# A Review Of Embedded System Based Coffee Maker Machines

**R.P.Karthik, S.Kavipriya, T.Kaushika, D.Magudeshwaran**

**Abstract:** Most people are loves to drink coffee/tea which is made by an ordinary coffee shop or coffee maker machine. Also, the coffee trade exceeds US $ 10Billion worldwide. The development of new modern hardware and software systems allows us to build an excellent coffee maker machine that satisfies customer needs. The Vending Machine is which delivers different products based on what the customer likes to drink. This kind of machine placed in shops, offices, institutes and various places where it required. It provides a wide variety of products in an automated process, without any manpower and easy to save precious time of humans in a fast-moving world. This paper compares different features like space, size, time to prepare the drink and how fast it works. The power dissipation of a vending machine is one of the major problems faced by the users. And the availability of the product is known only in some places not every. This is an automated product to create our day to day life more convenient. The product must be hygienic.

**Keywords:** instant coffee maker, smart tea maker, development in embedded system, customer requirement, power dissipation and market viability.

## I. INTRODUCTION

Beverages like tea and espresso are the most preferable drink by humans around the world. Employees at an MNC or noticeably small industry, if anyone likes to have a cup of their favored beverage daily. While an MNC can able to pay for the beverages ordered from their high-end canteens, a small office cannot buy. Small places of work depend on a roadside stall to fulfill their beverage requirements. Tea and espresso from these roadside stalls are of questionable quality [7]. The water used in these beverages should be from any tap, affecting the quality and taste of the drink. The cleanliness of utensils used in making these beverages can't be trusted can cause any effects. Another element that is definitely not possible to reflect on consideration is man or woman preferences. It is very hard for the stalls to cater to the special preferences of oneof a kind customers in an office. Some people would like sugar free tea, strong coffee, milk tea, etc. Also, the time that it takes for making the beverage is high and the distribution is a critical process. Same side tea and coffee drinks provide a lot of mentionable health benefits such as Boosts, Horlicks etc. physical performance, helps to burn fat, focus and stay alert, reduces risk of cancers, stroke and Parkinson's disease [8], etc..


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In the workplace every minute is precious, it could take a minimum quarter-hour for the beverage to reach the purchaser or office to refresh themselves. Maybe Tea and coffee vending machines can remedy this problem. However, tea and coffee vending machines reachable in the market nowadays are costly and bulky as said in reference [5]. Sometimes it consumes a high power supply.

## II. LITERATURE SURVEY

Vending machine technology company Vendon by reference [1] has teamed up with AT&T to enable a vending machine or coffee machine to remotely share its status in near-real-time via AT&T's cellular network. With the telemetry solution, companies such as vending machine owners or operators can gain automated data regarding how well each machine is stocked, how well it is operating, and when maintenance or supply workers need to pay a visit to a specific machine. The system employs a Vendon Internet of Things (IoT) telemetry box known as the vbox, as well as cloud-based software to manage the data. It is designed to help companies prevent vending machines from running out of stock and thereby missing sales, and also ensures that malfunctioning machines can be quickly serviced. The vending machine industry has been trending up year by year throughout the past five years, according to the two companies. Long-term forecasts show greater growth for the industry, but companies must compete with other retail offerings, such as brick-and-mortar stores and online ordering. Vendon's customers fall into two categories, according to AndreySergeyev, the firm's chief customer officer: vending machine companies for snacks and cold beverages, and those that make automated coffee machines. The customers ofVendon's coffee vending machine are operators who sell or rent their machines. The vending of products is a complex system. Some Companies can rent their machines and offer maintenance services. Because such services are, by nature, provided in remote locations, the companies face a challenge in managing their fleet of assets. Traditional machines that sell snacks, as well as cold and hot drinks, are restocked at regular intervals, based on calendar schedules. Vendon launched in 2009 in Latvia with an SMS text-messaging payment solution so that vending machine customers could

