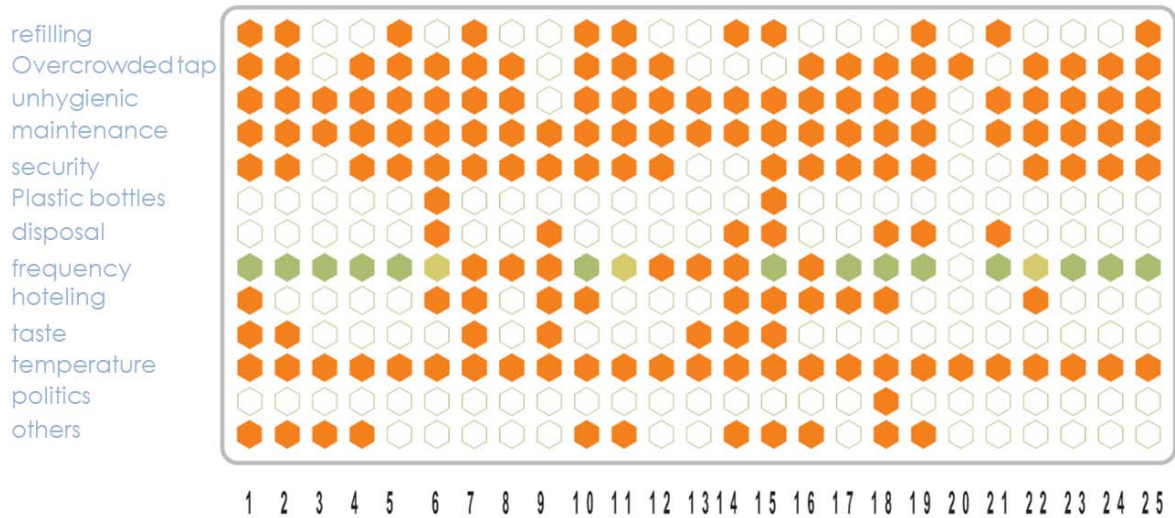
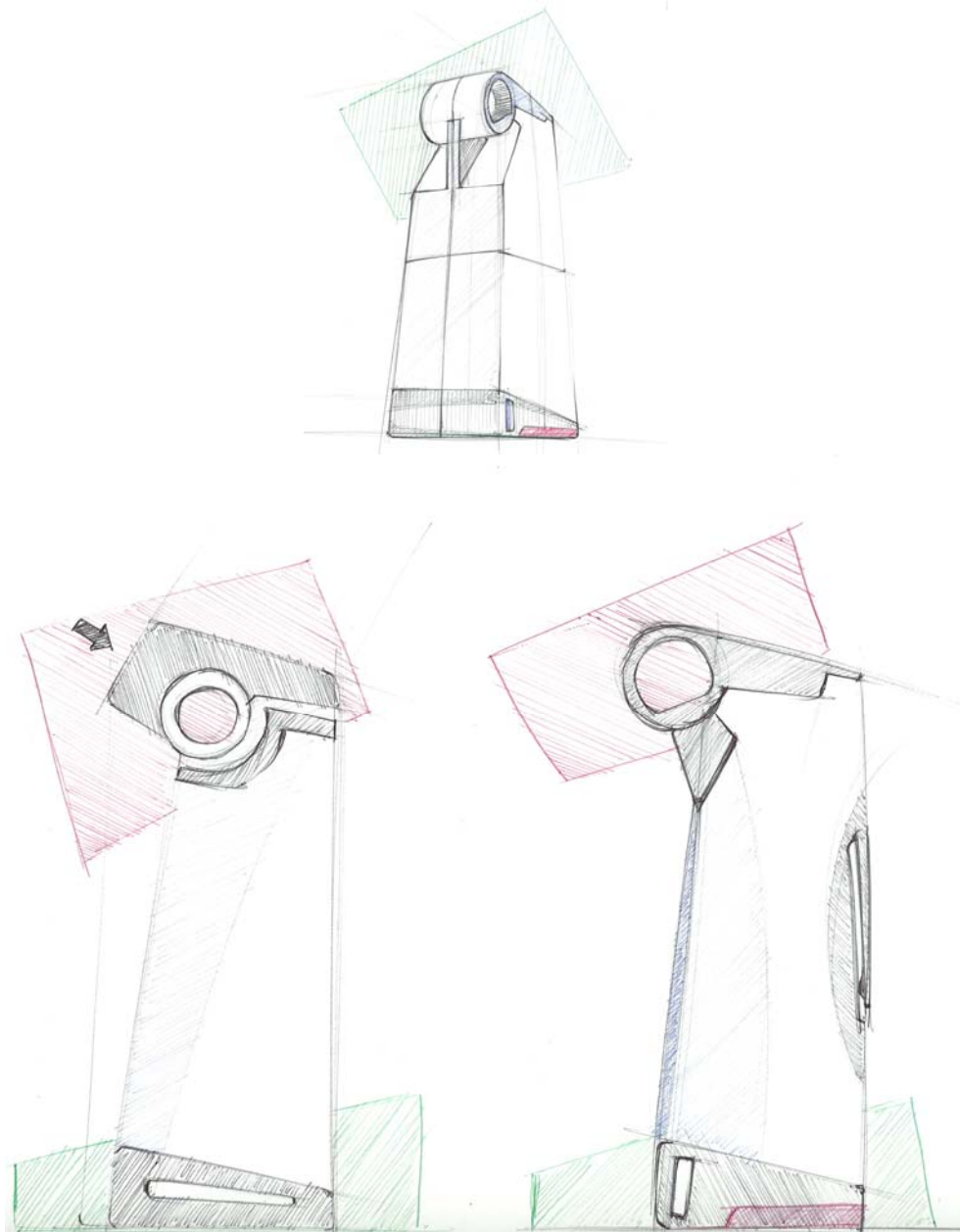


