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Venduino

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Abstract:

This project introduces an intelligent vending machine system that uses advanced technologies to improve user experience, streamline operations, and support sustainability. The main goal of this project is to offer various food and non-food items to people without requiring human interaction or a traditional retail setup. These machines are designed to provide easy and quick access to products and services, making them accessible 24/7 in locations like offices, schools, airports, hospitals, train stations, and public spaces. The primary advantage of these machines is that they need minimal human intervention, reducing labor costs for businesses. Operators can restock machines and perform regular maintenance on a schedule instead of having personnel present at all hours of operation.

Customers can make purchases by inserting coins, which ensures speed and efficiency, especially in time-constrained situations. Vending machines also offer consistent product quality and availability, allowing customers to expect the same products and services at any time, ensuring a reliable experience.

Keyword:

Vending machine; Arduino Nano

Introduction:

Vending machines have become a common part of our daily lives, providing various products and services with a straightforward coin, bill, or card swipe. These self-service machines have a long history dating back to the late 19th century and have continuously adapted to meet changing consumer needs. They play an essential role in our convenience-driven society, offering a wide range of items, including snacks, drinks, tickets, and electronics in places like offices, airports, schools, and public areas.

The concept of vending machines has come a long way since its early origins. The first recorded vending machine, invented by Heron of Alexandria in the first century AD, dispensed holy water when a coin was inserted, using a simple mechanism. Moving to the late 19th century, vending machines gained popularity with coin-operated devices dispensing goods like postcards, gum, and cigarettes. Over time, vending machines have evolved significantly, incorporating advanced technology, a broader product selection, and enhanced convenience.

Today, vending machines go beyond just snacks and beverages; they also dispense hot meals, healthcare products, electronics, and even artworks. Technological advancements have led to smart vending machines with touchscreen interfaces, cashless payment options, and internet connectivity, offering an improved and interactive user experience.

Contribution:

The following are the project's goal:

1. Revenue Generation: The primary goal of a vending machine is to generate revenue. This includes setting pricing strategies that maximize sales while ensuring a reasonable profit margin.
2. Customer Satisfaction: Providing a positive customer experience is crucial. Vending machines should be user-friendly and offer a variety of products that meet customer preferences and needs.
3. Product Freshness: Maintain the freshness and quality of products, especially in vending machines that dispense food and beverages. Regularly check and restock items to avoid selling stale or expired goods.

Related work:

When researching related work for a research paper publication on the topic of "Venduino," it's important to look for academic papers and studies that provide in-depth analysis and insights. . Here are some research papers and publications in the field of Vending Machine [1] T.C. Poon, K.L. Choy, C.K. Cheng and S.I. Lao, "A real-time replenishment system for vending machine industry" in 8th IEEE International Conference on Industrial Informatics, 2020. The paper illustrates how multivariate statistical techniques, namely factor and clusters analyses, can be used to examine the perceptions and preferences of customers and to support the development of a new energetically independentautonomous mobile robot vending machine for food distribution on beaches.The Another paper [2] Y. Zhou, F. R. Yu, J. Chen and Y. Kuo, "Cyber-Physical-Social Systems: A State- of-the-Art Survey, Challenges and Opportunities," IEEE Communications Surveys & Tutorials, vol. 22, no. 1, pp. 389-425, 2020 Vending Machines in Australian Hospitals.

This paper explores how well vending machines are meeting the needs of health care organizations and their staff and visitors in Australia. Hospital vending machines often provide

the only source of food through the night to staff and visitors and traditionally offer less-healthy options.

The Third Paper that we studied was [3] A. Sajid, H. Abbas and K. Saleem, "Cloud-Assisted IoT- Review of the State of the Art and Future Challenges," IEEE Access, vol. 4, pp. 1375-1384, 2016.This paper explains that Reducing sugar-sweetened beverage (SSB) consumption is a leading strategy to help combat high rates of adult obesity and overweight. Regulating SSB sales in schools has reduced access among youth.

