

Report : Week 04

Ideation & Concepts

Further Ideation and Final Concept

team **avoda.co**

Anagha Aneesh (18U130004)

Drishti Das (18U130013)

Vanshaj Kumar (18U130029).

This report summarizes the work that we have done and the progress that we have made regarding our Collaborative Design Project over the past one week (03/11/2020 - 09/11/2020). The main focus was to ideate and come up with concepts to solve our problem.

We did a role play where we pretended to be the user, customer and product in multiple scenarios and we realized that people would only use this alternative if it is as simple as hand transactions. People adapt to new methods only if it makes their life easier or it brings them profit. Something that's connected with the money box rather than something entirely different might increase the probability of usage.

An Overview of our Timeline.

- **Monday (09/11/2020)**
 - Rest
 - Good 12 hour Sleep
- **Tuesday (10/11/2020)**
 - Further Research
 - Ideation
- **Wednesday (11/11/2020)**
 - Ideation
- **Thursday (12/11/2020)**
 - Feedback Session

With that we looked into different types of sanitization, which actually involves two steps: Cleaning and Sterilization. The Cleaning step is actually quite crucial because if there were dirt remains on the notes, it is most likely to absorb radiation, or cover the virus surface in some way so that area isn't exposed to any sterilization method, hence it won't be entirely effective. With that, there are three main kinds of sterilization: heat, radiation and chemicals.

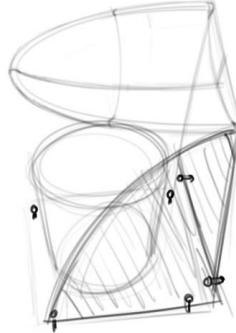
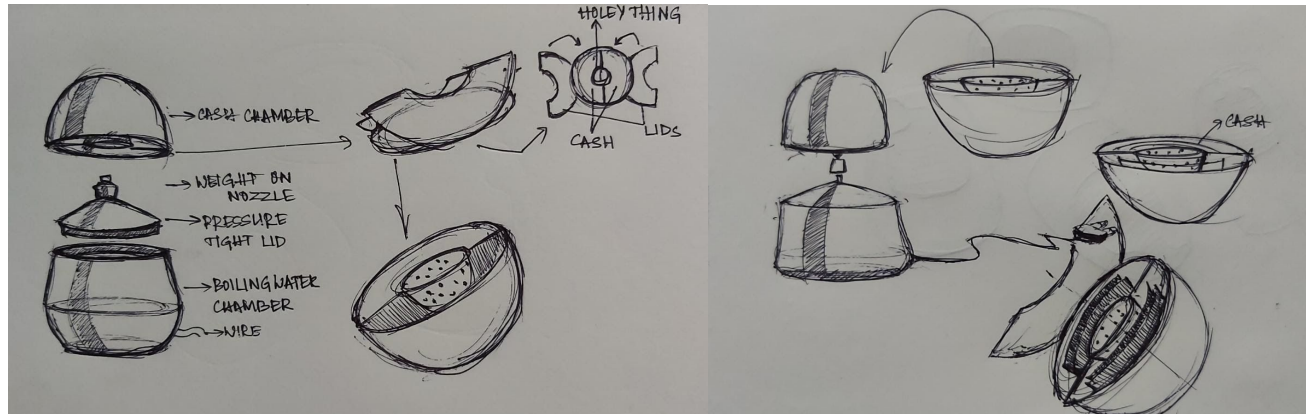
Heat would mostly involve solutions like, steam, hot air, or a hot metal surface. Since heat is something that they are mostly exposed with in a cooking environment, hence relevant to our context and is easily available (or so we thought) we decided to look for solutions based on this area. For on the other two, Radiation had solutions like UV which was widely known but we made sure we'd steer clear of Chemicals (which is mostly sanitizing solutions like the alcohol based hand sanitizer or spray) as they could be highly volatile when used near fire and could not be good for human body when accidentally mixed with the food.

Heat/Steam Sterilisation

Under heat sterilization, we suddenly thought of a pressure cooker and how the steam that comes out of it is extremely hot and can be used to sterilize the notes. We then looked into how the pressure cooker works and searched for similar items in the market. Anagha had then mentioned how they could puttu (a part of kerala cuisine) using something which uses a very similar concept to what we were thinking i.e. a puttu maker. With that we could visualize the form better and looked into other steam and hot air related products, like rice cooker, momo maker, hair dryer etc, and other steam sterilization methods used in different context and did some basic ideation on that.