Fig 13: Interview Result of 25 Users

play when we talk about the user group consisting of school children, college goers, hostellers and travellers. The product designed should not be bulky and heavy to be useful for these users.

Ideation and concept generation



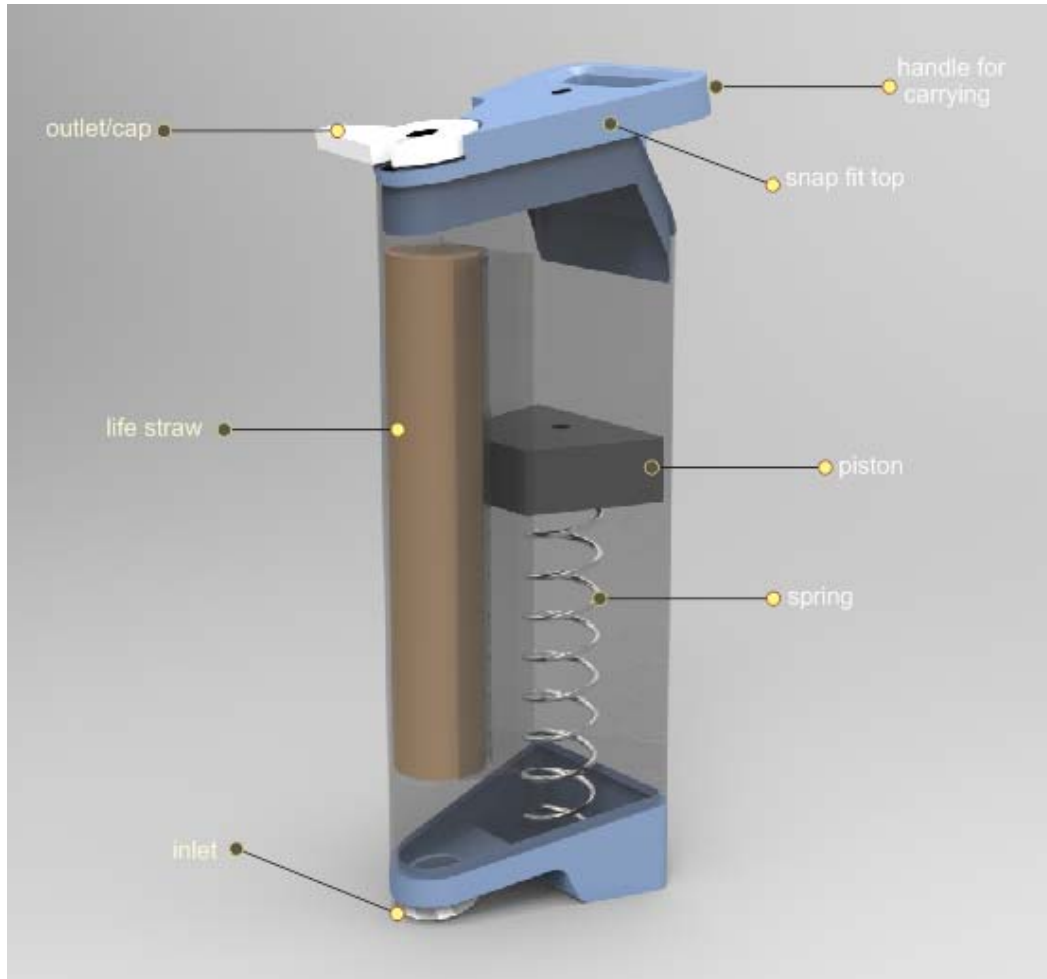


Fig 16: Detailing of Proposed Design

Constraints followed in design

Some of the constraints that have been followed in design of this product are as follows:-

- The size of product has been kept similar to the presently available 1 litre water bottles. This is because if the product becomes significantly bigger than the present packaged water bottles, then the consumers will not switch from such bottles to the designed product. Also this will hinder the portability of the product. The product is designed for the temporary stay scenario where people move frequently to significant distances. Thus the size of the product has to be small.