Methodology:

The methodology includes designing the system's hardware setup and user interface, which involves using hardware components such as the Arduino Nano Atmega328p, SG90 Servo Motor, IR Sensor, Power Supply, and an LCD Display. Additionally, real-time data management and transmission mechanisms will be developed.

Block diagram:

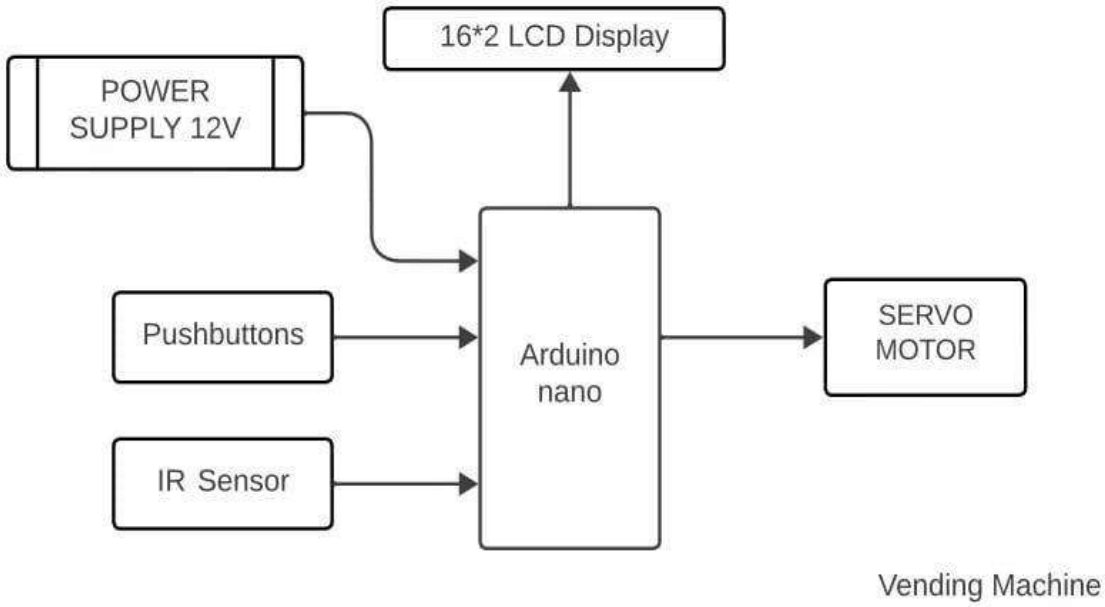
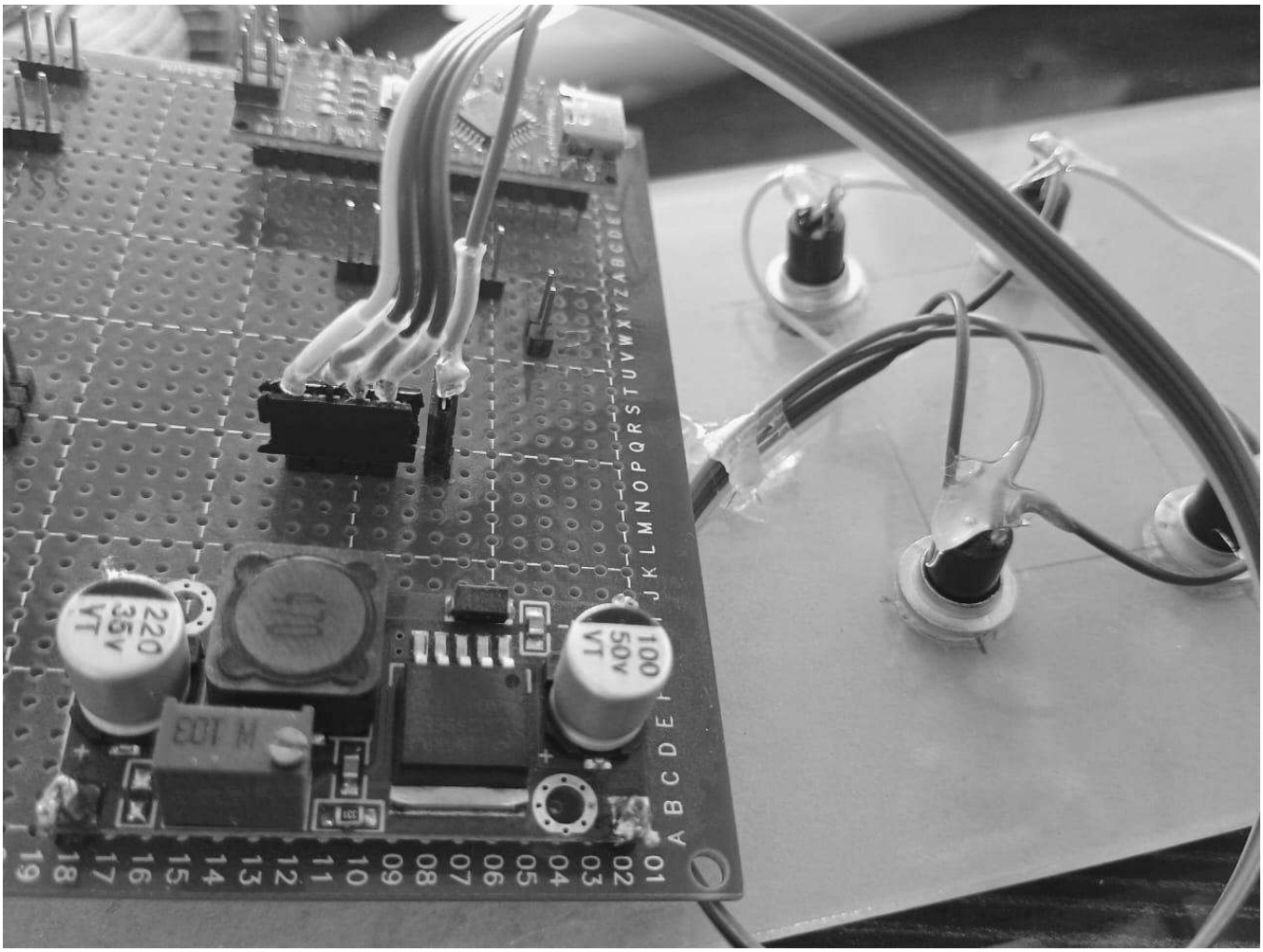


