

Juice machine



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Introduction

This project develops an automated juice dispensing system for efficient beverage control and user interaction. By integrating smart sensors and actuators, the system enables real-time monitoring and operation to ensure precise juice delivery and a smooth user experience. This cost-effective solution highlights the role of embedded automation in service applications, offering practical benefits for both personal and commercial use.

Design

The system is built around the PIC16F877A microcontroller, integrated with sensors and actuators to automate juice dispensing. An ultrasonic sensor checks tank levels, while an IR sensor detects the cup's presence. A servo motor operates the tank lid, and a pump dispenses juice into the cup based on sensor inputs. Real-time status is shown on a 16x2 LCD, with a potentiometer adjusting pump speed. Manual and automatic modes enhance functionality. Power is regulated via batteries and control circuits. Figures 1 and 2 represent the system's block diagram and component layout, respectively.

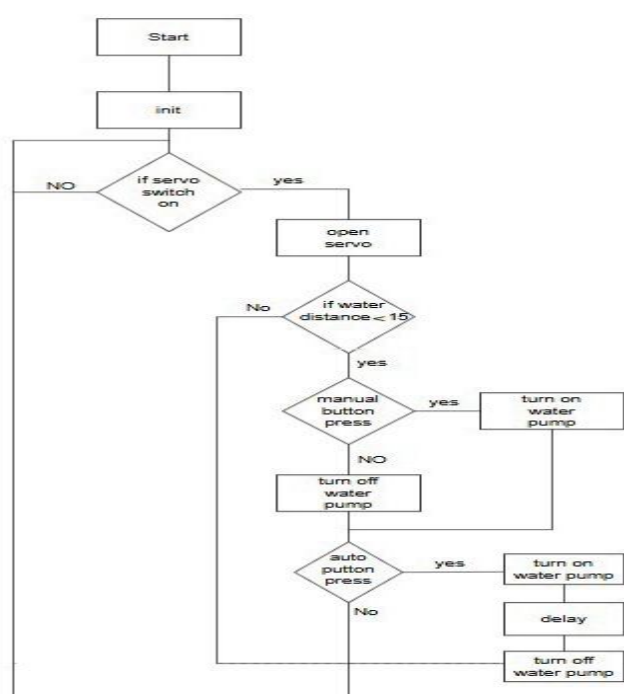


Figure 1: Software Design

