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Smart Tea Maker

Nikhil Chatap[1]Kumar Aman[2]Suprit Gaikwad[3] Prasad Ahire[4] Prof. N.B.Totla[5]
[(1,2,3,5)] Department of Mechanical Engineering,MIT Academy Of Engineering, Alandi(D).SPPU University
[4] R&D ,Vehicle Design, Force Motors Akurdi, Pune
Corresponding Author: Nikhil Chatap

ABSTRACT
The tea vending machine right now is in use for only commercial purpose, it has some drawbacks regarding the maintenance, cost as well as less convenient while operating. Hence we have come up with our Smart Tea Maker, with some additional features where we have tried to overcome the problem.
In order to make it useful for disable people we made the design accordingly. All types of users and their requirements are taken into consideration while designing.This 'Smart Tea Maker' will also save your time and money up to some extent as well. This will allow us to operate from some distance as Wi-Fi module has been fitted in it. Hence we will be able to control its functionality from our android devices and just a press of a button will results in a making of a cup of tea.
Keywords-*Operating distance, affordable to all, low maintenance, small size, micro-controller.*

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I. INTRODUCTION:

Motivation:

- For old-age and disable people it is very difficult to make a cup of tea when they are alone.
- For student also it is time consuming to go to the canteen every day.
- Current tea maker is very expensive with high maintenance.
- One cup of tea make my day.
- Interconnectivity in real life applications.
- The real life applications of the knowledge that we have achieved.

Objectives and Scope:

- To make it cheaper and better.
- To have availability of various smart features like Wi-Fi connectivity and automated functionality.
- To have an easy operations and small maintenance as well.
- To be faster and safer in comparison to existing one.
- To have a well-defined button and stirring systems.
- To have a proper utilisation of by-products such as tea wastes, heat loss and steam.

Statement of the problem:-

- For old-age and disable people it is very difficult to make a cup of tea when they are alone.
- For student also it is time consuming to go to the canteen every day.
- Current tea maker is very expensive with high maintenance.

II. LITERATURE SURVEY:

During the course of the survey, two distinct type of tea and Coffee vending machine have been observed:

- Household vending Machine
- Commercial vending Machine

The working of these appliances is quite simple. The appliance consist of a container made of plastic in which Tea or coffee premix powder is placed according to the requirement of the user. The appliance consists of a reservoir for storing water, this reservoir is connected to the heater. The quantity is of water is measured according to the requirement by the user and when the user switches on the machine then water gets heated and pours into the container thereby providing the required beverage. The machine offers options like Strong

Tea/Coffee, Regular Tea/Coffee, Mild Tea/Coffee and Sugar free Tea/Coffee. However, it is observed that this vending machines requires a huge maintenance cost. All the type of the user are not taken into the consideration while designing of the product. The most common observed defect during the survey is chocking of the flow pipes.

The vending machines available in the market has many inbuilt features involved in it, provides a computerized automatic system like in Nescafe, Bravilor Bonamat, Bella. But, however it comes to the household purpose use, the cost of the product is not affordable to all because of advanced features involved in it which may not useful for household purpose up to large extent such as separate heating system of water and milk in Bravilor Bonamat . Tea vending machines in the market provide an only one interface to interact with the user whether it is physical switch board or a screen touch system. The user must have to go to the vending machine each time to give a command to make tea/coffee. A physically disabled person has to do the same activities if he is alone at home and wish to have a cup of tea/coffee.