Further ideation board





Main Concerns

- Complicated Process

The process, even though serves its purpose, is going to be a gargantuan shift from a regular transaction. The process could be divided into two main halves - the first being the cash input by the customer and the second being the sterilization and cash output. The first part involves the shopkeeper to confirm what he has gotten is the right amount and trigger it to fall into the katori below. In this case, he has to keep an eye on making sure to shift it when it's full. Then he has to transfer it to the heating chamber for sterilization and wait for the process to be completed (3 seconds, but it is an added activity to his normally busy schedule). Once done, the notes have to be transferred into his regular money box from where he provides the user with the balance amount.

QS: What happens if the customer is too lazy and doesn't end up using it, even if he owns one? How can the customer be sure that whatever he is returning from the money box is actually heat sterilized?

- **Commitment**

There are chances that the shopkeeper might leave the notes in for way too long that they will get exposed to too much steam/heat, damaging the money inside. This would not only be a loss to him but also would make him not want to use the product anymore or be skeptical about using it. This also requires additional care while handling, since the water inside is boiling hot.

QS: Could there be a feedback mechanism that tells the shopkeeper that the notes have been in there for the desired amount of time?

- **Pre-occupation of the Stove**

Most small food stall owners usually have only one stove which is constantly in use. When he has to sterilize a bunch of notes, he will have to move the vessel in use to a different place, (maybe his counter). Later when that is done, he will have to move it back.

QS : How convenient would it be for a stall owner who has a heavy tub full of boiling oil to keep switching with the sterilizing product each time he wants to sterilize the notes?

- **Condition of Notes**

Steam is moisture and since the currency notes are basically paper, the notes will definitely absorb this moisture during the process. Even though the first few sterilizations would work fine on the notes, there is a possibility that the condition of the notes might deteriorate faster due to constant exposure to heat and the journey of a note over time is quite indefinite and unpredictable.

QS : Would anyone, say the Government, want their notes to be constantly subject to heat if that affects its quality?

- **Acceptance of the Product**

Even though hygiene is *our* concern, would it be of the same importance to the rest out there, considering the fact that most people are still unaware of the fact that money is an extremely common and significant carrier of germs and viruses?

QS : How do you market the product in such a way that the target users are convinced?

Unfamiliar Concept: Peltier effect

We found out about something called a peltier effect when in an impromptu meet with Prof. Avinash in the morning of the presentation. He introduced us to this concept which uses something called a thermoelectric effect, which is basically the conversion of electric energy to thermal energy based on the difference in temperature of two surfaces, and vice versa. In this case we use two metal sheets and we connect it to two wires which connects to a current source. So, once electricity is passed, as a way of creating temperature difference between two plates (metal sheets) one side becomes very cold and one side becomes very hot.

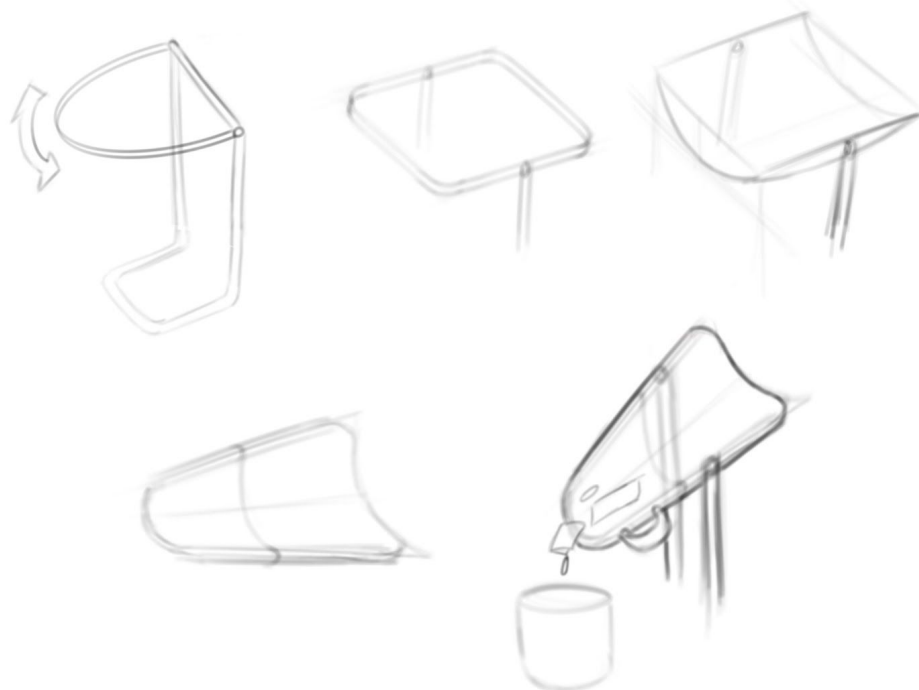
We thought that maybe we could incorporate the extremely hot side in our design to create a heating box (hence a way to sterilize the notes)

