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MUG MAGIC - Design and Development of Low-Cost Mini Tea and Coffee Machine using AI-ML concepts

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Abstract
In this paper, the design and development of low-cost mini tea and coffee machine is being presented. The final year project work undertaken by us involves the Design and Development of Mini Tea and Coffee Machine . The aim of this project is to cater to the specific requirement of the consumer especially of small scale sector with the intention of providing the consumer with the option of selecting the types of tea/coffee he/she wants and also providing them option to select a suitable reservoir of water such as a 1 liters mineral water bottle thereby moving a step further of the machines which are available in the market for small scale organisations / industries / offices. In a fast-paced world, where time is of the essence, this mini machine offers a solution for those seeking a quick and high-quality beverage experience. This project encompasses the entire product development process, from concept ideation to final prototype. The project titled "Design and Development of Low-Cost Mini Tea and Coffee Machine using AI-ML concepts" introduces a novel approach to beverage preparation. This innovative system leverages Artificial Intelligence (AI) and Machine Learning (ML) technologies to create an affordable, compact tea and coffee machine that caters to individual preferences. The mini machine offers a user-friendly interface, allowing users to customize their beverages based on taste, strength, and other parameters. By employing AI and ML algorithms, the system learns and adapts to user preferences over time, delivering a tailored experience with each cup of tea or coffee. This project not only demonstrates the potential for technology to enhance convenience but also highlights the integration of AI and ML in everyday appliances. In summary, the project showcases a forward-looking concept that brings automation and personalization to the realm of beverage preparation, all at a low cost. It exemplifies the influence of AI and ML in redefining user experiences and convenience, hinting at a future where smart, affordable appliances cater to individual tastes and preferences. The work carried out is the seventh semester main-project by the students of Electronics & Communication Engineering under the guidance of the faculties supervision (guide).

Introduction

The Mini Tea and Coffee Machine project represents a fusion of technology, design, and culinary delight. This endeavor aims to create a small, user-friendly appliance that can quickly brew a wide variety of teas and coffees, ensuring that individuals can savor their favorite beverages with minimal effort and maximum enjoyment [1]-[5]. Whether you're a busy professional rushing to a morning meeting or a student burning the midnight oil, this mini machine promises to cater to your caffeine cravings or tea preferences with ease. Beverages like tea and coffee have become a part of a daily routine of people around the world. Employees at an MNC or a relatively small industry,

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everyone wants to have a cup of their favorite beverage daily [6]-[10]. While an MNC can afford to have beverages ordered from their high end canteens, a small office cannot. Small offices depend on a roadside stall to fulfill their beverage requirements. Tea and coffee from these roadside stalls is of questionable quality [11]-[15]. The water used in these beverages could be from any tap, affecting its quality. The cleanliness of utensils used in making these beverages cannot be trusted. Another thing that is virtually impossible to consider are the individual preferences. It is very difficult for the roadside stall to cater to the different preferences of different customers in an office. Proposed block-diagram of the project work is shown in the Fig. 1 [16]-[20].

Block-Diagram of the Project work

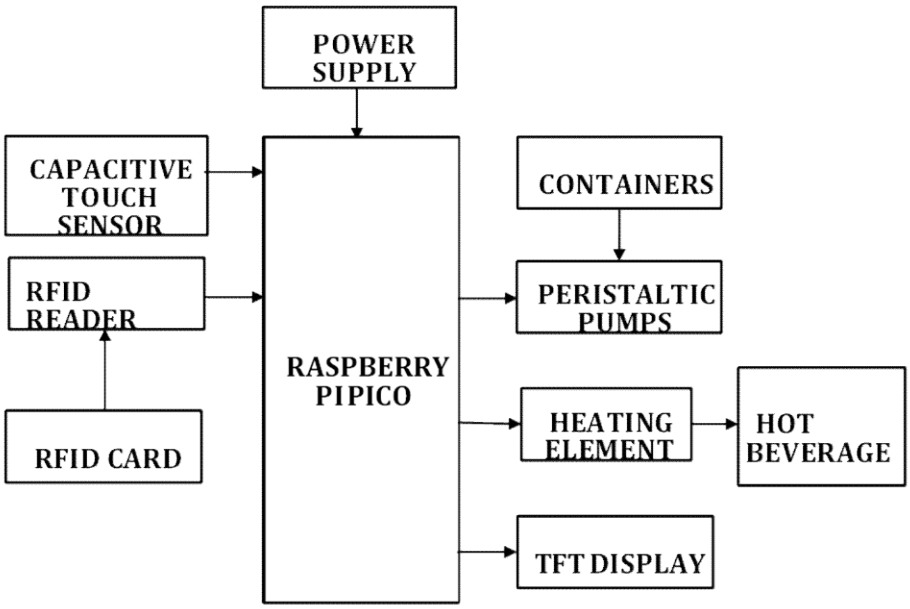

Fig. 1 : Proposed block-diagram of the project work

Objective of the project work

The objective of the project is to design and develop a mini tea and coffee making machine, which dispenses the beverage of required quality in less time. The machine uses readily available tea and coffee premix powder to prepare the beverage. To operate the coffee machine by voice commands through AI [21]-[25].

Aim of the project work

Traditional Hot beverage vending machines offer a limited selection of coffee, lacking the ability to customize the strength of the coffee according to user preferences.

Proposed methodology

The proposed methodology consists of First RFID card is scanned. Select the variety the hot beverage either TEA or COFFEE using touch capacitive sensor. Next select the concentration strong or dilute using the respective touch sensor. Raspberry pi with pico-seconds command to the milk and tea or coffee decoction peristaltic pumps through relays. Heating element is heated up and milk is allowed to fall on the it thus heating the milk [26]-[30].

Working of the main project module

The cold water is added to the top of the machine, known as the reservoir, and the ground coffee is added to the filter, which sits in the top of the machine. Once the machine is switched on, the water then heats up and passes through the beans.

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Tools used (hardware / software)

Raspberry Pi PICO, 1.8 inch TFT display, RFID card and sensor, Peristaltic Pump 2v/6v, Power adopter, Basic electrical elements such switch and wire

Applications & Advantages

One important advantage of Mini tea and coffee machines are compact and lightweight, making them highly portable. Small offices can benefit from mini machines to provide employees with a convenient and cost-effective way to enjoy coffee and tea during work hours, reducing the need for expensive coffee shop visits.

Expected Outcome of the project work

We 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 successful design and development of this Mini Tea and Coffee Machine are expected to revolutionize how individuals enjoy their favorite hot drinks

Overall Conclusions

The project titled "Design and Development of Low-Cost Mini Tea and Coffee Machine using AI-ML concepts" represents an innovative approach to the creation of a cost-effective beverage dispenser. Through the integration of AI and ML technologies, this project has successfully addressed the demand for automated, customizable, and efficient tea and coffee preparation. In conclusion, the project has demonstrated the feasibility of implementing advanced technologies in everyday appliances. By providing a low-cost solution for preparing tea and coffee, it not only enhances convenience but also showcases the potential of AI and ML in enhancing the user experience. This mini machine offers a glimpse into the future of smart, automated appliances that cater to individual preferences, all while being affordable and accessible. The project contributes to the broader trend of leveraging AI and ML in enhancing various aspects of daily life, including something as simple and beloved as enjoying a cup of tea or coffee.

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