COFFEE MAKER

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REVIEW-1

INTRODUCTION

There is truly nothing better than a perfect cup of coffee in the morning. But not all coffee maker are the same. That's where a smart coffee machine can help you. With the best smart coffee makers, you can brew at specific temperatures for a specific amount of time, so you'll get the perfect cup every time.

ORIGINAL MODEL

A coffee maker has become essential for all coffee lovers nowadays. They help in preparing a cup of coffee even before one gets out of bed! Nowadays, Different models, shapes, and brands are available in the market- One cup coffee maker/Single serve, Coffee Brewer, Drip coffee maker, French Press etc which provide the users with different design and features.
 Availability of different flavors to meet personal tastes and preferences ;"Simply cut, drop and add water" and such easy to use features ; it's ability to save time, efforts and money of the user; ability to control the temperature of your coffee and measure the quantity of coffee the user requires and all of it at one click of a button, makes it a must buy for all.

This machine described below brews the perfect coffee, creamy lattes and cappucinnos using coffee pods and has a milk and a water chamber to help with froth and brewing respectively. It also has adjustable temperature dials so that the user can choose the temperature of his drink based on their own convenience.

TARGET AUDIENCE

With coffee representing a lifestyle as much as a simple beverage, today's consumers want it all – taste, convenience and cost efficiency. But the most important aspect is time consumption. Nowadays, people want coffee to be ready while they get up from their bed and rush to their work. Thus, The smart coffee maker generally targets the working class that is men and women in the age group 20 to 40.
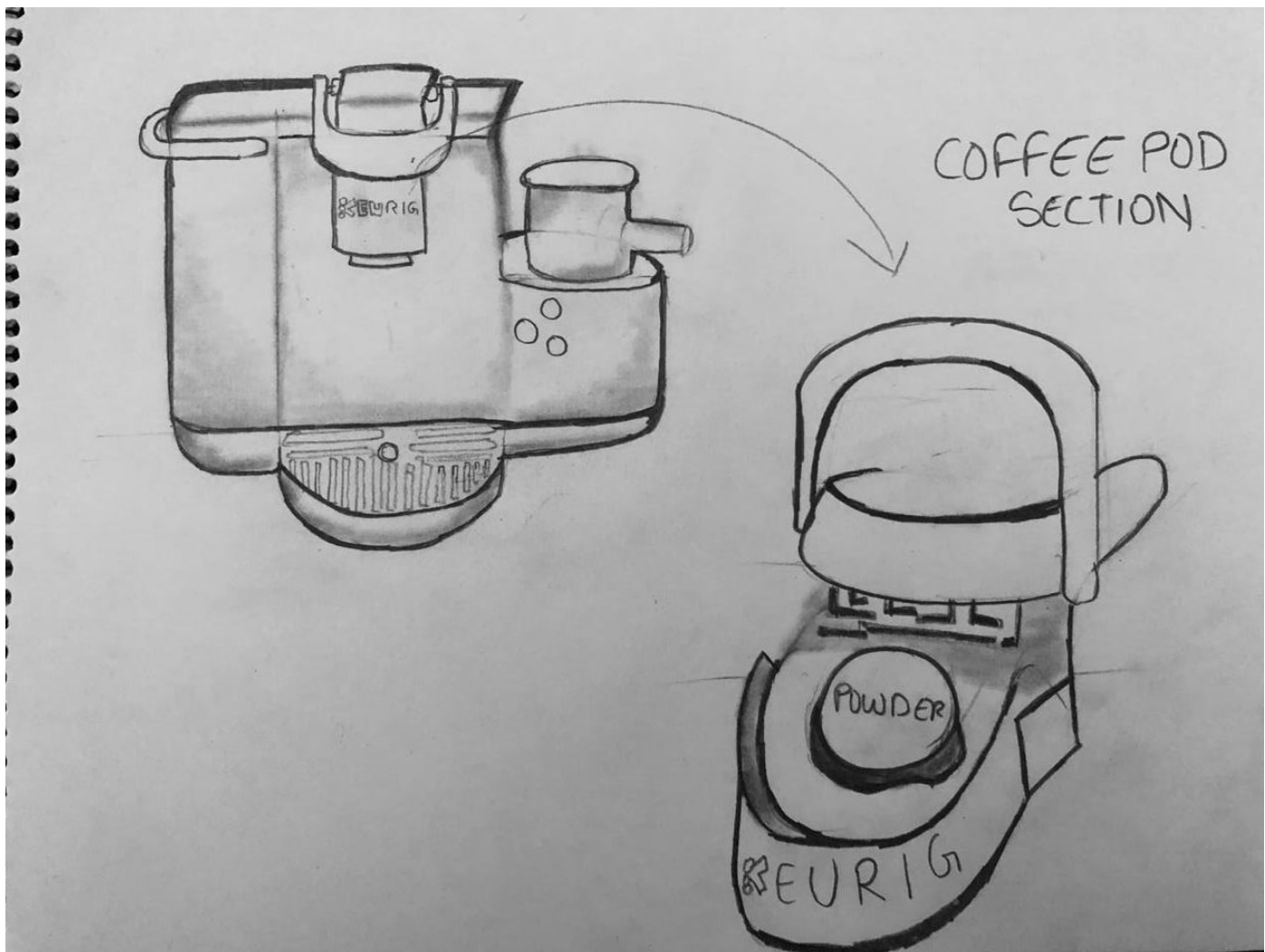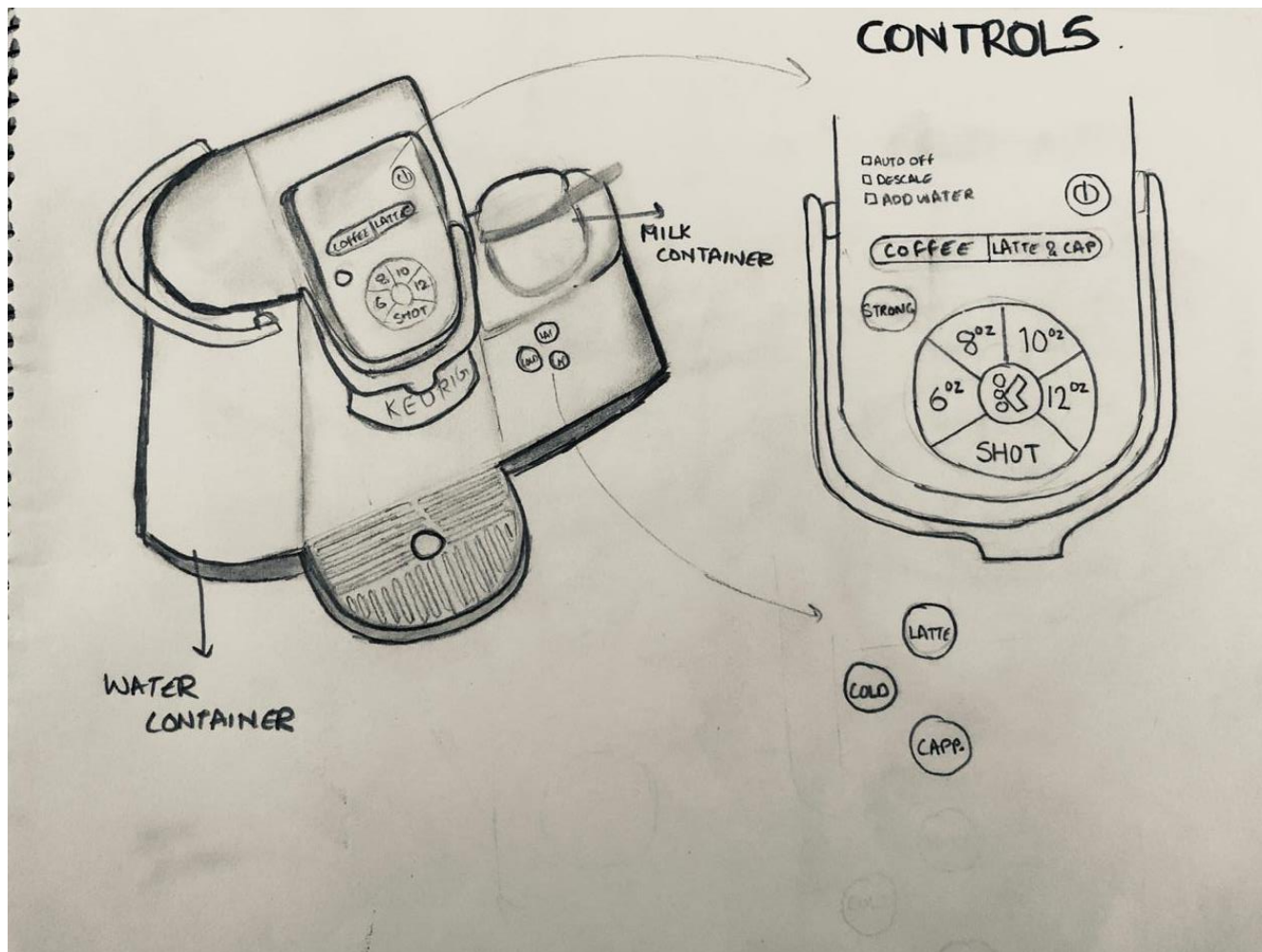
LIMITATIONS