pay for products using their smartphone and bank account information, without requiring cash. Since then, the firm has been examining the market and discovering ways to make vending and coffee machines more intelligent. The company serves such customers as Latvia's King Coffee Service, Pelican Rouge, and Vending Land. Most vending machines track data, such as the machines' temperatures, for maintenance purposes, in addition to the number of purchase transactions that take place. But that information can only be accessed by a service provider physically visiting the machine. Recently, Sergeyev says, "People are starting to understand they need to make their machines smart—they want to be able to make decisions based on [near-real-time] data." As per the survey, a good coffee/tea will have the ingredients with the proportions for tea (Table 1) and coffee (Table 2) mentioned in the following table.

***Table 1**. Proportion for Tea*

| TEA | Premix | Water (PH 7) | Sugar | Milk |
|---|---|---|---|---|
| Regular | 3tsp | 100ml | 1tsp | *30ml |
| Strong | 5tsp | 100ml | 1tsp | *30ml |
| Mild | 2tsp | 100ml | 1tsp | *20ml |

***Table 2**. Proportion for coffee*

| COFFEE | Premix | Water (PH 7) | Sugar | Milk |
|---|---|---|---|---|
| Regular | 4tsp | 100ml | 2tsp | *40ml |
| Strong | 6tsp | 100ml | 2tsp | *40ml |
| Mild | 3tsp | 100ml | 2tsp | *30ml |

*Milk level varies based on milk fat and quality.

## III. METHODOLOGY

The working principle of Smart Tea Maker given by the reference [3] is very simple, as the mechanism is simple. Time-consuming for the working of the product is reduced. All the steps are arranged orderly as per the time used only. In order to achieve this, a major focus was given on the geometrical aspects of the product. The flow chart is shown in Figure 1

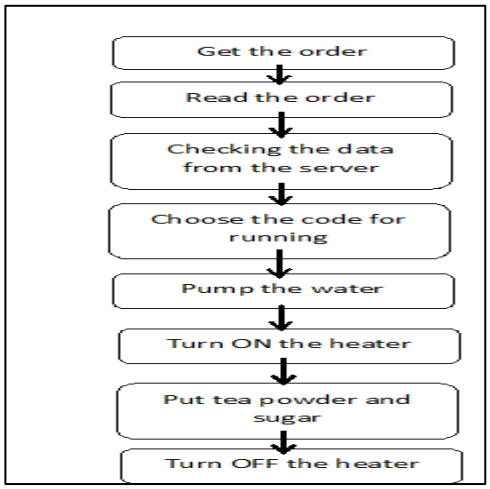


***Figure 1.**Flow chart*

A storage container is at the top for storing sugar and tea powder, two adjacent containers are provided for milk and water storage. Figure 2 shows the model design of the smart tea maker.

***Figure 2** Smart Tea Maker*

DC- motor (12 V) is used to rotate the disc. As the disc rotates both the pipe gets open the ingredient falls down, for that the disc is eccentrically connected to the shaft of the motor. But the proportion of the ingredients is going to be different as the diameter of the pipes varies. The calculation of the position of the shaft of the motor on the disc uses the following equation 1.

$$s = r.\theta \qquad \text{Equation (1)}$$

Larger diameter: Smaller diameter=2:1

Distance between the centers of pipe on the disc was 6.9cm

As the whole mechanism is time-oriented, so to obtain the fixed quantity from both containers,

$$\text{Discharge} = \text{Volume} / \text{time} \qquad \text{Equation (2)}$$

All the opening timing gets standardize by obtaining analytical and practical solutions. By using this formula the machine can be designed which reduces the time.

