

Automatic Component Organizer And Dispenser (ACOD)

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Abstract- A creative way to simplify access to necessary electronic components and tools is to include an electronics dispenser into a lab or maker space. Along with prototyping supplies like breadboards and jumper wires, this ACOD can dispense a wide range of components, such as resistors, capacitors, diodes, transistors, integrated circuits, connectors, and more. The machine's intuitive interface, which includes keypad controls or token control, facilitates speedy component selection and retrieval, thereby increasing production and decreasing downtime. Smooth transactions are supported by a strong payment system, and effective stock tracking and replenishment are ensured by an automated inventory management system. Additionally, the machine has optional barcode scanning for simple component maintenance and access control for secure usage.

Keywords- Component Sorting, Component Dispensing, Inventory Management

I. INTRODUCTION

An Automated Component Organizer and Dispenser (ACOD) machine, which is a specialized device designed to dispense electronic components such as resistors, capacitors, and other small parts. This machine is particularly useful in educational institutions, electronics labs, and maker spaces where quick access to components is essential [1]. The ACOD machine provides easy and quick access to electronic components, making it especially useful for students and professionals working on projects. The machine's simple operation allows users to easily retrieve the components they need.

Automated machines like the ACOD are becoming increasingly popular as a means of increasing efficiency and ease in various tasks. These machines can complete tasks with minimal human assistance, making them highly effective [2]. The device features a large number of inputs and outputs to serve clients, and it can be compared to a token dispensary, which is an automatic machine that offers items like electronic components, resistors, capacitors, diodes, etc. [3].

Most of the initiatives are restricted to one discipline, which can make it harder to be creative and innovative. This project, however, combines mechanical, electronic, electrical, and programming abilities, encouraging the creation of links across multiple disciplines rather than learning topics in isolation. By integrating these disciplines, the project fosters a more holistic understanding of the system and promotes creativity and innovation [4].

The main objectives of the ACOD project are threefold: automation, convenience, and management. The automation aspect aims to automate the process of dispensing electronic components, reducing manual labor and increasing efficiency [5]. The convenience objective provides easy and quick access to components, making it easier for users to retrieve the parts they need. Finally, the inventory management objective aims to track and manage inventory levels efficiently, ensuring that components are always available when needed [6].

By achieving these objectives, the ACOD project can significantly improve the workflow and productivity of electronics labs, maker spaces, and other environments where electronic components are frequently used. The project's interdisciplinary approach also promotes a more holistic understanding of the system, allowing users to appreciate the interconnectedness of different disciplines.

In this project, an Arduino microcontroller will be used to power a dispenser and component organizer, leveraging the versatility and ease of use of Arduino-based systems [7]. The ACOD machine, which sells various types of electronic components from the machine, is based on Arduino and operates on a token-based system. The goal is to offer a solution in a machine that is convenient and efficient, making it easier for users to access the components they need [8]. The rack and two gear bevels make up the assembly, which operates using the same idea as a vending machine [9]. The parts are placed in several boxes, and the token will determine which box is dispensed with. The box includes a number of parts that are necessary for the experiments, providing users with a comprehensive set of components for their projects.

II. LITERATURE REVIEW

According to [10] a comprehensive review of existing pill organizers and dispensers, highlighting their design, functionality, and limitations. The authors examine various types of pill organizers and dispensers, including manual, automated, and smart devices, and discuss their features, such as reminders, alarms, and monitoring capabilities. They also identify the benefits and drawbacks of each type, including ease of use, adherence, and cost-effectiveness, and suggest future directions for the development of more effective and user-friendly pill organizers and dispensers, emphasizing the importance of improving medication adherence and management.

According to [11] a design and implementation of an automatic medicine dispensing machine, which aims to reduce medication errors and improve patient safety. The authors describe the machine's architecture, which consists of a microcontroller, sensors, and a dispensing mechanism, and explain its working principle, where the machine dispenses medication according to a pre-programmed schedule. They also discuss the machine's features, such as password-protected access, alarm systems, and a user-friendly interface, and highlight its advantages, including reduced medication errors, improved patient compliance, and increased efficiency in healthcare settings.

