SMART TEA / COFFEE VENDING MACHINE

SHENBAGAPRIYA A, KIRTHIKA K M

PG STUDENT, ASSISTANT PROFESSOR

SRI RAMAKRISHNA INSTITUTE OF TECHNOLOGY

Abstract—The project presents a spearheading arrangement pointed at conveying moment and fulfilling glasses of tea or coffee. In today's fast-paced society, where tea and coffee utilization is inescapable, distributing machines have ended up crucial in assembly the raising request. This venture endeavors to improve the usefulness of tea and coffee distributing machines to promote client fulfillment, minimize downtime, and optimize operational costs. The proposed Tea Distributing Machine (TVM) looks for to revolutionize the client involvement by joining cutting-edge highlights such as an instinctive touchscreen interface, multilingual alternatives, and consistent installment frameworks. Moreover, the TVM addresses natural concerns by actualizing eco-friendly bundling, advertising reusable holders, and joining energy-efficient components. Leveraging IoT innovation, the TVM empowers farther observing for proactive support, guaranteeing continuous benefit and decreasing operational disturbances. Exacting quality control measures are foremost in keeping up the security and cleanliness of apportioned refreshments, in this way maintaining immaculate item guidelines. By consistently mixing development with maintainability and user-centric plan standards, the TVM represents a noteworthy headway within the field of robotized refreshment apportioning frameworks. This venture not as it were points to meet the advancing needs of buyers but moreover underscores the importance of eco-conscious hones and innovative development in forming long term of refreshment distributing.

Index Terms—Tea Vending Machine, QR code payment, Conveyor mechanism, sensors.

I.INTRODUCTION

Cleverly tea and coffee machines stand as inventive arrangements at the cutting edge of the ever-evolving refreshment industry. This venture report fastidiously traces

the inventive highlights and transformative affect of these state-of-the-art distributing frameworks, fastidiously created

at the crossing point of progressed innovation and modern plan. By consistently coordination innovation into our ageless tea utilization propensities, these machines rethink the conventional tea-drinking encounter, advertising a interesting mix of comfort and customizability custom fitted to the energetic inclinations of present day customers. In today's fast-paced world, where time is of the substance, savvy Tea Distributing Machines (TVMs) rise as guides of effectiveness and development, promising to revolutionize the way we lock in with one of the world's most seasoned and most cherished refreshments.

Outlined to meet the changing needs of people exploring today's frenzied ways of life, shrewd TVMs represent a commitment to effectiveness and personalized encounters. With an natural and user-friendly interface, clients can effortlessly get to a assortment of tea determinations, changing the brewing prepare into an locks in and agreeable encounter. These machines are more than fair robotized containers; they serve as doors to a world of flavor, smell, and liberality, all typified inside the limits of smooth and cutting edge plan. By combining cutting-edge innovation with ageless convention, shrewd TVMs bridge the crevice between the past and the long, run welcoming individuals to savor not fair the drink, but the whole custom, in a way that's present day, helpful, and completely customizable.

This project report serves as a comprehensive study of savvy tea distributing machines, shedding light on their pivotal part as catalysts for alter within the refreshment benefit scene. Past simple deals arrangements, these machines speak to a worldview move within the acknowledgment and approach to

the ageless convention of tea utilization. By digging into the complicated subtle elements of their plan and usefulness, we reveal the transformative affect they guarantee. As society proceeds to advance, so as well must our approach to refreshment benefit. Shrewd TVMs offer a keen reaction to society's requests for proficiency without relinquishing the lavishness of personalized encounters. With inventive highlights and a commitment to improving client engagement, these machines reshape the story encompassing tea utilization, welcoming people to set out on a travel of investigation, revelation, and enchant with each glass.