- The size of the product should not be smaller as it would not be possible for such a product to carry a good amount of water and store it for future use.

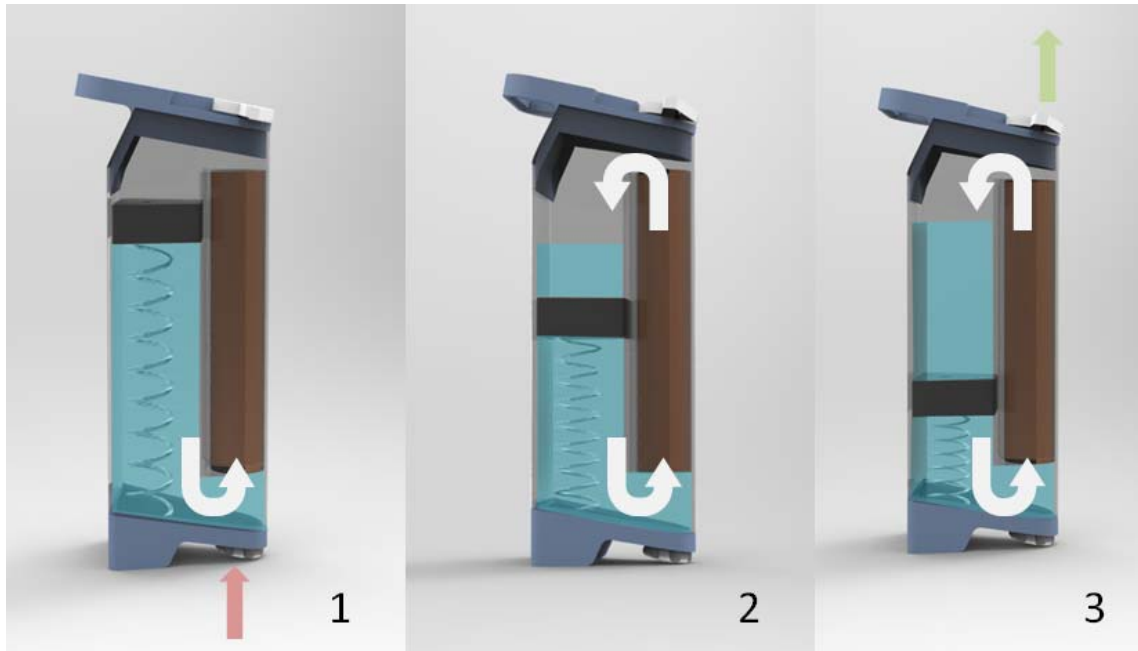


Fig 17: Working of Proposed Design

- After that the cable is released by pushing a button thereby making the spring to release its tension by pulling piston down. In this process the pressure inside the piston cylinder arrangement gets increased which pushes the water through the filter in upward direction. The movement of water is shown by white arrows.
- The filtered water that is released by the piston starts accumulating on the top of the piston in the chamber that gradually becomes bigger as the piston moves down.
- As sufficient amount of water gets collected on the top chamber above piston one can drink it through the outlet shown by the green arrow. This gives an explanation of the basic filtration in this device.