Fig: Block Diagram of Vending Machine

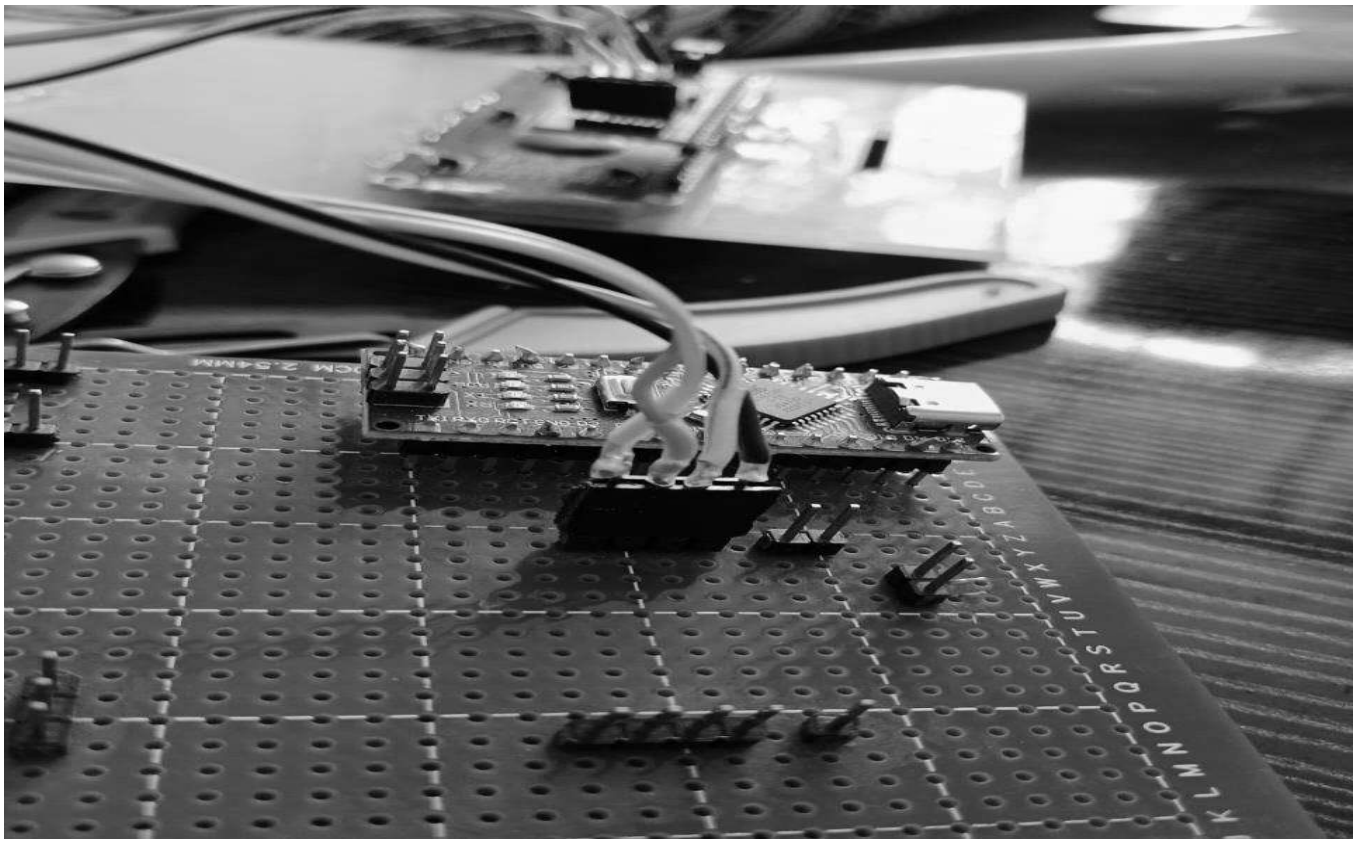
Result and Discussion:

This project offers customers the products they desire, providing validity and satisfaction. As a result, we affirm that this project is highly advantageous for schools, colleges, airlines, and can be beneficial in the future for emergency places like hospitals and healthcare systems.

By inserting coins, this machine dispenses snacks, cold drinks, and other items, providing quick and easy access to products and services, making them available 24/7 hour.



This is a picture of the physical vending machine prototype, showcasing its design, and features. This image should display the exterior appearance, product presentation, and the user interface.



Above picture provide close-up images of the vending machine's user interface, highlighting the selection buttons, display screen, and payment options, such as card readers or coin slots.

Conclusion:

The project's feasibility and viability can be evaluated to determine if it was a worthwhile endeavor. The successful deployment and revenue generation of the vending machine indicate its financial viability.

Additionally, an assessment can be made to determine if the vending machine project has enhanced efficiency in product distribution, reduced labor costs, and improved overall operational processes. It's also important to evaluate the security measures in place to prevent theft or tampering and ensure the vending machine's reliability in operation.

The success of a vending machine project hinges on various factors, including financial performance, user satisfaction, regulatory compliance, and goal attainment. Conclusions drawn from these aspects can provide valuable insights for future projects and decision-making. A comprehensive evaluation is essential to gauge the overall success and identify areas for improvement in the vending machine project.

References:

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[3] A. Sajid, H. Abbas and K. Saleem, "Cloud-Assisted IoT-Based SCADA Systems Security: A Review of the State of the Art and Future Challenges," IEEE Access, vol. 4, pp. 1375-1384, 2016.

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