With that we also looked into different kinds of current sources we could go for. We suddenly realised that solar energy is be something that could be further explored as an energy source. But since this is not a continuous source, we decided we could go ahead with a DC battery anyway (which is kind of a necessity for all the mobile stall owners) (a battery similar to that of two wheelers)

So in this current new thought process of ours, we divided transaction in two parts:

1. Accepting the money

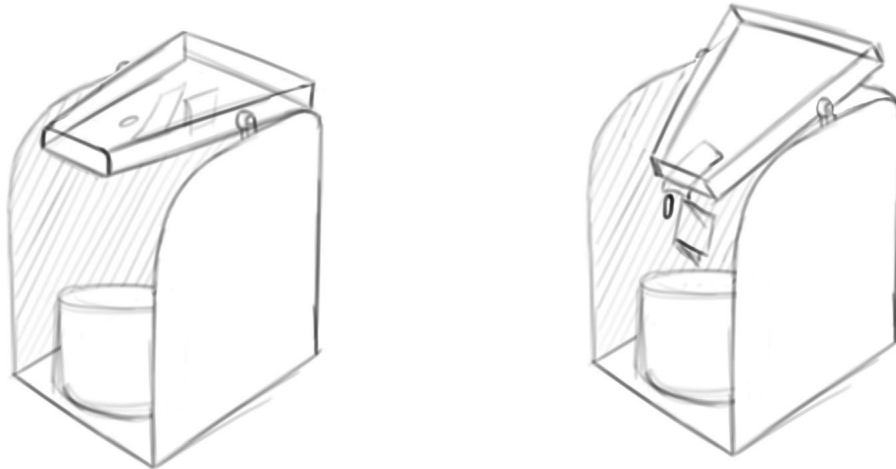
This was our first challenge where we had to figure out a way in which customers can pay the exact amount of money without coming in contact with the vendor. We came up with a



few ideas like having some sort of plate where the customer will put in his money and after the vendor confirms that the money amount is accurate he can push down the plate and the money will then drop into the money sanitisation box.

We also thought of how just plates won't be enough as all these stalls are quite open and wind will be quite common in there so we came up with a four sided closed design with only two cavities, one for input by customer and other for output by vendor.