LITERATURE REVIEW

[1] In 2011 Muhammad Ali Querishi., Abdul Aziz, and Hafiz Faiz Razool Shrestha proposed a study on the Design and Implementation of Vending Machine using Verilog HDL. It provide valuable insights into the global tea consumption trends, emphasizing a consistent and steady growth in tea consumption worldwide. The contemporary consumer, they argue, is increasingly inclined towards the pursuit of convenience without compromising on the quality of their tea-drinking experience. This observed trend highlights the imperative for the development of a Tea Vending Machine (TVM) that aligns with modern preferences. As consumers lead busier lives, the demand for solutions that seamlessly integrate into their fast- paced routines becomes apparent. Understanding and catering to these evolving preferences is crucial for the success of any tea-related vending solution, making Smith et al.'s findings a foundational pillar for the subsequent exploration of the Smart Tea Vending Machine.

[2] In 2017 Ravi grivois Shah., Juan.R.Gonzales, Barbara.A.Edwards and Amy.L.Howerter proposed a study on Impact of Healthy Vending Machine Options in a Large Community Health Organization. These delve into the critical aspect of customer experience within the context of vending machines. Their research underscores that a seamless and enjoyable customer experience is paramount for the success of vending machines. Factors such as user interface design, payment options, and product customization play pivotal roles in shaping customer satisfaction. This insight is directly applicable to the Smart Tea Vending Machine, as it places a strong emphasis on an intuitive and user-friendly interface. The research by Shah et al. provides a framework for understanding the intricacies of customer interactions with vending machines, guiding the design philosophy of the Smart Tea Vending Machine to ensure it not only meets but exceeds user expectations. This emphasis on user satisfaction aligns with the broader trend in consumer behavior, emphasizing the importance of a positive and engaging experience in their purchasing decisions.

[3] In 2020 Maula Paula de Tavares., Anna Lucia Mourad proposed a study on Coffee beverage preparation by different methods from an environmental perspective. It shift the focus to brewing methods in vending machines, particularly in the context of coffee. They highlight that while advanced brewing methods have been explored for coffee vending machines, there is a notable gap in research concerning the application of similar technologies to tea vending. This underscores the need for innovation in the brewing process of tea to ensure consistent quality, an area that the Smart Tea Vending Machine specifically addresses. By incorporating advanced brewing techniques tailored to tea, this vending solution aims to bridge the existing gap identified by Tavares et al., contributing to the enhancement of the overall tea- drinking experience through a focus on brewing precision and quality.

[4] In 2022 Cheng zu Liu., Zong yong da.,Yao Xue., Xueming Quan proposed a study on Product Recognition for Unmanned Vending Machines. These draw attention to the increasing importance of sustainability considerations in consumer choices. Their research documents various sustainable vending machine practices, including the use of eco-friendly packaging and the implementation of energy-efficient technologies. This aligns with the broader societal shift towards environmentally conscious choices and positions the Smart Tea Vending Machine as a contemporary solution that adheres to sustainable practices. By integrating eco-friendly packaging and energy-efficient technologies, this vending machine not only caters to the growing demand for sustainable choices but also aligns with the global commitment to environmentally responsible practices.

[5] In 2020 Nerea Nunez., Xavi Collado., and Clara Martinez proposed a study on Authentication of the Origin, Variety and Roasting Degree of Coffee Samples by Non-Targeted HPLC-UV Fingerprinting and Chemometrics. Application to the Detection and Quantitation of Adulterated Coffee Samples. Nunes et al. (2017) contribute to the literature by highlighting the successful integration of Internet of Things (IoT) technology in vending machines. Their research showcases the benefits of real-time monitoring, which reduces maintenance costs and improves machine uptime. This technology-driven approach resonates with the Smart Tea Vending Machine, which embraces IoT for efficient operation. Real-time monitoring ensures that the machine functions optimally, providing a seamless experience for users while minimizing downtime and maintenance costs. The integration of IoT technology, as emphasized by Nunes et al., positions the Smart Tea Vending Machine as a technologically advanced and reliable solution in the realm of vending machines.