This demand has spurred a flood of investments and innovation in this space, delivering smarter coffee machines. However there are a lot of limitations still left which might give some difficulties to the users. These are:

1. The measuring unit for the weight of a cup of coffee is generally mentioned in ounce(oz) in majority of the coffee machines. The main problem that arises is that ounce is not used as a measuring scale worldwide. For people to understand the amount of coffee to be served, one needs to put in measuring quantity which is understood by people all over the globe.

2. Generally in most of the coffee makers one does not get to know about the amount of time required or time left to make desired coffee the user wants.

3. Some users are having challenges with the longevity of this device. The coffee machine regularly will remove coffee oils and other dirt that collect on the espresso parts with time. Such debris contaminates the brew to make it unnecessarily bitter. If not properly washed from time to time it reduces efficiency of the device. Now the working class does not have that much time to clean the device internally and change filters. The users have to spend on

repairs and replacements since the machine will not be working perfectly. The efficiency thus decreases and gets added in the list of problems for the user.

ORIGINAL MODEL DESIGN

COFFEE POD
SECTION.

POWDER

KEURIG

CONTROLS

AUTO OFF
DESCALE
ADD WATER

COFFEE | LATTE & CAP

STRONG

8oz | 10oz

6oz | 12oz

SHOT

LATTE

COLD

CAPP.

MILK CONTAINER

WATER CONTAINER

MODIFIED MODEL

We understand the difficulties the users would face over a simple coffee machine and with the only motive being utmost customer satisfaction, the following changes can be done in the model:

1. For a normal user, a coffee is generally measured by the number of cups a user wants to drink. Thus For people to understand better, we changed the button pad labels to

the number of cups the maker would serve at once. The cup would be of a standard size used around the world (250mL). Hence, its easier for everyone to use it.
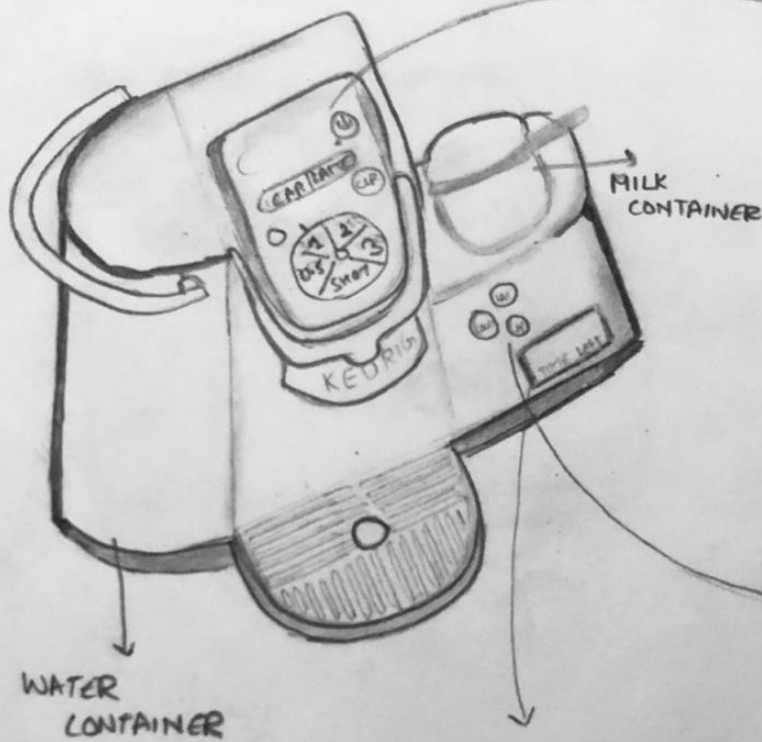
2. For people to get the estimated time for a coffee to be made so that they can complete other errands at that time, we are

providing with a digital screen which provides the user with the estimated time for the type of coffee they require.

For example. if the user requires cappuccino latte, the device would show 3-4 minutes for the coffee to be made and also display the amount of time left for the coffee to be ready.

3. One can improve the longetivity of the device by the Flushing process in which the hot water will clean the internal parts by removing coffee particles stuck to the corners of the machine. Thus we have added another button called 'clr'. When the user clicks on the button after every serve, hot water flushes from an internal pipe to all the parts inside (eg. Filters) and removes all the unwanted debris. The dirty contaminants gets flushed out with the water in the pipe outside the machine thus making it clean and ready for the next serve. This increases the life span of the device.

REVISED MODEL DESIGN

MODIFIED DESIGN

CONTROLS

MILK
CONTAINER

KEURIG

WATER
CONTAINER

AUTO OFF
DESCALE
ADD WATER

C.APP. | LATTE

STRONG

CLR

AUTOMATIC
CLEANING
OF
FILTER

0.5 | 1 | 2 | 3
SHOT

no. of
cups
served

ESP.