According to [12] proposes a novel design for an automatic Chinese medicine dispensing machine, which utilizes a shelf-based mechanism to store and dispense traditional Chinese medicine. The authors describe the machine's architecture, which consists of a shelf-based storage system, a robotic arm, and a control system, and explain its working principle, where the machine retrieves and dispenses medicine according to a pre-programmed prescription. They also discuss the machine's features, such as high storage capacity, precise dispensing, and a user-friendly interface, and highlight its advantages, including improved efficiency, reduced labor costs, and enhanced patient safety in traditional Chinese medicine dispensaries.

According to [13] presents a design for an advanced medication dispenser that aims to improve patient safety and reduce medication errors. The authors describe the dispenser's architecture, which consists of a microcontroller, sensors, and a dispensing mechanism, and explain its working principle, where the dispenser releases medication according to a pre-programmed schedule and alerts patients and caregivers through SMS and email notifications. They also discuss the dispenser's features, such as password-protected access, medication tracking, and a user-friendly interface, and

highlight its advantages, including improved patient compliance, reduced medication errors, and enhanced patient safety in healthcare settings.

According to [14] a novel automated pill dispenser designed to enhance medication compliance, efficiency, and accuracy. The author describes the dispenser's architecture, which incorporates advanced features such as automated pill counting, scheduling, and reminders, and explains its working principle, where the dispenser releases medication according to a pre-programmed schedule and sends notifications to patients and caregivers. The author also highlights the dispenser's benefits, including improved patient adherence, reduced medication errors, and enhanced patient safety, making it a valuable solution for healthcare providers and patients alike.

According to [15] a novel design for a weekly electronic pills dispenser featuring circular containers. The authors describe the dispenser's architecture, which consists of a microcontroller, sensors, and a dispensing mechanism, and explain its working principle, where the dispenser releases medication according to a pre-programmed schedule and alerts patients through visual and auditory notifications. They also highlight the dispenser's advantages, including improved patient compliance, reduced medication errors, and enhanced patient safety, making it a promising solution for healthcare settings.

According to [16] an innovative pill dispenser and cutter system designed to improve medication management for individuals with disabilities. The authors describe the system's features, including a user-friendly interface, automated pill dispensing, and a built-in pill cutter, which enable users to easily manage their medication regimens. They also highlight the system's benefits, such as increased independence, improved medication adherence, and enhanced quality of life for individuals with disabilities, making it a valuable assistive technology in healthcare settings.

According to [17] a novel design and implementation of an automatic medicine dispensing machine. The authors describe the machine's architecture, which consists of a microcontroller, sensors, and a dispensing mechanism, and explain its working principle, where the machine dispenses medication according to a pre-programmed schedule and alerts users through a display screen and buzzer. They also highlight the machine's advantages, including reduced medication errors, improved patient safety, and increased efficiency in healthcare settings, making it a promising solution for automated medication dispensing.

III. STUDIES AND FINDINGS

Several research and conclusions have been conducted on electronic Automatic Component Organizer and Dispenser (ACOD), with a focus on accessibility, user experiences and technological developments.

accessible: Research has found that many automated vending machines do not include accessible features for those with visual impairments. A study found that bad design, a lack of tactile information, and a lack of non-visual input have a substantial influence on accessibility, prohibiting blind individuals from freely selecting, purchasing, and collecting products.

User Experience: Research into the user interface and behaviour has revealed various design flaws in multi-interface dispenser machines. Enhancements have been proposed to improve user involvement and satisfaction. Technological Advancements: Smart automatic electronic component organizers and dispensers have been developed as a result of the Internet of Things (IoT) being integrated into vending machines. Compared to conventional RFID-based systems, these machines provide speedier service, improved security, and cashless transactions.

IV. CONCLUSION

To sum up, the creation of ACOD machine specifically designed for an electronics lab is a big step in the direction of improving operational effectiveness and resource accessibility. With the help of this project, we were able to effectively design and implement a system that meets the unique requirements of an electronics lab setting and gives users quick access to necessary parts and equipment. The ACOD machine ensures improved inventory management by measuring component consumption in real-time, which not only saves downtime by cutting down on time spent looking for and collecting parts. The usefulness and advantages of incorporating automated dispensing systems in specialist environments like electronics labs have been proven by this experiment. Prospective improvements may encompass broadening the assortment of components offered, incorporating sophisticated payment mechanisms, and incorporating functionalities such as remote monitoring and restocking notifications. In summary, this project demonstrates how smart organizer and dispenser technologies are used to increase operational efficiency and optimize technical workspaces.

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