2024

Project Documentation

VENDING MACHINE ARDUINO BASED

Done By:
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Contents:

Project Name: Vending Machine Arduino Based

Team Members

- **Mohammed Sameeh Zaloom (Leader)**
    - Responsibilities: Hardware, circuit implementation, woodcraft, and project planning.
- **Mohammed Abdullah Hasweh**
    - Responsibilities: 3D design using Fusion 360.
- **Hamza Waseem Nasser**
    - Responsibilities: Coding for the Arduino.

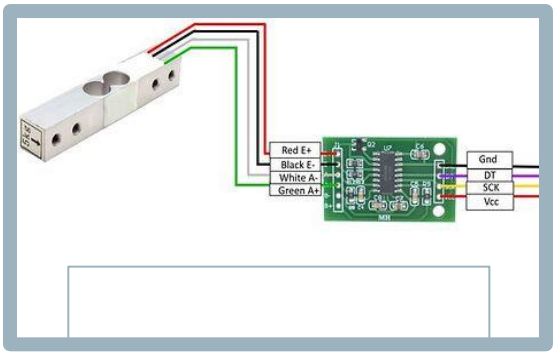
1) **Introduction:**
   Welcome to the documentation for our Embedded Systems project titled "Vending Machine Arduino-based." As students specializing in Artificial Intelligence and Robotics, we've embarked on a fascinating journey to design and implement a small vending machine using Arduino Mega, servo motors, keypad, LCD, wood, and various other components.

2) **Project Overview:**
   - **3D Design**

We initiated the project by creating a 3D design for the wooden exterior structure using Fusion 360. The design not only focuses on aesthetics but also ensures practicality for housing the Arduino Mega, servo motors, keypad, LCD, and other components.

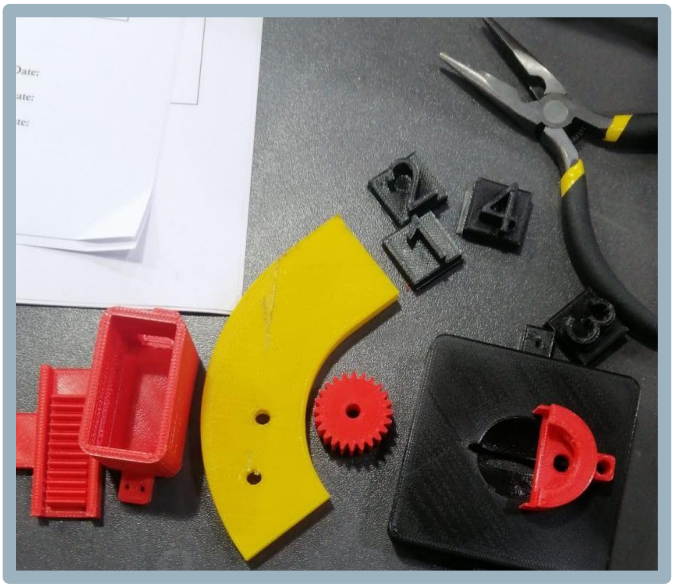
- **Coin Detection System**

  Our vending machine incorporates a sophisticated coin detection system for seamless transactions. We employ a load cell weight sensor and three IR sensors to detect coin speed and diameter accurately. The load cell helps in measuring the weight of the coin, while the IR sensors ensure precise measurement of speed and diameter. These sensors collectively contribute to an efficient and reliable coin recognition mechanism.



- **3D Printing**

  To enhance the functionality and appearance of our project, we utilized 3D printing technology. Plastic components, such as coin slots and other intricate parts, were designed and printed to perfection. This not only adds a modern touch to our vending machine but also showcases the integration of cutting-edge technologies.



- **Arduino Mega and Servo Motors**
  Mohammed Zaloom is also responsible for the hardware and circuit design, focusing on integrating the Arduino Mega with four servo motors.
  The servo motors will control the dispensing mechanism of the vending machine, ensuring smooth and precise product delivery.