COLD

HOT

TIME LEFT   (CLOCK)
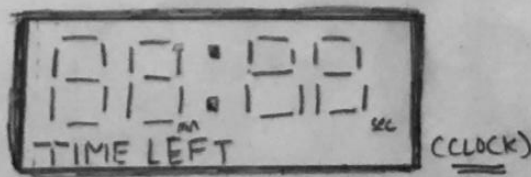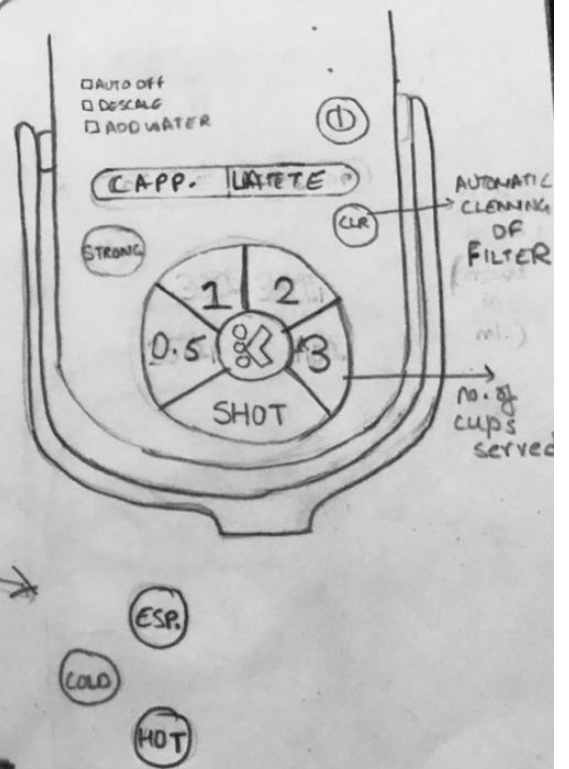
A DIGITAL SCREEN SHOWING
HOW MUCH TIME WOULD A SELECTED DRINK
TAKE TO BE PREPARED.

REVIEW-2

FUNCTIONALITY 1: *Adding components in a coffee maker*

0. **Adding Components**
1. **Plug in the coffee maker.**
2. **Add a coffee filter in the filter basket.**
3. **Measure out the coffee beans and put it in the filter.**
4. **Measure the milk and water according to taste.**
5. **Pour the measured amount in the milk container and water tank respectively.**

TASK ANALYSIS DIAGRAM

```
                    ┌─────────────────────┐
                    │ 0.                   │
                    │ Adding Components    │
                    └──────────┬──────────┘
                               │
  ┌──────────┬──────────┬──────┴──────┬──────────┬──────────┐
┌──────────┐ ┌──────────┐ ┌──────────┐ ┌──────────┐ ┌──────────────┐
│ 1.       │ │ 2.       │ │ 3.       │ │ 4.       │ │ 5.           │
│ Plug in  │ │ Add a    │ │ Measure  │ │ Measure  │ │ Pour the     │
│ the      │ │ coffee   │ │ out the  │ │ the milk │ │ measured     │
│ coffee   │ │ filter   │ │ coffee   │ │ and water│ │ amt in the   │
│ maker    │ │          │ │ beans    │ │          │ │ resp.        │
│          │ │          │ │          │ │          │ │ containers   │
└──────────┘ └──────────┘ └──────────┘ └──────────┘ └──────────────┘
```
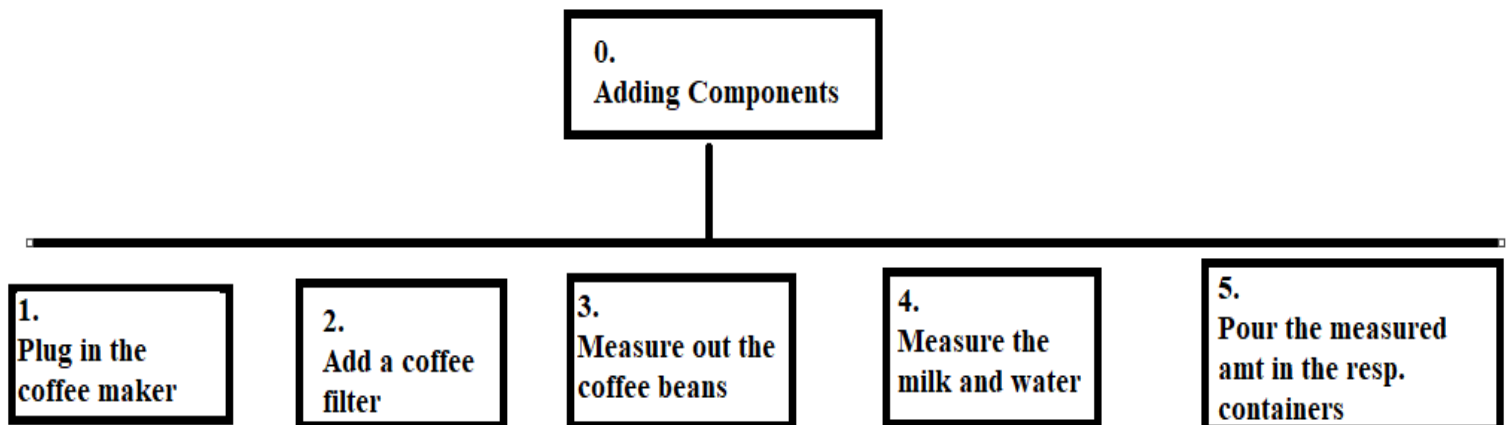
FUNCTIONALITY 2: *Selecting the type of coffee*

0. **Select type of coffee**
1. **Look at the button options in the control panel.**
2. **Select the type of coffee**
   2.1 Latte
   2.2 Espresso
   2.3 Capp.
3. **Select the choice of coffee to be made**
   3.1 Strong