Filtration unit used

The filtration unit used is the life straw water filter made by the company Vestergaard Frensdén. This is basically a membrane based filter that is capable of removing small particulates and pathogens upto 99.9%.



Fig 20: CAD Render showing Design of Outlet

The design of outlet reveals a simple and beautiful design that is designed for single handed use. The rubberized gasket makes it sealed when closed and the snap fit rotation clicks it to lock in secured position.

The motorized versions and the leg operated versions that were discarded in the initial stages of the conceptualization and prototyping , have become more relevant now, after a wider audience was exposed to the idea and the prototype was palced under review of experts.

Images of Prototype:

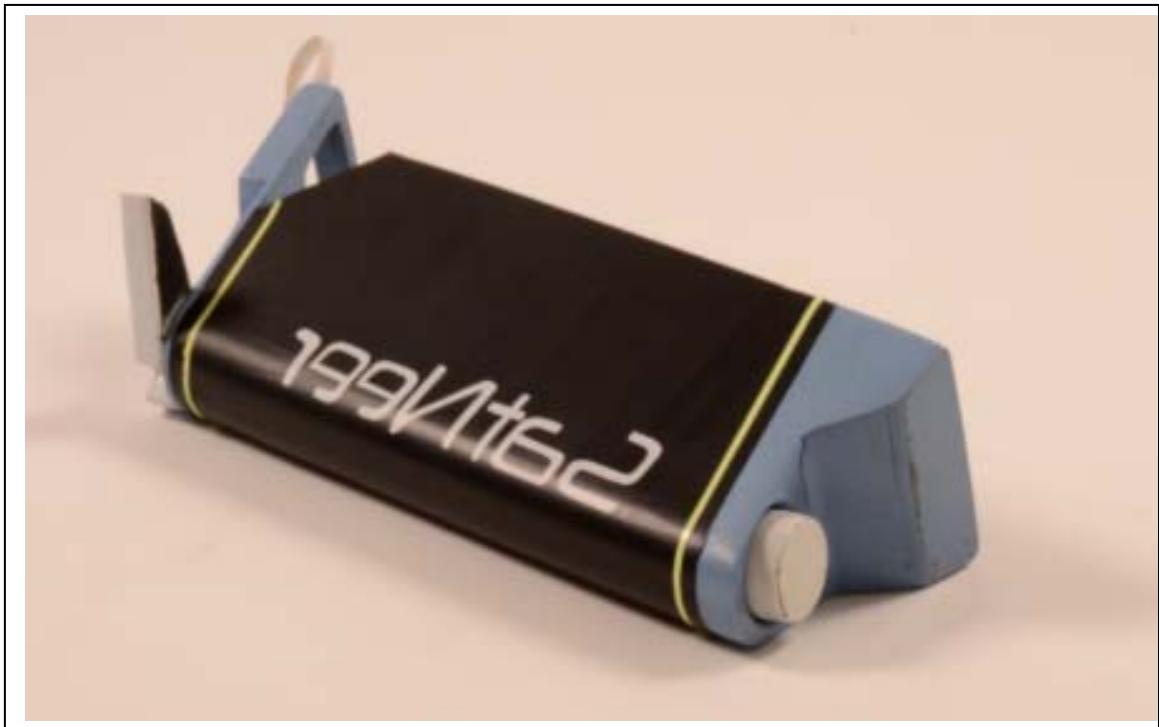
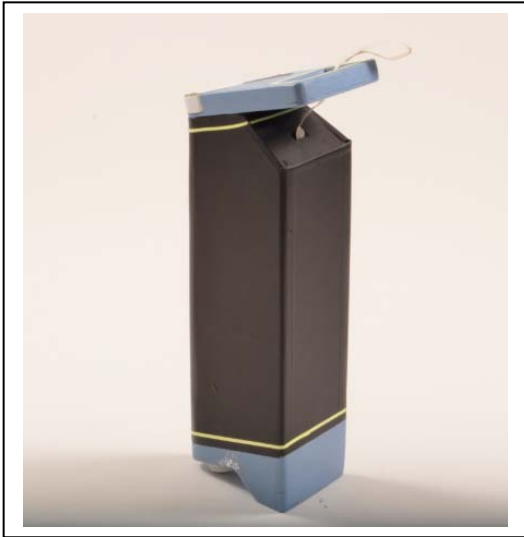


Fig 21: Images of the prototype