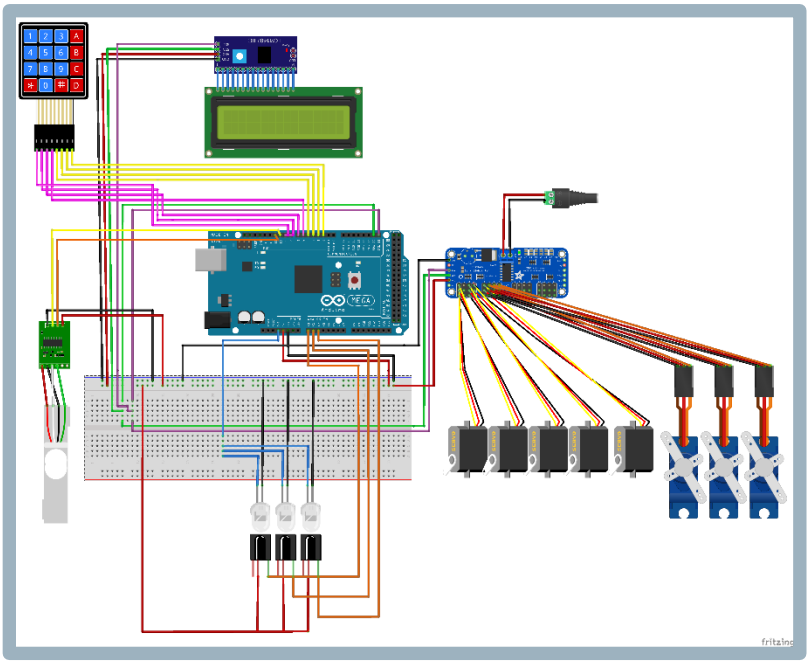


Figure 1 Our Circuit Diagram

- **Keypad and LCD:**
  Hamza Waseem is in charge of coding the keypad and LCD interface. The keypad will serve as the user input for product selection, and the LCD will provide a clear display of available products and transaction information.

3) Implementation Steps

- **Hardware Setup**

  As the leader, Mohammed Sameeh Zaloom took charge of hardware design and circuit implementation. This involved connecting Arduino Mega, servo motors, keypad, LCD, and sensors in a way that ensures smooth interaction.

- **Woodcraft**

Mohammed Sameeh Zaloom also handled the woodcraft aspect, bringing the 3D design to life. The wooden exterior was carefully crafted to house the components securely and aesthetically.

- **3D Design**

  Mohammed Abdullah Hasweh used Fusion 360 to create a detailed 3D model of our vending machine. This step was crucial to visualize the final product and ensure compatibility with all components.

- **Coding**

  Hamza Waseem undertook the coding responsibility, implementing the logic and functionality of the vending machine. This includes handling user input from the keypad, displaying information on the LCD, and controlling the servo motors for dispensing items.

4) Project Timeline:

November 2023

Week 1-2:

Project Kickoff

- Define project scope, objectives, and team member roles.
- Research and finalize the list of required components.
- Initial discussions on the 3D design concept.

Week 3-4:

3D Design and Planning

- Mohammed Hasweh begins 3D design using Fusion 360.
- Finalize the wooden exterior structure design.
- Collaborate on the integration of components into the design.

Week 5-6:

Component Procurement and Initial Coding

- Order necessary components, ensuring they align with the project schedule.
- Hamza Waseem starts initial coding for Arduino, focusing on basic functionality.
- Monitor progress and address any design adjustments.

December 2023

Week 1-2:

Woodcraft and Initial Hardware Setup

- Mohammed Zaloom begins woodcraft, bringing the 3D design to life.
- Commence initial hardware setup and test basic connections.

Week 3-4:

Coin Detection System Implementation

- Implement the coin detection system using the load cell weight sensor and IR sensors.
- Ensure accurate measurement of coin speed and diameter.
- Integrate the coin detection system with the Arduino code.

Week 5-6:

Full Hardware Integration and Testing

- Complete the hardware setup, connecting all components.
- Conduct comprehensive testing to identify and address any issues.
- Refine the code for optimal performance.

January 2024

Week 1:

Presentation Preparation

- Mohammed Zaloom prepared presentation materials showcasing the project journey, design choices, and functionalities.
- Rehearse the presentation to ensure a smooth and informative delivery.

January 2, 2024: Presentation Deadline:

- Finalize the project documentation and presentation.
- Deliver the project presentation, highlighting key features, challenges, and solutions.

5) Conclusion:

The "Vending Machine Arduino-based" project represents a collaborative effort, blending skills in hardware design, 3D modeling, and coding. As AI and robotics students, we've applied our knowledge to create a functional and innovative vending machine. This documentation serves as a record of our journey and the various components that contribute to the success of our project.