TASK ANALYSIS DIAGRAM
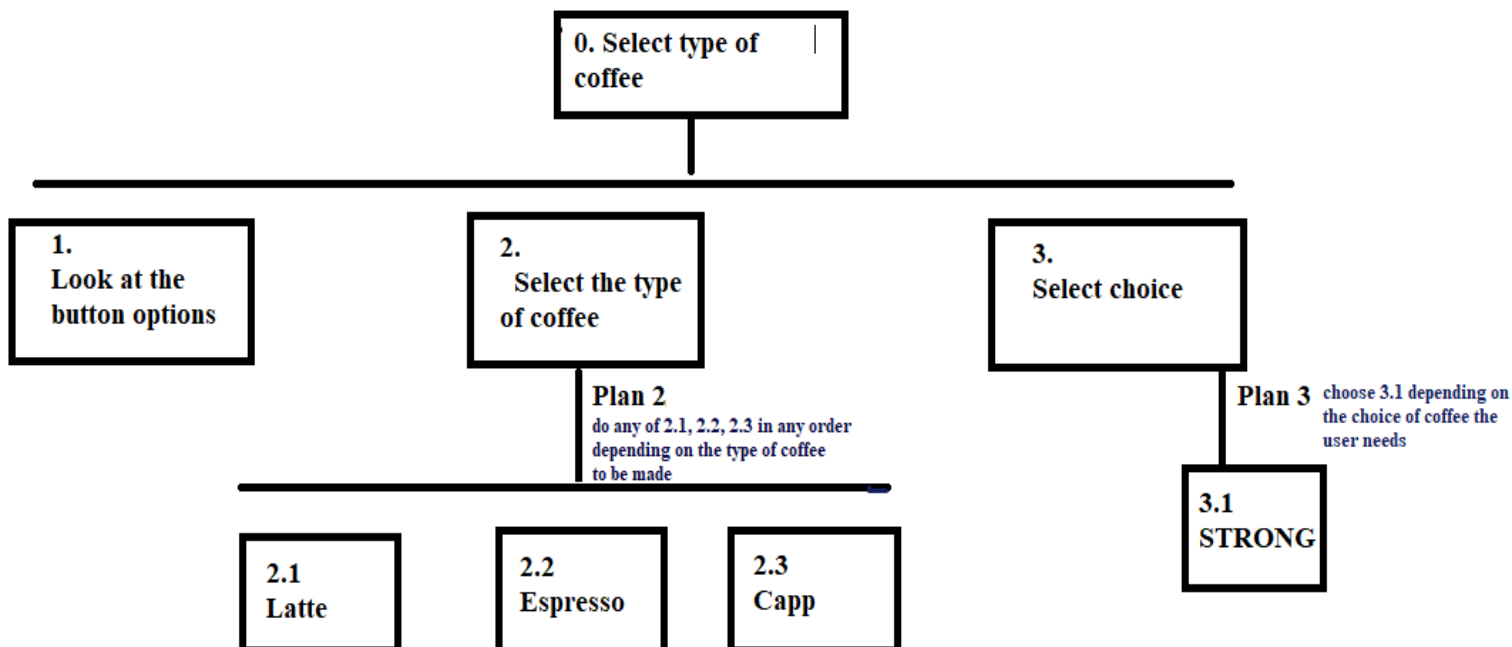
```
                    ┌─────────────────────┐
                    │ 0. Select type of   │
                    │ coffee              │
                    └─────────────────────┘
                              │
   ┌──────────────────────────┼──────────────────────────────┐
   │                          │                               │
┌──────────────┐    ┌──────────────────┐         ┌──────────────────┐
│ 1.           │    │ 2.               │         │ 3.               │
│ Look at the  │    │  Select the type │         │ Select choice    │
│ button options│    │ of coffee        │         │                  │
└──────────────┘    └──────────────────┘         └──────────────────┘
                              │                             │
                    Plan 2                        Plan 3  choose 3.1 depending on
                    do any of 2.1, 2.2, 2.3 in any order            the choice of coffee the
                    depending on the type of coffee                 user needs
                    to be made
                              │                        ┌──────────┐
   ┌──────────┬───────────────┴──────────┐             │ 3.1      │
┌────────┐ ┌──────────┐ ┌──────────┐                   │ STRONG   │
│ 2.1    │ │ 2.2      │ │ 2.3      │                   └──────────┘
│ Latte  │ │ Espresso │ │ Capp     │
└────────┘ └──────────┘ └──────────┘
```
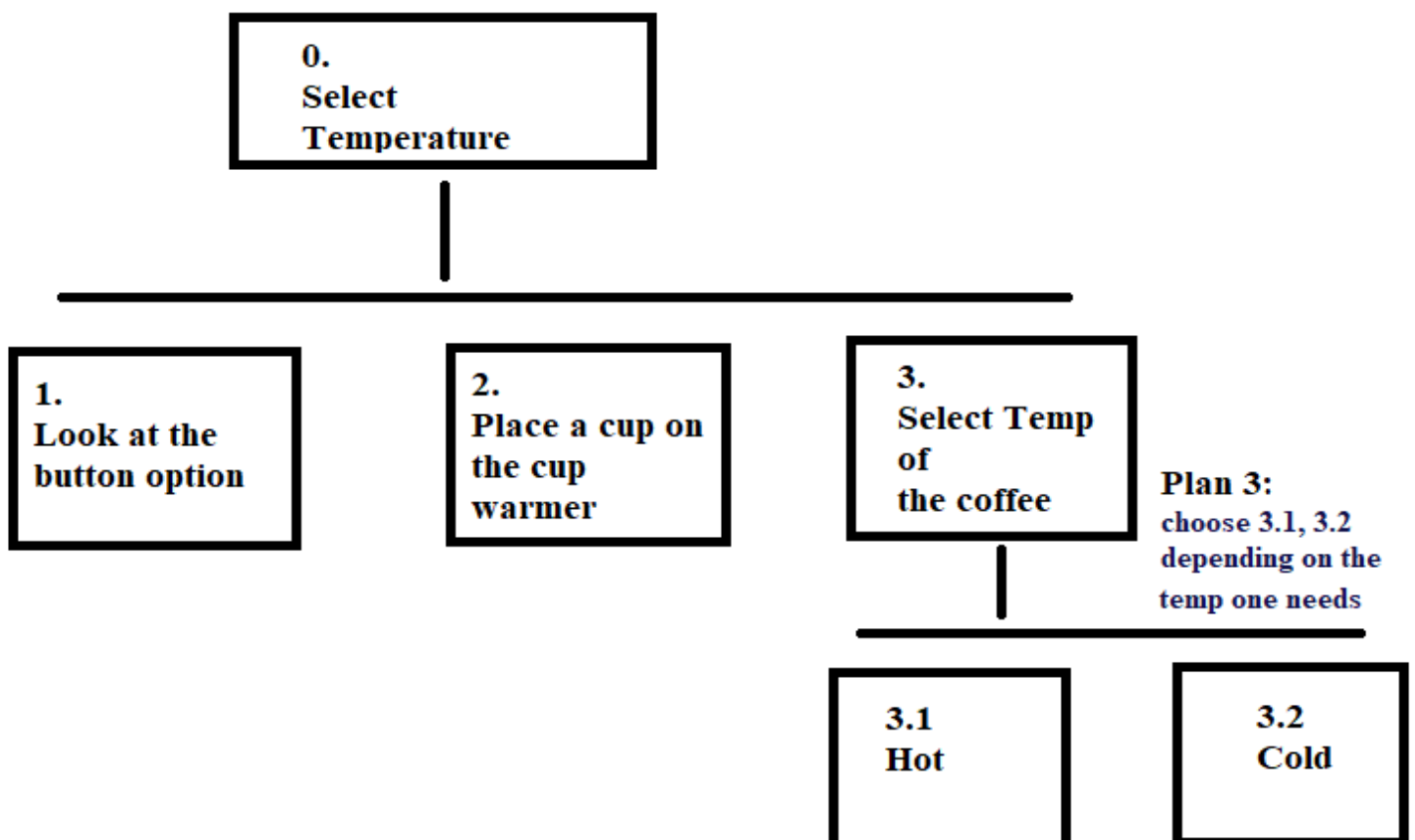
FUNCTIONALITY-3: *Select Temperature*

0. Select Temperature
1. Look at the button option in the control panel.
2. Place a cup on the cup-warmer
3. Select temp of the coffee
3.1 Hot
3.2 Cold