System Requirements and design:

Hardware requirements:

1) Mechanical:

Sr. No.	Components	Dimensions
1	china clay plate	20mm (diameter)
2	Steal vessel	17mm(diameter),14.5mm(height)
3	Steal storage container	20mm(diameter),6mm(height)
4	Plastic container	8mm(12mm)
5	Steel plate	7mm
6	Steel pipes	10mm,20mm
7	Square steal pipe	Sides-20mm
8	Plastic pipes	8mm
9	Metallic strips	10cm,5mm
10	M-seal	
12	Glue gun	
13	Cello tapes	

2) **Electrical:**

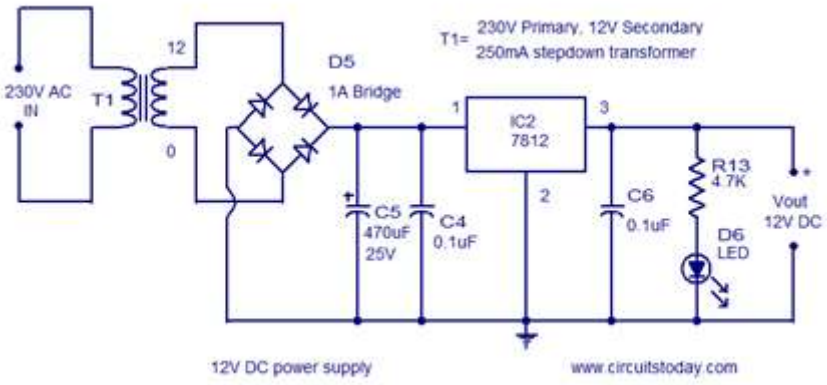
Sr. No	Software
1.	CATIA V2
2.	Eagle PCB Design
3.	Arduino UNO
4.	Bluetooth controller module
5	Circuit IO
6.	Lucid Chart

3**) Software:**

Sr. No.	Components	Specifications
1	Arduino Uno board	Microchip ATmega328P microprocessor 32 KB of Flash memory, 2 KB of SRAM, and 1 KB of EEPROM
2	HC-05(Bluetooth module)	Frequency: 2.4GHz ISM band.
3	1298 motor driver module	5V **Drive** voltage: 5V-35V. Logical current: 0-36mA **Drive** current: 2A (MAX single bridge) Max power: 25W. **Dimensions**: 43 x 43 x 26mm
4	Relay module	Operating voltage 12V
5	step down transformer	230V-15V
6	IC 7812	12V Voltage Regulator

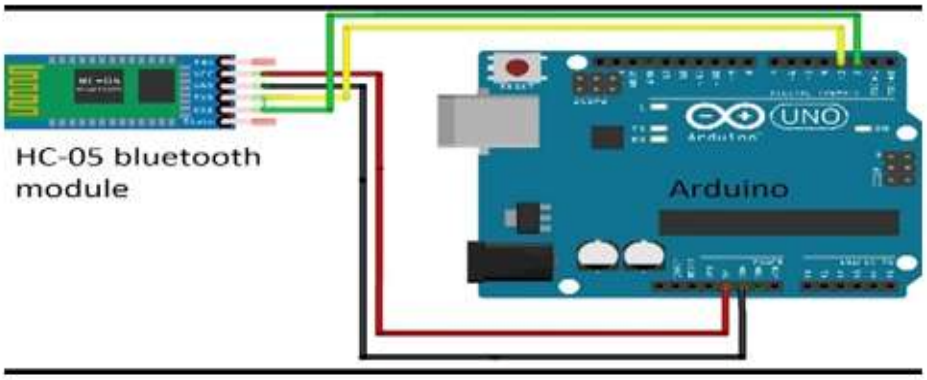
Connectivity Diagrams:

a) 12 V power supply:



12 V Power Supply Design

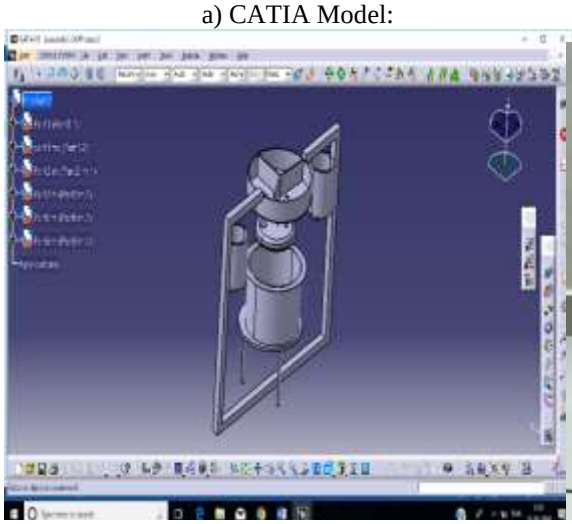
b) Arduino Uno connections with Bluetooth module:



Arduino UNO and Bluetooth connection

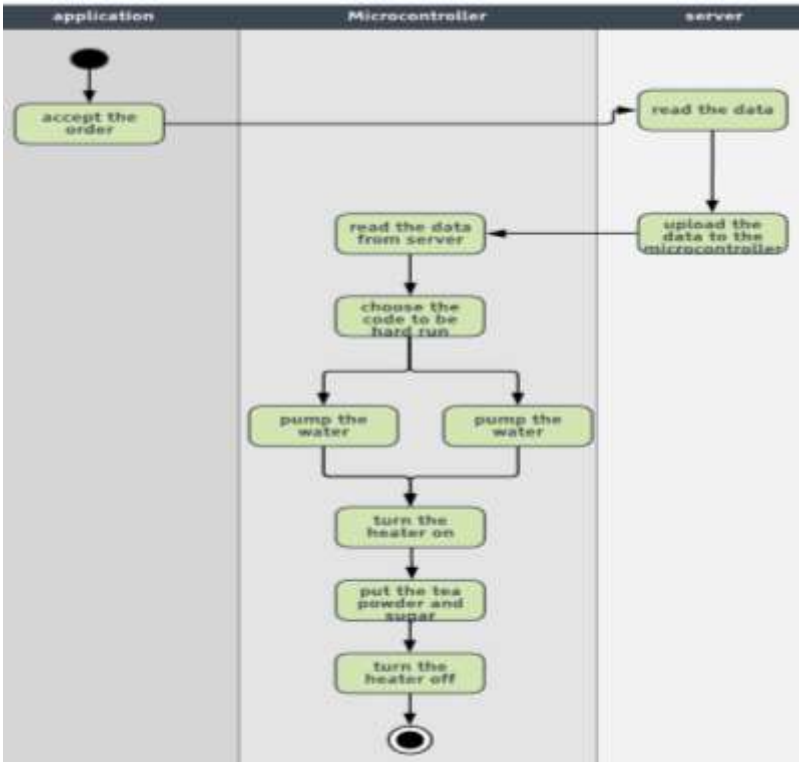
Design Diagrams:

a) CATIA Model:



b) Actual Model**:**

Activity Diagram:



Theory and Equation:

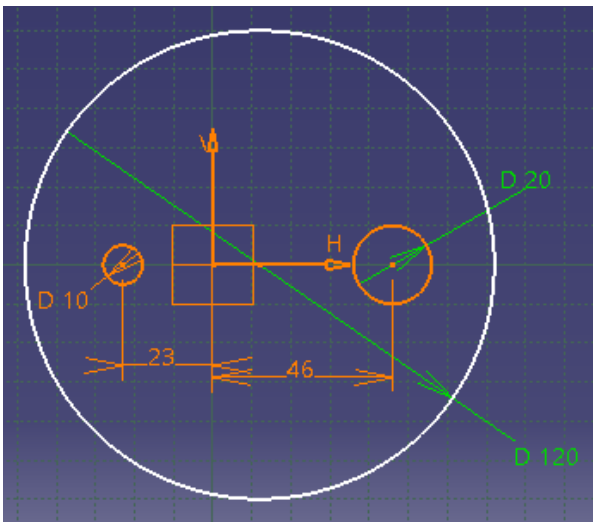
The working principle of Smart Tea Maker is very simple, as the mechanisms involved in it are simple. The working of the product is 'timing' oriented. All the steps are arranged sequentially as per the time only. In order to achieve this, major focus was given on the geometrical aspects of the product. Storage container is at the top for storing sugar and tea powder, two adjacent container are provided for milk and water storage.

DC- motor (12 V) is used to rotate the disc. As the disc rotates both the pipe gets open, for that the disc is eccentrically connected to the shaft of the motor. But the proportion of the ingredients are going to be different as the diameter of the pipes are different. For the calculation of the position of the shaft of motor on the disc, uses a following equation.