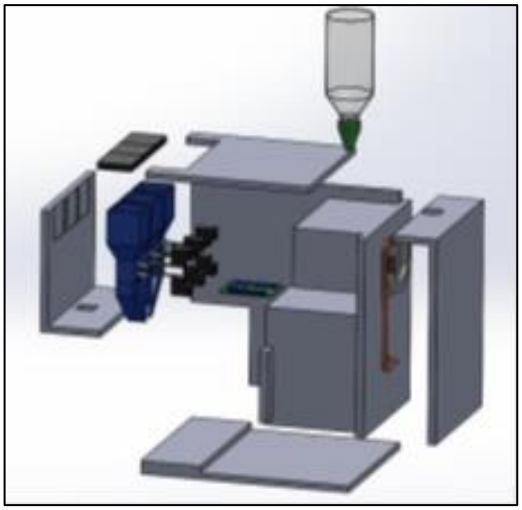

***Figure 3** Vending machine mechanical system*

Figure 3 shows the CAD design of the vending machine [6]. This machine provides options like types of drink what the

customer prefers, the thickness of the drink and sugar level as they required. This machine made up of food-grade steel use to prevent corrosion and it is easy to clean and maintain the Ingredient.

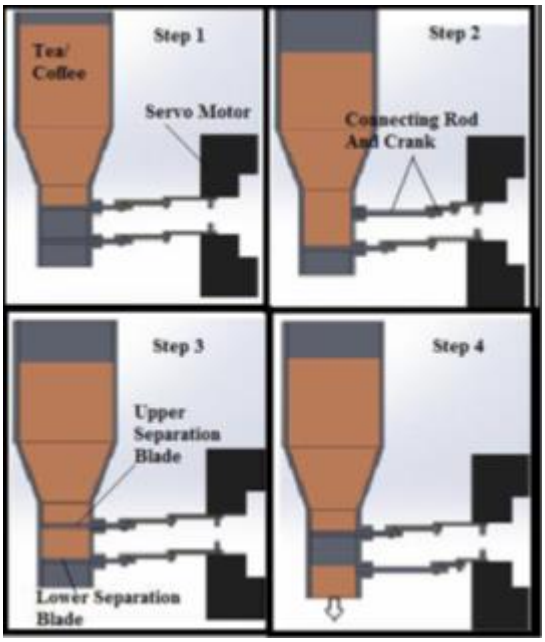


***Figure 4*** *Mechanical design for Tea/ coffee maker.*

Figure 4 shows the mechanical layout to show the opening of the valve to control the flow of the powder. The water is stored in the container. The water is heated by the heating elements where the temperature is monitored by the thermostat. The solenoid valve is opened and closed by using the servo motor which is controlled by Arduino microcontroller. Figure 5 shows the full setup of the coffee machine with RFID technology.

***Figure 5****Coffee maker setup*

To overcome the manual power for operations this machine was designed. This machine uses RFID technology [5] to store the details about the user in the database. First the person's details must be registered. The amount must be deposited for initial registration so that they can have coffee at any time they want. If the RFID card is scratched it checks whether the user is already registered or not. If the user is already registered it displays the name and balance available. Only if the balance is available the next step will be proceeded. The user will get the drink.