TASK ANALYSIS DIAGRAM

```
                    ┌─────────────────┐
                    │ 0.              │
                    │ Select          │
                    │ Temperature     │
                    └────────┬────────┘
                             │
     ┌───────────────────────┼───────────────────────┐
┌──────────────┐   ┌──────────────────┐   ┌──────────────────┐
│ 1.           │   │ 2.               │   │ 3.               │
│ Look at the  │   │ Place a cup on   │   │ Select Temp      │
│ button option│   │ the cup          │   │ of               │
│              │   │ warmer           │   │ the coffee       │
└──────────────┘   └──────────────────┘   └────────┬─────────┘
                                                    │
                                         ┌──────────┴──────────┐
                                    ┌──────────┐         ┌──────────┐
                                    │ 3.1      │         │ 3.2      │
                                    │ Hot      │         │ Cold     │
                                    └──────────┘         └──────────┘
```

Plan 3:
choose 3.1, 3.2 depending on the temp one needs
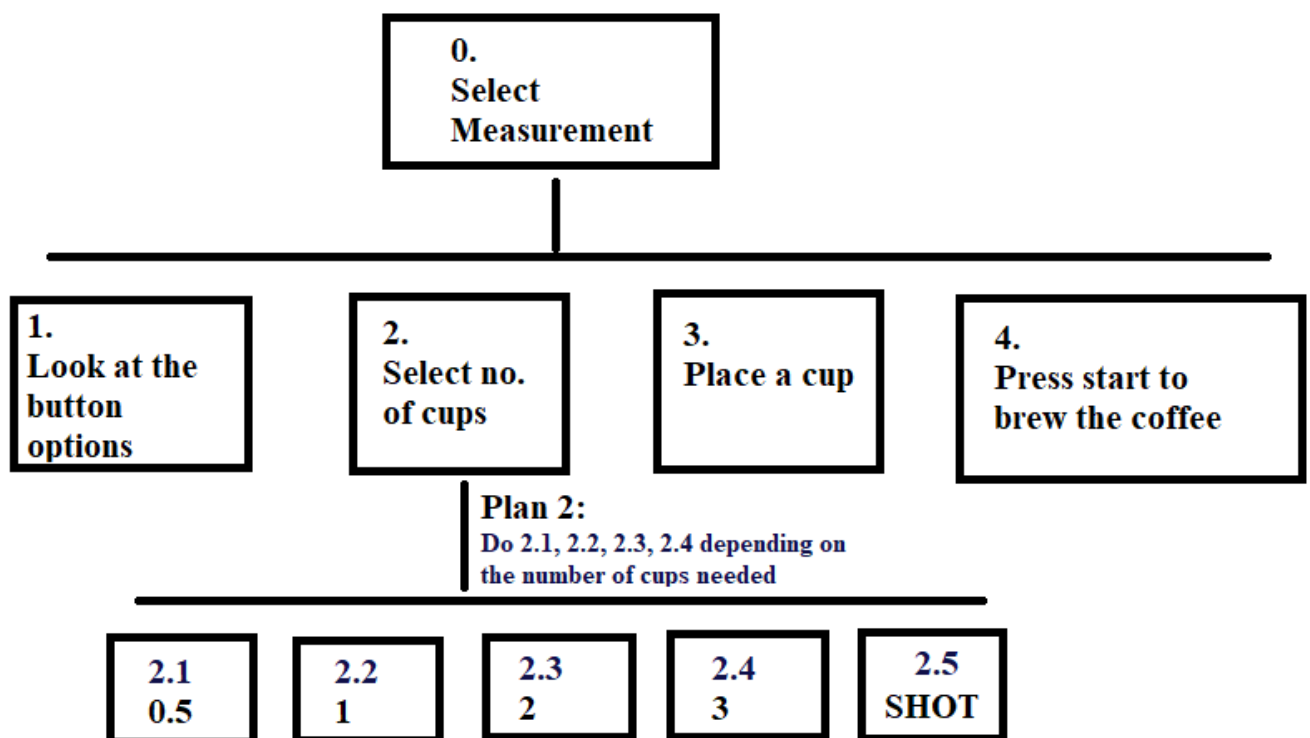
FUNCTIONALITY-4: *Measurement*

0. **Select Measurement**
1. **Look at the button options in the control panel**
2. **Select Number of Cups**
    2.1 0.5
    2.2 1
    2.3 2
    2.4 3
    2.5 SHOT
3. **Place a cup**
4. **Press start to brew the coffee**

TASK ANALYSIS DIAGRAM

```
                    ┌──────────────────┐
                    │ 0.               │
                    │ Select           │
                    │ Measurement      │
                    └──────────────────┘
                             │
   ┌─────────────┬───────────┴───────────┬──────────────┐
┌──────────┐ ┌──────────┐ ┌──────────┐ ┌──────────────┐
│ 1.       │ │ 2.       │ │ 3.       │ │ 4.           │
│ Look at  │ │ Select   │ │ Place a  │ │ Press start  │
│ the      │ │ no.      │ │ cup      │ │ to brew the  │
│ button   │ │ of cups  │ │          │ │ coffee       │
│ options  │ │          │ │          │ │              │
└──────────┘ └──────────┘ └──────────┘ └──────────────┘
```

Plan 2:
Do 2.1, 2.2, 2.3, 2.4 depending on the number of cups needed

```
┌────────┐ ┌────────┐ ┌────────┐ ┌────────┐ ┌────────┐
│ 2.1    │ │ 2.2    │ │ 2.3    │ │ 2.4    │ │ 2.5    │
│ 0.5    │ │ 1      │ │ 2      │ │ 3      │ │ SHOT   │
└────────┘ └────────┘ └────────┘ └────────┘ └────────┘
```

FUNCTIONALITY-5: *Clr*

0. **Select Clr button.**
1. **Wait for the screen to display-"Your coffee is ready"**
2. **Remove cup from the cup warmer**
3. **Press Clr.**
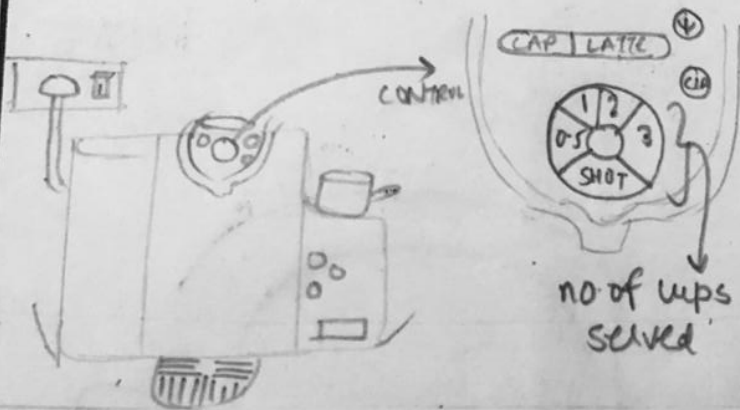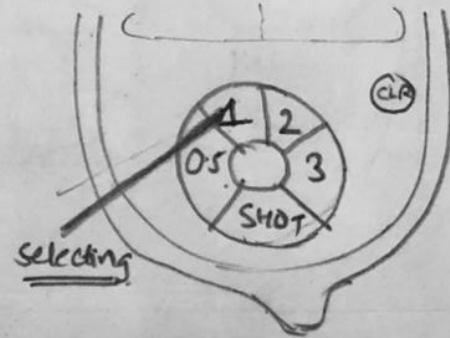4. **Switch off the device**

