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From Concept to Creation: Developing a Sugar-Level Adjustable tea-making and vending Solution

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INTRODUCTION & AIM

Experience a new era in tea preparation with our cutting-edge semi-automated tea making and vending machine. Designed to deliver top-quality tea without the need for constant human oversight, our innovation aims to revolutionize the way tea is brewed and enjoyed. With a focus on enhancing tea quality while addressing concerns about sugar consumption in instant beverages, our machine offers customizable sugar levels and batch-wise preparation, accommodating up to four cups per batch. Utilizing advanced technology including a 64-bit microcontroller, temperature control system, and efficient heating mechanisms, our tea maker ensures quick and consistent results with every brew

METHOD

Here machine is basically consist of following components :

- **Heating unit**

Heating unit consists of 3 kW heater. it covers with $160 \times 120 \times 100\ mm^3$container. For heating unit 13 A is supply.

- **Mixing unit**

Mixing unit consist of mixing tea cup and mixer mainly. The mixer rotates at 180 rpm constant. A solenoid valve is attached to it for prepared tea liquid out. The mixer consists of $20 \times 30\ mm^2$,4 flaps which is made out of stainless steel.

- **Machine casing**

Main frame is fabricated with 0.8 mm thickness Zn coated sheet

- **Tea brewing method.**

Tea strainer use for the collect tea dust. Hot water comes from heater directly drop on to the tea strainer in equal time interval.. The strainer attaches to a stepper motor through a coupling. Tea dust removing after the using by the rotational movement of the tea strainer by the stepper motor.

- **Water transport system**

Water is transport in the machine using $12mm$ diameter silicon tubes.

- **Water supply hose**
- **Control panel**

This is located at the back side of the machine. It consists of main PCB attached to 64 bit microcontroller, 12 V 6.3 A DC power supply, 24V 10 A DC power supply, buck convertor, 5VDC Relay Module with Coupling Protection, Floatless Level Switch , Solid State Relay Module, 2 Phase Stepper Motor Driver , Industrial Relay 24 V, MCBs, RCCB 40A,30mA

- **Used tea dust removing tray**
- **Water in solenoid valve**
- **Water out solenoid valve**
- **Front door control unit**
- **Tea and sugar storing and conveying system**
- **Used tea dust collector**

The components was initially identified and designed by trial and error method. After that modification were done accordingly.

RESULTS & DISCUSSION

Figure 1 : 3D view of the tea machine

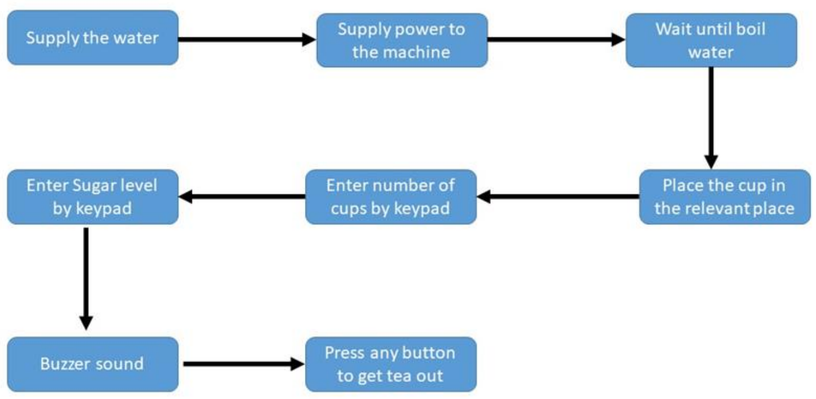

Figure 2 : Machine operation sequence

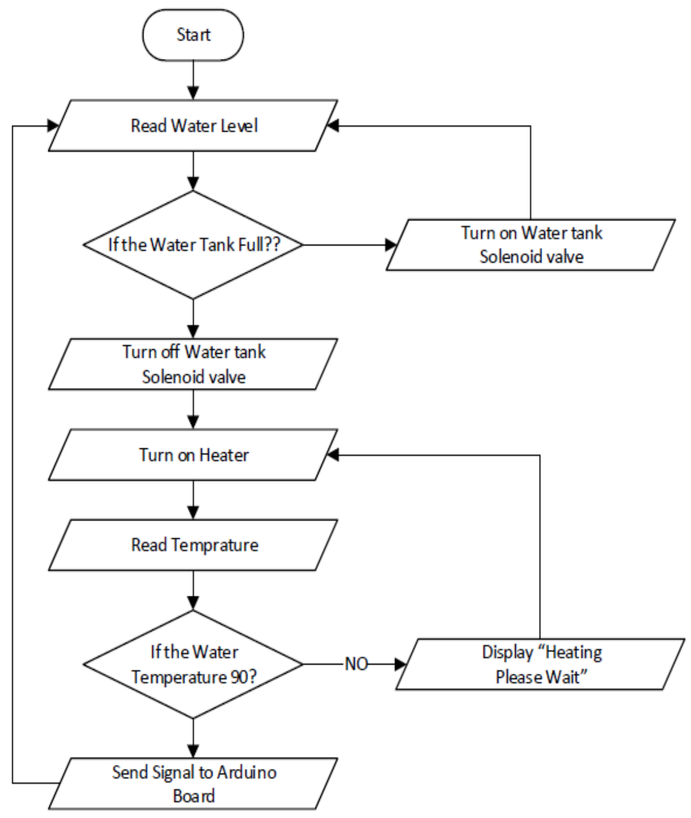

Figure 3 : Heating system operation sequence

CONCLUSION

After mixing is finished, customers can grab their personalized drink whenever they want. Here, the quality of the tea was defined by its taste and the color of the beverage. The test was performed by giving some sample cups of tea to a group of people and listing out their preferences on the taste and the color of them.

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FUTURE WORK / REFERENCES

With further development, this automated technology can be extended for versatile beverage preparation beyond tea, accommodating a variety of herbal beverage formulations.