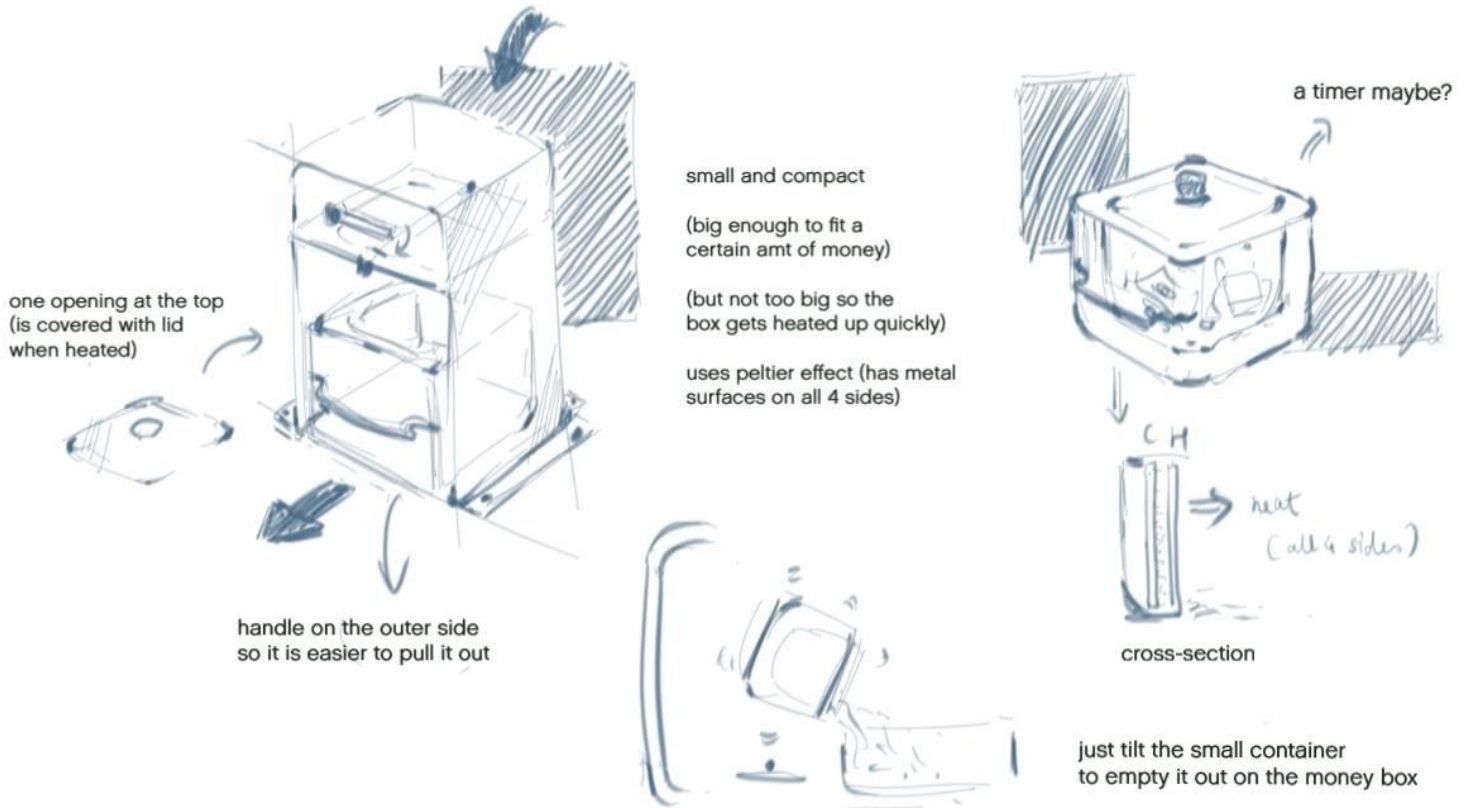
We also considered the privacy of the vendor's money box so we gave our money collector three sides so that customers will not be able to see where that money is getting stored.



2. Sterilisation box

The form starts with the basic form similar to the one at the top. The sterilization box is something that would be placed under the top tray. Different mech and forms are illustrated for the top are above. (the one in the sketch below is a basic form)

The box would itself be small and compact. As mentioned it should be big enough to collect enough money to be sterilized at once (maybe every 1-2 hours) but it shouldn't be too big or it'll take longer for the cabin/box to heat up. Based on the Peltier effect, the temperature that it would go up to, based on the voltage range that it would be exposed to



(which is 12V - 24V) would be around 70-80 degrees celsius. This temperature is enough to kill most of the germs, (the higher the temp, the more germs get killed).

Since this box uses Peltier effect it would require the box to be covered with hot metal on all four sides (and cold metal on the other sides) which is covered with an insulation of certain thickness (cross-section)

It also has a lid at the top which is not put when collecting money from the top, and once filled, the lid is to be put to capture the heat inside. Once the heating is done (which should take around 15 mins), we pull it out using the handle and then just tilt it to empty it out on their own money box/drawer.

The Other Half

Okay, so by now the first half of the transaction is done which was getting money from the customer and now the other half would be the shopkeeper arranging the notes and giving the change to the customers. And it will be nice if this part can also become contactless but it will come with a lot of complications and expensive mechanisms.

- So here we decided assumed that as he is not coming in contact with dirty money and whatever money he got is now sterilised, he can do the other half of the transaction which is giving the change to the customer by himself.

Thank you,