TASK ANALYSIS DIAGRAM

```
                    ┌─────────────┐
                    │ 0.          │
                    │ Select Clr. │
                    └──────┬──────┘
                           │
  ┌────────────────────────┴─────────────────────────────┐
  │                    │              │                   │
┌─────────────┐  ┌──────────┐  ┌────────────┐  ┌──────────────┐
│ 1.          │  │ 2.       │  │ 3.         │  │ 4.           │
│ Wait for    │  │ Remove   │  │ Press clr. │  │ Switch off   │
│ display     │  │ Cup      │  │            │  │ the          │
│ to print-   │  │          │  │            │  │ device       │
│ "your       │  │          │  │            │  │              │
│ coffee is   │  │          │  │            │  │              │
│ ready"      │  │          │  │            │  │              │
└─────────────┘  └──────────┘  └────────────┘  └──────────────┘
```

CHART NOTATION

```
                        ┌─────────────────────────┐
                        │   make a cup of coffee   │
                        └─────────────────────────┘
                                     │  Step 0
```

| 1.
Plug in coffee-maker | 2.
Add coffee filter to filter basket | 3.
measure coffee powder and add it in filter | 4.
add milk and water in their resp. container | 5.
Select Options | 6.
Place a cup | 7.
Press start | 8.
Wait for display | 9.
wait till coffee is brewed | 10.
Press clr to flush | 11.
Switch off coffee maker |

| 5.1
Select type of coffee | 5.2
Select temp | 5.3
Select amount |

STORYBOARD FOR SELECTING NO. OF CUPS

(1) LOOK AT BUTTON OPTIONS.

CONTROL

CAP | LATTE

CLR

0.5 1 2 3
SHOT

SELECT

no. of cups served

(2) SELECT NO. OF CUPS.

CLR

0.5 1 2 3
SHOT

Selecting

(3) PLACE A CUP. DEPENDING ON OPTION CHOOSED
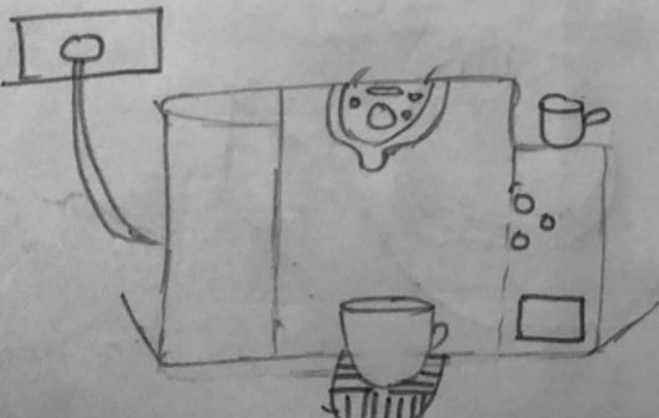
(4) START.

Start
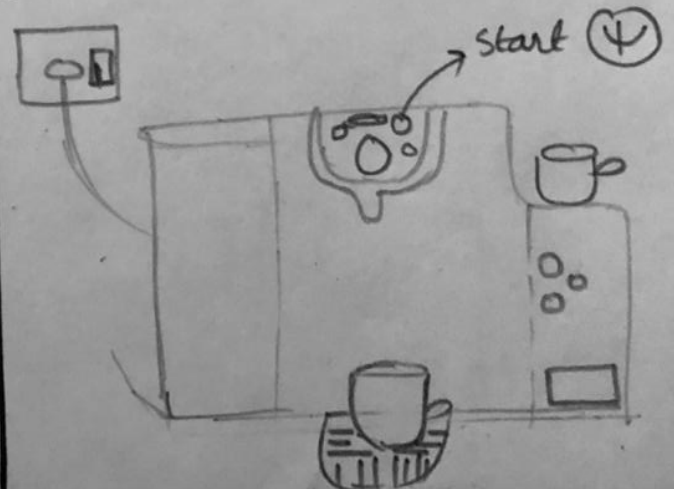
STORYBOARD FOR SELECTING TYPE OF COFFEE

AFTER ADDITION OF MILK, WATER & COFFEE

LOOK AT OPTIONS

Looking

OPTIONS

CAP LATTE

STRONG

ESP.
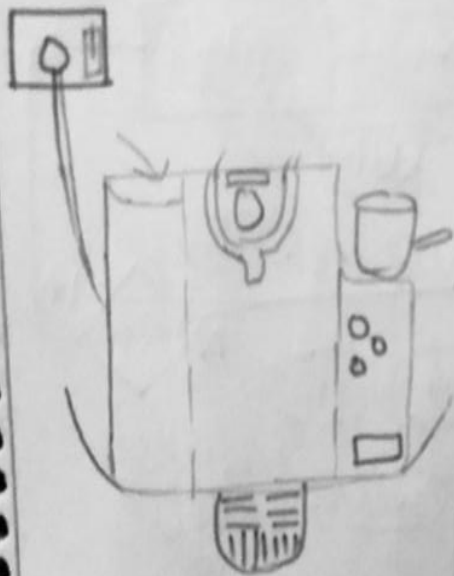
OPTIONS { CAP LATTE ESP. STRONG }
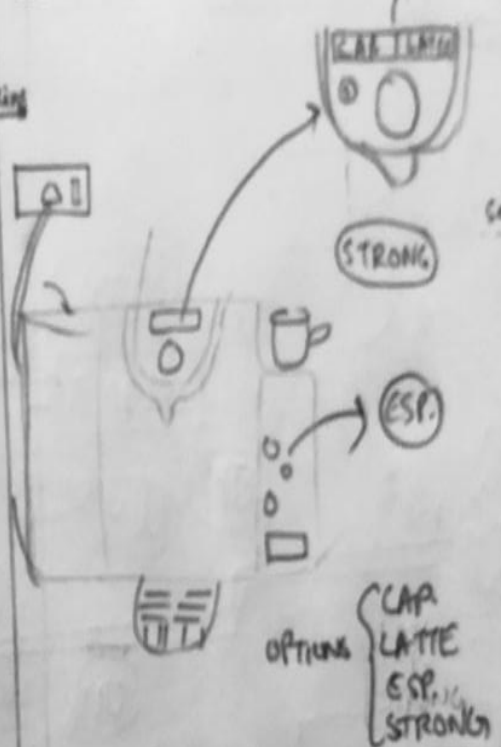
SELECT THE CHOICE (STRONG OR NOT)

STRONG

C
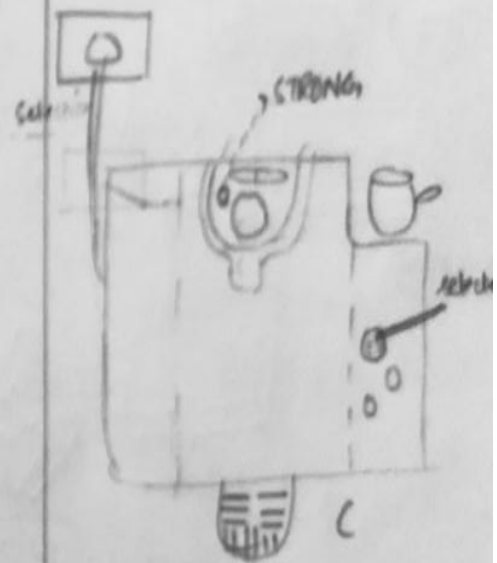
COGNITIVE WALKTHROUGH

- **ACTIVITY- USING THE CLR BUTTON TO CLEAN THE MAKER**

  UA 1: Press the 'CLR' button

  SR 1: The system internally starts flushing water through the filter and starts clearing process

  UA 2: Place a container to collect the residue

  SR 2: The system stats pouring out the residue matters through the main nozzle

  UA3: Plug the coffee maker out

  SR3: system stops.