PROPOSED SYSTEM

The Smart Tea Distributing Machine (STDM) combines high-tech features with traditional beverage enjoyment, transforming how we experience tea. At its heart is an easy-to-use interface, either a touchscreen or simple buttons,

allowing customers to select their favorite teas and customize their drinks effortlessly. Payment options are diverse, from cards to NFC and QR codes. This interface, shown in Figure 1, ensures a smooth and user-friendly experience, enhancing satisfaction.

The STDM's brewing system is advanced, carefully controlling factors like water temperature and steeping time to ensure consistent quality. This precision lets customers tailor their tea exactly to their liking, making brewing a personalized and enjoyable process. Such advanced brewing technology not only improves satisfaction but also sets new standards for automated beverage dispensers.

Beyond user interaction and brewing, the STDM has robust systems for operation and management, allowing real-time monitoring and inventory tracking. This ensures optimal stock levels to meet demand. Networking options like Wi-Fi and Ethernet enable seamless data exchange for remote monitoring and updates. Operators gain valuable insights into performance, usage patterns, and customer preferences, enabling data-driven decisions and operational efficiency.

With energy-efficient components and control systems, the STDM minimizes environmental impact, aligning with sustainability goals. In summary, the STDM represents a shift in automated beverage dispensing, blending innovation with tradition to deliver a superior tea experience tailored to modern consumers' evolving needs.
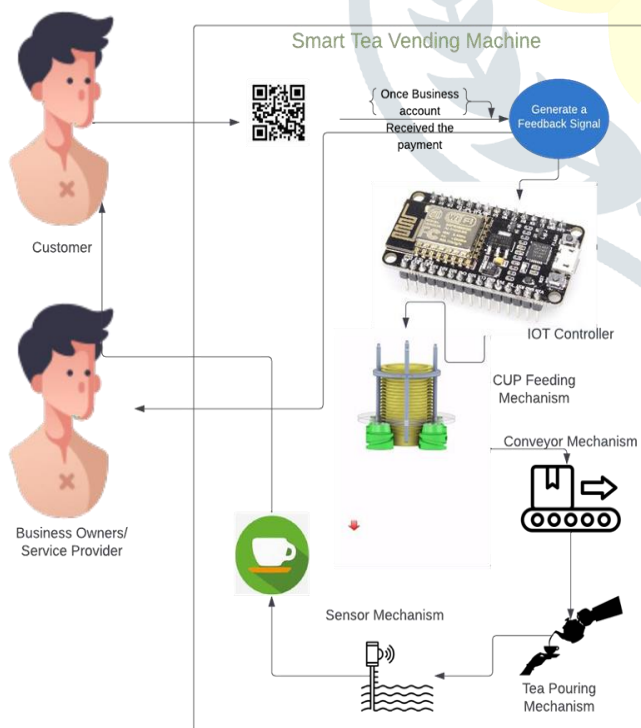
Figure 2 in our report provides a clear depiction of the operational process within the smart tea vending machine through a detailed flowchart. This visual representation serves as a comprehensive guide for users, offering step-by-step navigation from initiating the transaction to receiving the selected tea product. Beginning with the "Check QR code" stage, users can seamlessly start the transaction process by scanning a QR code with their mobile devices, ensuring a modern and efficient payment experience. Moving through the flowchart, users then proceed to the "Item selection" stage, where they can browse and choose from a diverse range of tea options presented in an intuitive interface. Upon selecting their preferred tea blend, the system securely processes the transaction at the "Payment" stage, verifying payment authorization and ensuring a smooth and hassle-free vending experience.
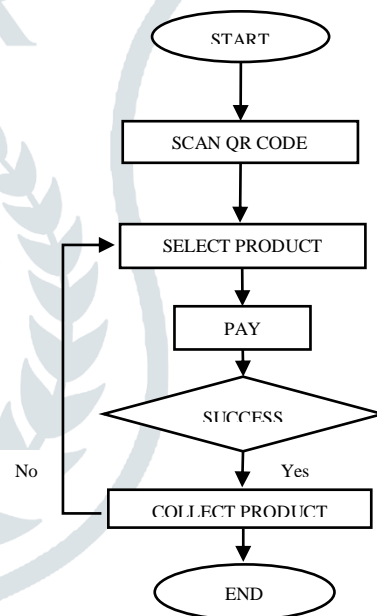