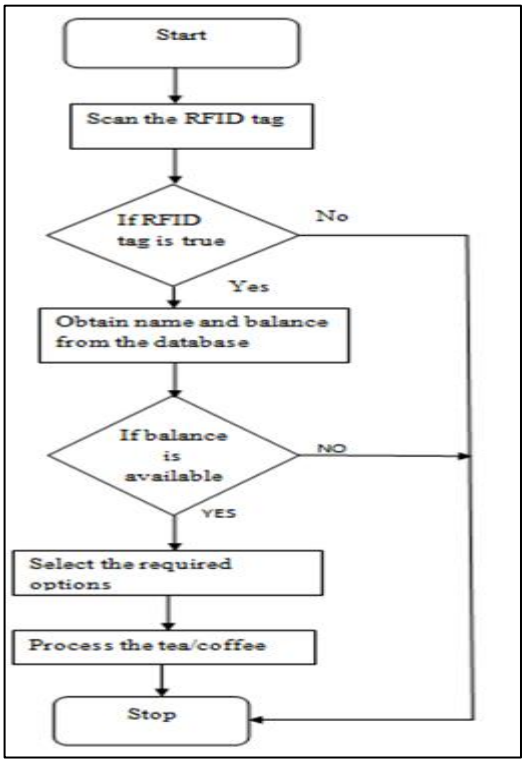


***Figure 5*** *Flow chart*

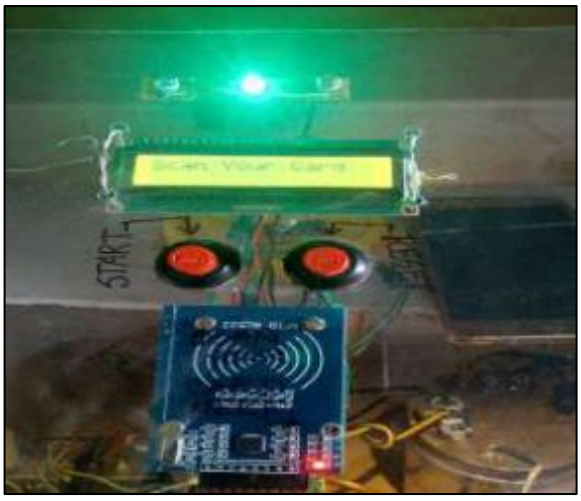


***Figure 6*** *RFID integrated with machine*

Pouring of Dry Coffee Mix to the Mixer Container is controlled by a mechanical valve or gate attached to the servo motor. An Ultrasonic Sensor senses the coffee dry mix level and starts the alarm & deactivates the system when the level is low. Inside the Mixer Container, the Mixer

Motor rotates to mix the coffee finally. Figure 4 shows the RFID integrated with the machine for cashless transactions. Then Submersible Pump2 pushes the coffee made in the Mixer Container to pouring it in the coffee cup from Mixer Container. Figure 5 shows the mechanical CAD design for tea/coffee maker.

## IV. RESULTS

After doing certain experiments with being Smart Tea Maker given in the reference [3], the result for 2 cups of tea has been finalized. The result is finalized by testing the taste of the tea made. Both the pumps of milk and water should need to on for 20 sec to have a required proportion of both. Then, the heating coil gets on immediately, after heating for 4 minutes of time, the disc rotates 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 to break up as it is a part of the program only. This was the result obtained for two cups of tea, by doing lots of experiments and testing the tea made, finalized the results for 1 cup, 3 cups and 4 cups of tea as well and put their timing accordingly into the program. The time taken by the machine for preparing the drink is reduced by using this method [3] According to reference [5], though there is a great scope to make automated appliances based on Arduino, eye-catching technological innovation has not been made yet. So we can implement the idea to make such appliances which will be based on Arduino& RFID in our daily life. This project can be used in restaurants, hotels, coffee shops where customers drink coffee on a daily basis or regular customers. It can also be used in industry houses where employers drink coffee or tea. Introducing Self Service Vending Machine (Coffee, Tea, and Snacks) to give 24*7 food facilities to the customers it reduces manpower and also increases the profit in case of used in shops. According to reference [6], the material used for making the vending machine is made up of food-grade material which keeps the ingredients more hygienic. This is designed in a great manner which also gives good structure to attract the customer. They have fixed many options according to the customer requirement.

## V.CONCLUSION

As per the reference [1], the primary causes of headaches for those in the vending business are an inefficiency in maintenance and stocking, and the need to maximize sales to compete with stores and online food retailers. They need to know the machine works and sell products properly and if it's broken, they need to know that. Every minute it's down costing you money. To recover this issue, the remedial action is periodic checking of the stock and updating it to the device owner and the person who maintains the device. As mentioned in reference [6], they have designed and developed a mini tea and coffee making machine which is capable of dispensing the required quality (taste) of beverage in less time. The powder separation mechanism used in this machine has certain advantages over the presently used screw extruder mechanism. For instance, it is less complex and is consistent in operation. The heating unit consumes less power, thereby reducing operating costs.

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