  Question 1: Is the effect of the action the same as the user's goal at that point?

  Ans. The "CLR" button initiates the flushing process. When the user clicks on the button after every serve, hot water flushes from an internal pipe to all the parts inside (eg. Filters) and removes all the unwanted debris. The dirty contaminants gets flushed out with the water in the pipe outside the machine thus making it clean and ready for the next serve

  Question 2: Will users see that the action is available?

  Ans. The user will see the residue being flushed out from the system in the container they place.

UA-1	PRESS THE 'CLR' BUTTON
UA-2	PLACE CONTAINER
UA-3	PLUG OUT THE DEVICE
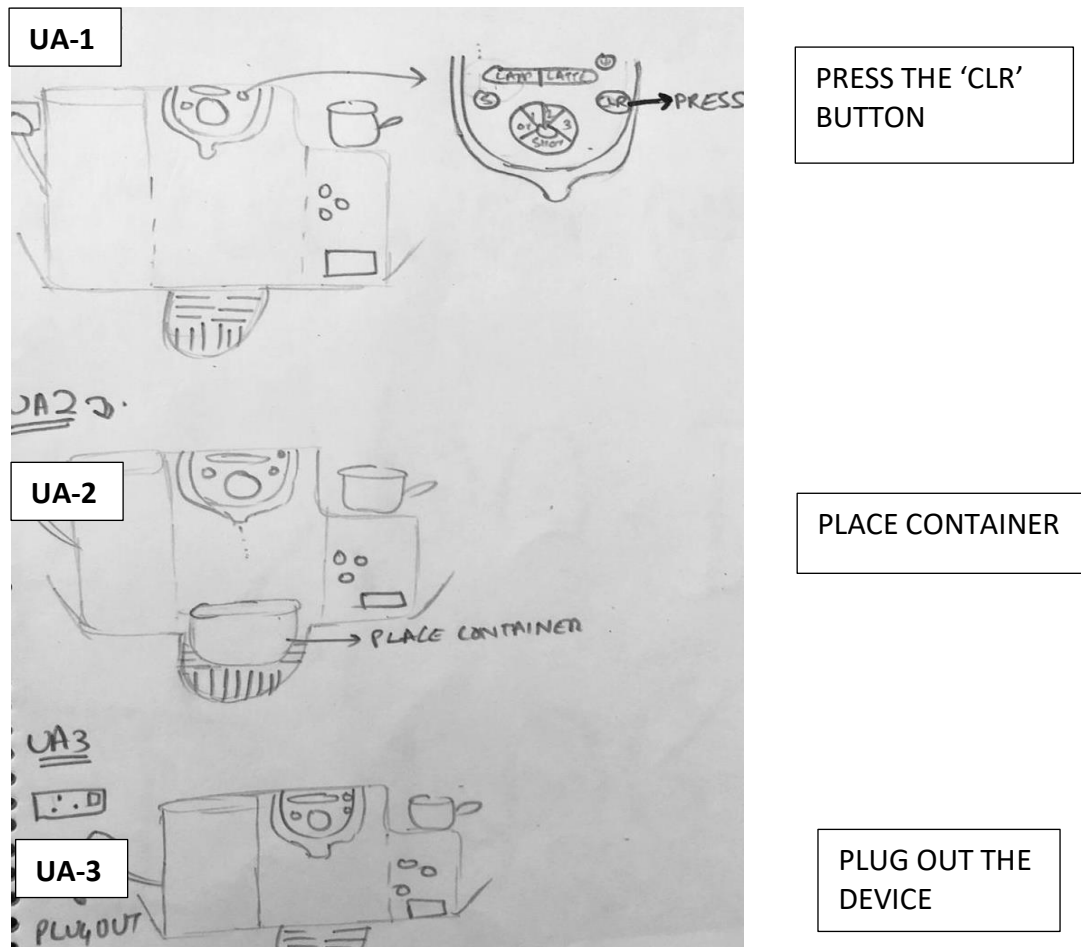
- **ACTIVITY- SELECTING THE NUMBER OF CUPS ON COFFEE and POURING IT**

  UA 1: Press the option of the amount of cups you want. (0.5,1,2,3,shot)

  SR 1: The system internally brewing the particular amount using the supplies in it.

  UA 2: Place a cup or cups to collect the coffee and press start brewing

  SR 2: The system starts the brewing the coffee and pours it in the cup

Question: After the action is taken, will users understand the feedback they get?

Ans. Once the action is taken the screen will display- "your coffee is ready". Also a beeper is placed which will start blinking and make a beeping noiseto inform the user that the coffee has been made. Thus we can assume that the user would recognize these as indicating successful completion of the first action.