$s = r.\ \theta$ ….....equation (1)

Larger diameter: Smaller diameter=2:1

Distance between the centres of pipe on disc was 6.9cm



As the whole mechanism is time based, so to obtain the fixed quantity from both container,

Discharge = Volume / time ……..equation (2)
All the opening timing gets standardize by obtaining analytical and practical solutions.

III. RESULT:

After doing certain experiments, result for two cup of tea has been finalized. Result is finalized by tasting the taste of the tea made.

Results for two cup of tea:

Both the pumps of milk and water should need to on for 20 sec to have a required proportion of both. Then, heating coil gets on immediately, after heating for 4 minutes of time, the disc rotate and allows the sugar and milk to get into the vessel. The opening time of a disc is 1.9 seconds to have a required proportion. The heating is simultaneously going on. After 4 minutes the power supply to the circuit gets break up as it is a part of program only.

This was the result obtained for two cup of tea, by doing a lots of experiments and testing the tea made , finalized the results for 1 cup , 3 cup and 4 cup of tea as well and put their timing accordingly into the program. The key lines in the programming of two cup of tea are mentioned below:

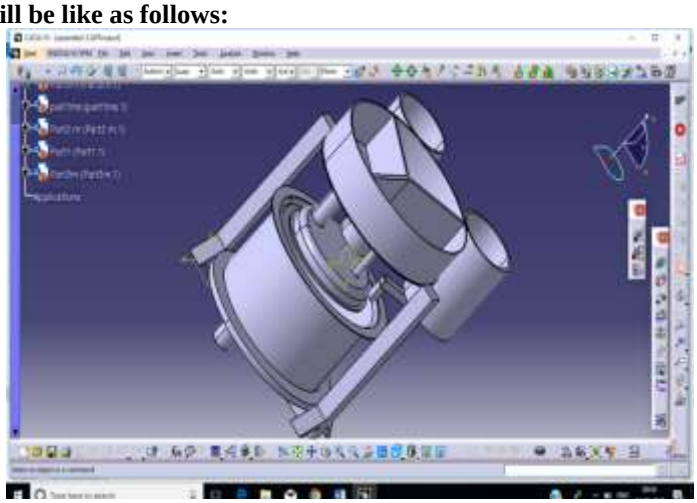
```
digitalWrite(13,HIGH);//turn the water and milk pumps on.
delay of 20 sec i.e. water and milk allows into the container during this time.
digitalWrite(13,LOW);//turn the water and milk pumps off.
digitalWrite(6,LOW);//turn the heating coil on
delay (240000);
analogWrite(9,200);//initiate the flow of tea powder and sugar
delay(1900);
digitalWrite(6,HIGH);//terminate the flow of tea powder and sugar
```

IV. CONCLUSION AND FUTURE SCOPE:

Smart Tea Maker has a big advantage that it can be used at a household as well as a commercial purpose. It occupies less space as compared to the current tea makers. It provides a facility of operating it from a distance as well, for a physically disable person it is very useful as it is observed that most of the physically disable person are not able to make a cup of a tea of their one. Time and proportion is very crucial factor here, for acquiring good result lots of experiment is required. Selection of proper material is one of the key design aspect as here in this case, heating is there so the use of plastic material is avoided.

In future scope, our main focus will be on size reduction of the overall design. The second one is the selection of the proper material in design. Here, in current model hydrophobic material is not used. Use of hydrophobic material will not only serve the purpose efficiently but also makes the cleaning process easier. It is observed that in the product developed, the discharge is getting reduces as the height of the ingredient in the container goes down. To overcome this, conical shape container will be used. The furnace used has some disadvantages it occupies a large space, high power consumptions and less durable. So the use of electrical kettle will help to overcome this problem. The implementation of physical Switch provides another facility to operate which makes the product more user-friendly. In order to make the product cheaper, manufacturing procedures will also be taken into consideration

The futuristic model will be like as follows:



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