Fig 2: Flowchart for Manual Mechanism

The smart tea vending machine introduces an innovative QR payment system, showcased in Figure 2, That marks a significant leap in cashless transactions. Users interact with the machine's user-friendly interface to select their preferred tea blends and opt for QR code payment. Upon selection, the machine swiftly generates a unique QR code containing all transaction details, ensuring a secure and streamlined payment process. This seamless integration with UPI Framework A allows users to authorize payment by scanning the QR code with their mobile devices, eliminating the need for physical cash and traditional payment methods.

Fig 1: Proposed block diagram

METHODOLOGY
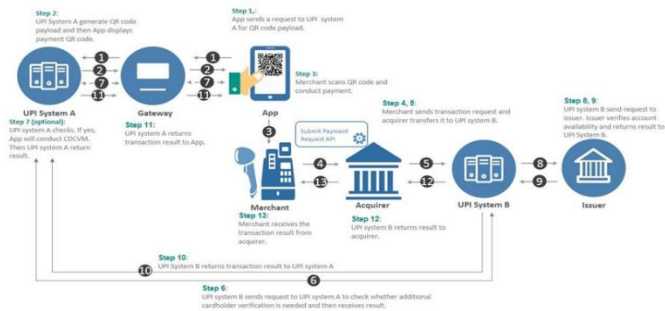
Fig 3: Flowchart for Automatic mechanism

Merchant interaction is simplified as they scan the QR code using a reader, initiating the transaction process without delays. Subsequent steps, including transaction request transmission, account verification, and result retrieval, unfold seamlessly between UPI Framework A and UPI Framework B, ensuring the security and efficiency of each transaction. Optional features, such as receipt generation, further enhance user convenience and satisfaction. This digital advancement not only aligns with the trend of reducing reliance on physical cash but also sets a new standard for cashless transactions in the vending machine industry, offering users a seamless and efficient way to enjoy their favorite tea blends.

RESULT AND ANALYSIS

The fully functional vending machine, depicted in Figure 4, epitomizes precision manufacturing, designed specifically for tea production and adaptable for coffee or other hot beverages. It seamlessly integrates cutting-edge technology with practical functionality to cater to the demands of modern consumers. Featuring a user-friendly interface, typically a responsive touchscreen or intuitive physical buttons (as illustrated in Figure 4), it enables effortless navigation through a diverse range of beverage options for a personalized experience. Additionally, its precision-engineered brewing mechanism ensures consistent delivery of high-quality beverages, while optional features like coffee dispensing enhance its versatility.
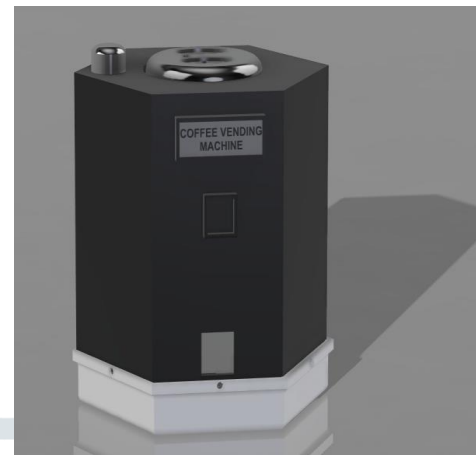
Fig 4: Fully developed Tea Vending Machine

The realization of the fully functional vending machine involves fundamental stages: design, assembly, and quality control, as depicted in Figure 4. During the design phase, emphasis is placed on incorporating user-centric elements for an intuitive interface and integrating advanced brewing mechanisms for optimal beverage production. Assembly involves meticulous integration of components, following the design depicted in Figure 4, to ensure seamless functionality and durability. Quality control encompasses rigorous testing methods, as outlined in Figure 4, to validate performance, reliability, and safety, ensuring compliance with design specifications and regulatory standards.