UA-1

PRESS THE OPTION

UA-2

PLACE CUP AND PRESS START
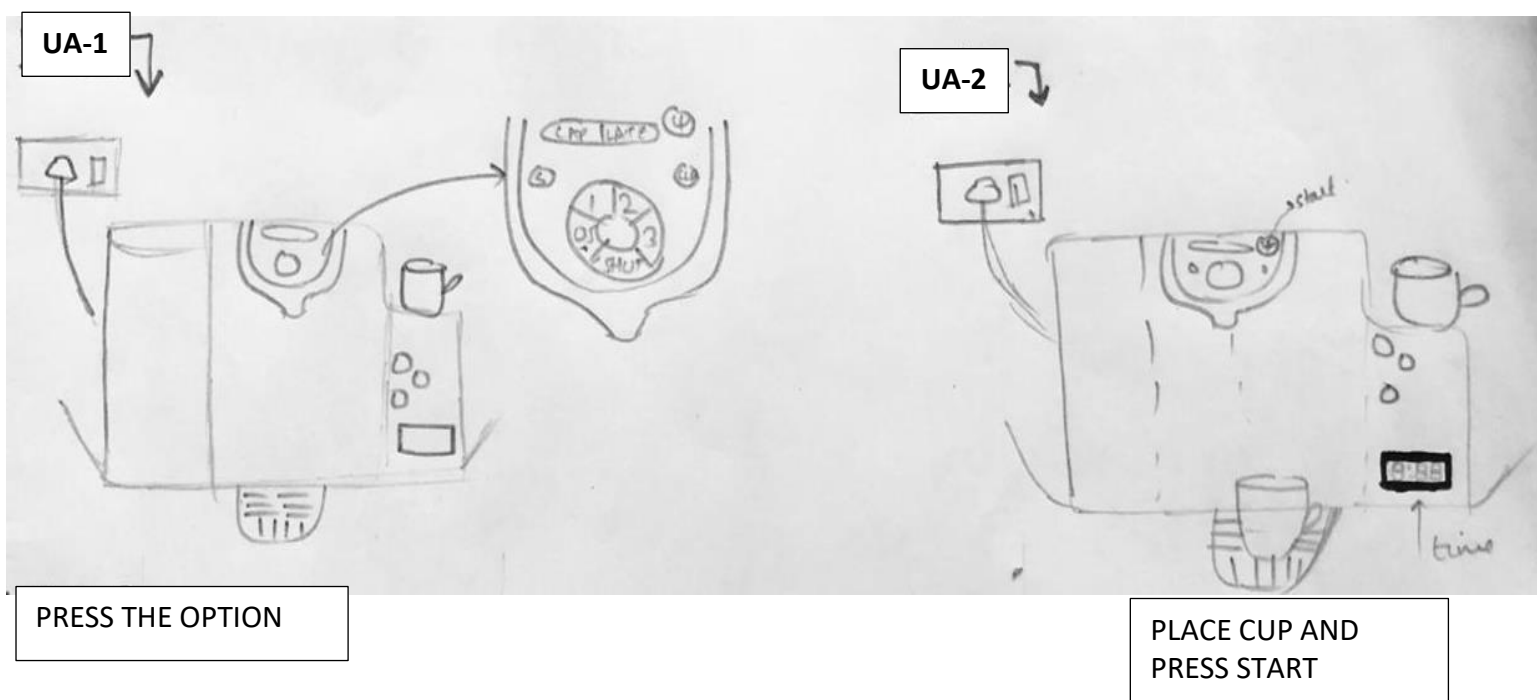
INPUT DEVICES-

1. **Solenoid Valve**- It's a valve that releases the brew pressure.
2. **Indicator light**- Used for LED screen to showcase the time left for coffee to be ready.
3. **Temperature sensor**- to measure the temperature of coffee.
4. **Capacitive sensors**- to measure the quantity of coffee.
5. **Control Panel**- Various buttons to be provided so that the user can make specific cup of coffee the way they like.
6. **Cup Warmer**- Warms cups when needed.
7. **Power Cable**- For power to be generated in the machine.
8. **Grinding coarseness regulator-** Regulates the amount of grinding the coffee needs according to the user.
9.
   a. **Steam Valve**- A valve connected between the wand and the flexible pipe provides the possibility to regulate the flow of steam.
   b. **Steam Button**- To control the steam valve.

OUTPUT DEVICES-

1. **LED screen**- Which showcases the time left for coffee to be made.
2. **Buzzer**- A light blinks when coffee is ready with a beep sound.

3. **Coffee nozzle (delivery pipe)-** from which coffee is poured in the cup.
4. **The pipes dispensing the milk, water and foam into the coffee machine-** These pipes are attached to the milk and water containers and as soon as milk and water is poured in the container, the pipes start delivering them to the coffee filter where the outlet of this pipe lies.
5. **Steam Wand/ Steam Spout**- built in steam wand, for frothing milk to make a creamy cappuccino.

COMPARE AND CONTRAST ALTERNATIVES

- **SOLENOID VALVE**- 2 way valves function in just two ways- inlet and outlet. Water is supplied under pressure to the inlet side of the valve. When the coil is activated, the pressurized water or steam is allowed to pass, and exits the outlet side of the valve.

3 way valves function nearly the same way, they also include a discharge to relieve any pressure in the system when the valve is deactivated. These are most commonly used in group heads, and this discharge is where the backflush soap exits

- **INDICATOR LIGHTS-** The main choice is color either red or green, weather is has a chrome bezel and electrical connections. Thus one can use both pilot lamps and led control lamps. Pilot lamps are cheaper.

- **TEMPERATURE SENSOR**-Initially the temperature sensor spring was made of the Ni–Ti alloy , but later it was replaced by a small Ni–Ti–Cu spring because of its large force difference between high and low temperatures. Additionally, the use of an Ni–Ti–Cu spring lowers the cost.

- **CAPACITVE SENSOR-** the capacitive sensor can be attached to the container for coffee beans in this place, so that this sensor could serve, at least, signal presence/absence of coffee in this place, which is the threshold value below which there is still sufficient coffee to produce

- **CONTROL PANEL-** The control panel consists of buttons (eg. Clr, Amt, Temp etc.). One alternative is that instead of buttons we can use a rotary dial or a temperature knob so that the user can have their particular coffee the way they like it.

- **CUP WARMER-** We can make it eco-intelligent. Switch On and Switch Off button can be provided so that it would warm the cup only when the user needs it. If not switched off it will automatically switch off after 5-6hrs. One more design alternative is that instead of having the cup warmer on the machine where the final cup is placed to get the coffee we can have separate base where the cup-warmer is inbuilt so that more than one cup can be warmed together. The shape would be circular to increase the area.

- **POWER CABLE-** The pin can be a two pin as the product is shipped worldwide. Using a universal AC power cord should be preferred more than any cheap regular one which may create difficulties for the users worldwide. Cable length can be increased for more conveniences.

- **GRINDING COARSENESS REGULATOR-** Instead of providing them with the knob which may mess up a cup of coffee and make it an undrinkable mess, we can put buttons which indicate how the user wants the coffee to be grinded. The coarseness may range from Coarse to Medium Fine to Fine. When a user would push any one of the buttons, the machine would automatically combine the grind type and consistency and provide with properly extracted coffee.

- **STEAM BUTTON-** Instead of a steam button we can have a steam knob. It would be easier for the users.

- **STEAM VALVES**- Valves can also be in the newer machines solenoid operated, in which the solenoid valve operates the steam valves and is controlled via and electronic switch. Other than that it can be either rotational or lever

- **LED DISPLAY/SCREEN-** The LED screen which is used to inform the user about the time left for a coffee to be made, Instead of LED we can also use LCD, as it is cheaper and may provide us with change in display design as well as the color of the screen.

- **BUZZER**- Instead of a beep buzzer circuit, the music buzzer circuit can be provided by the utility model can solve the defects in the prior model of monotonous sound, poor tone quality and it has the advantages of euphonic sound and good tone quality.

- **COFFEE NOZZLE-** One alternative is that instead of long cylindrical pipe drip design the coffee nozzle is shaped into, it can also be shaped into conical cone like structure.

- **PIPES DISPENSING MILK AND WATER (inside the coffee container)**- We can use stainless steel instead of steel for the material of the pipes so that they do not get affected by the chemical reactions. Also, a charcoal filter can be added at the end of the water pipe to make the coffee taste better.

- **STEAM WANDS**- Espresso makers for homes can be provided with froth assist steam wands. The simple version of this is an additional pipe either of metal or plastic which slides over the wand like a sheath and has