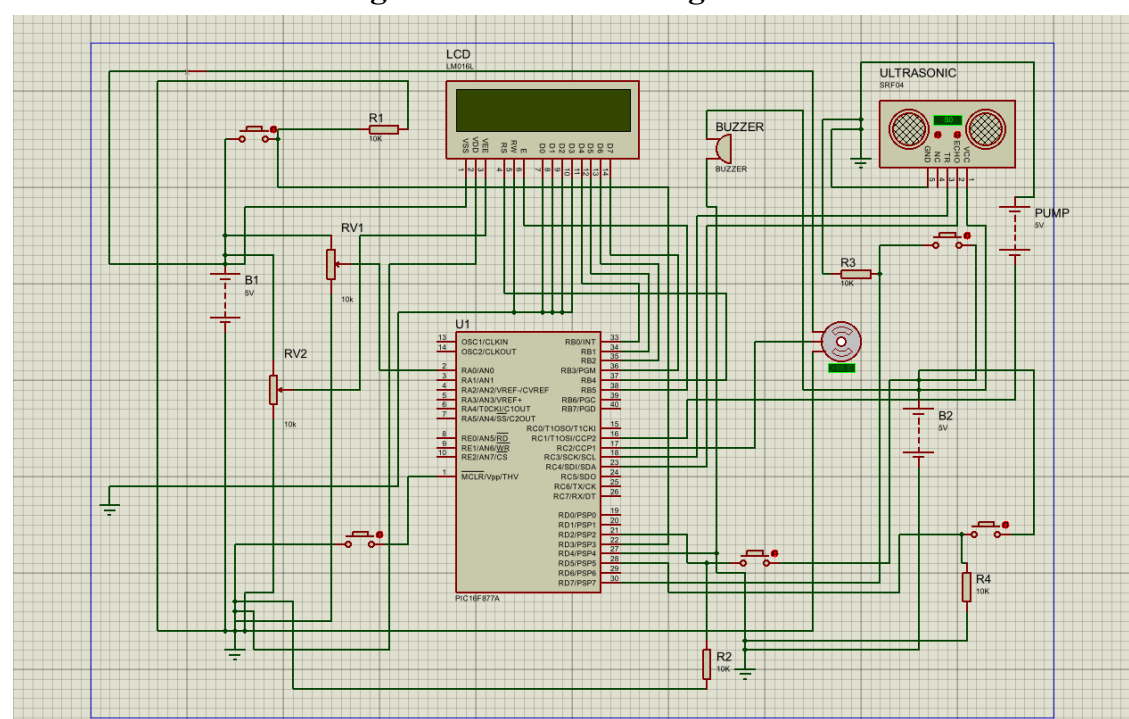


Figure 2:Electrical Design

Results

The system successfully meets its objectives through intelligent automation. Upon startup, it activates a buzzer and displays a welcome message on the LCD. Juice level in the tank is measured by an ultrasonic sensor and shown. The pump activates when a cup is detected and stops when the set volume is reached.

Manual mode allows continuous dispensing via a button press, offering more control. If the tank is empty or no cup is present, the machine halts operation and displays an alert. This ensures safety, prevents waste, and maintains efficiency. Figure 3&4 show cases the system's final implementation.

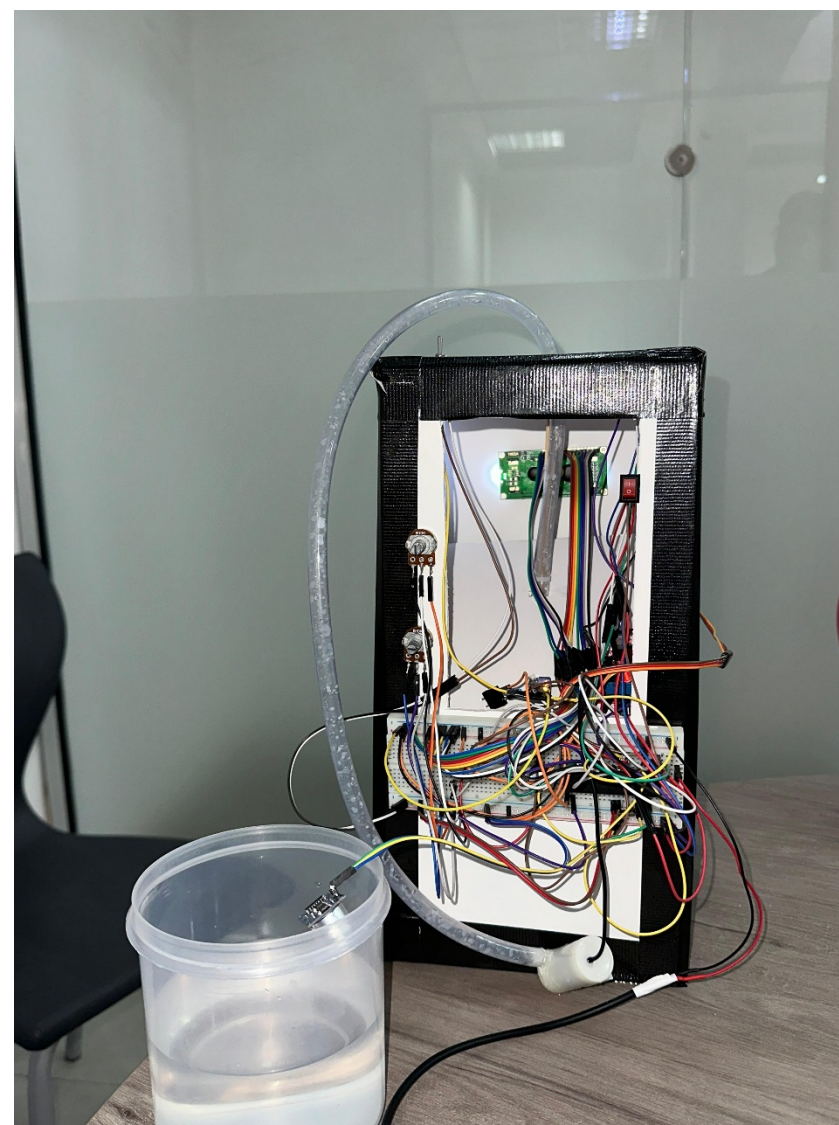


Figure 3: Final implementation



Figure 4: Final implementation

Conclusion

While building the automated juice dispensing system posed challenges, we successfully achieved the desired functionalities and met project requirements. This process enhanced our understanding of embedded systems, sensors, and actuators, and demonstrated how microcontroller-based solutions can address real-world challenges. This project emphasizes precision and convenience in smart service automation.