Functionality, reliability, and safety are paramount features of the fully functional vending machine, illustrated in Figure 4. Engineered to execute the entire beverage preparation process seamlessly, every component is rigorously tested during quality control to verify performance under various conditions. Moreover, safety features such as secure enclosures, locks, and encryption are integrated to safeguard user interaction and internal mechanisms. This dedication to functionality, reliability, and safety ensures that the vending machine not only delivers convenience and quality but also prioritizes user well-being and satisfaction, establishing it as an essential and trusted component in the tea or beverage consumption experience.

Fig 5: Smart Tea / Coffee Vending Machine.

Figure 5 presents a snapshot of a fully operational vending machine, showcasing its sleek and contemporary design that seamlessly blends into any setting. The user-friendly interface and advanced brewing mechanisms underscore its commitment to functionality, reliability, and safety. This visual emphasizes the machine's status as a cutting-edge solution for automated beverage service, epitomizing the convergence of technological innovation and user-centric design principles.

Within the image, the vending machine stands prominently with its modern exterior, featuring intuitive controls and a digital display for easy navigation. The transparent panels reveal the intricate brewing components, highlighting the machine's dedication to consistent and high-quality beverage production. Overall, Figure 5 serves as a testament to the machine's innovative capabilities, positioning it as a pivotal player in redefining the future of refreshment services with its blend of style and efficiency.

CONCLUSION

In today's energetic scene of mechanical development, the shrewd tea distributing machine speaks to a combination of conventional refreshment delight with cutting-edge mechanization. Its instinctive client interface, advertising a plenty of alternatives through a straightforward touch or tap, caters to the fast-paced ways of life of advanced buyers. The consideration of different cashless installment strategies, counting QR codes, improves comfort and openness, reflecting the advancing computerized back scene. Behind the scenes, a fastidiously calibrated brewing device guarantees consistency and quality in each container, fulfilling the observing tastes of tea devotees. Leveraging modern sensor innovation and stock administration frameworks, the machine works with exactness, minimizing downtime and maximizing effectiveness. Additionally, exacting security measures and proactive upkeep frameworks maintain cleanliness guidelines and guarantee dependable operation. Discretionary highlights like coordinates cameras and receipt printers assist hoist the machine's utility, upgrading its flexibility in different situations. Situated at the cutting edge of innovative progression and customer comfort, the savvy tea distributing machine is balanced to rethink the computerized refreshment benefit scene.

FUTURE WORK

Looking ahead, long run of the keen tea distributing machine holds energizing conceivable outcomes for assist upgrade and refinement. The integration of progressed fake insights

calculations might revolutionize the client involvement by advertising personalized tea suggestions based on person inclinations and rising patterns. Grasping eco-friendly hones, such as utilizing biodegradable bundling and energy-efficient components, adjusts with maintainability objectives and reflects a commitment to natural stewardship. By leveraging Web of Things (IoT) innovation, the machine seem accomplish real-time checking and prescient upkeep capabilities, guaranteeing ideal execution and minimizing operational disturbances. Health-conscious highlights, counting giving dietary data and advertising wellness-focused tea alternatives, may offer to a broader statistic of health-conscious buyers. Additionally, growing installment choices to incorporate portable wallets, contactless installments, and indeed cryptocurrency would cater to the different inclinations of cutting edge buyers and adjust with the advancing scene of computerized back. These future improvements emphasize a direction for the keen tea distributing machine that grasps mechanical advancement, supportability, and a tireless devotion to assembly the ever-evolving needs of customers.

ACKNOWLEDGEMENT

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