Water Tank

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Introduction

This project develops an automated dual-tank system for efficient water and environmental management. Utilizing a PIC16F877A microcontroller, the system integrates ultrasonic sensors for water level monitoring, an NTC thermistor for temperature sensing, and a fan, pump, and solenoid valve for regulation. An LCD provides real-time data, ensuring easy monitoring. This cost-effective solution highlights the role of embedded automation in resource management and sustainability.

Design

The system is built around the PIC16F877A microcontroller, interfaced with various components to achieve efficient automation and monitoring. Ultrasonic sensors are used for water level detection, while an NTC temperature sensor monitors thermal conditions. A servo motor controls valve operation, and the solenoid valve, along with a 12V DC water pump, manages fluid movement. Real-time data is displayed on an LCD, with LEDs providing status indication. A power regulation circuit ensures consistent operation. Figures 1 and 2 illustrate the software and hardware designs, respectively.

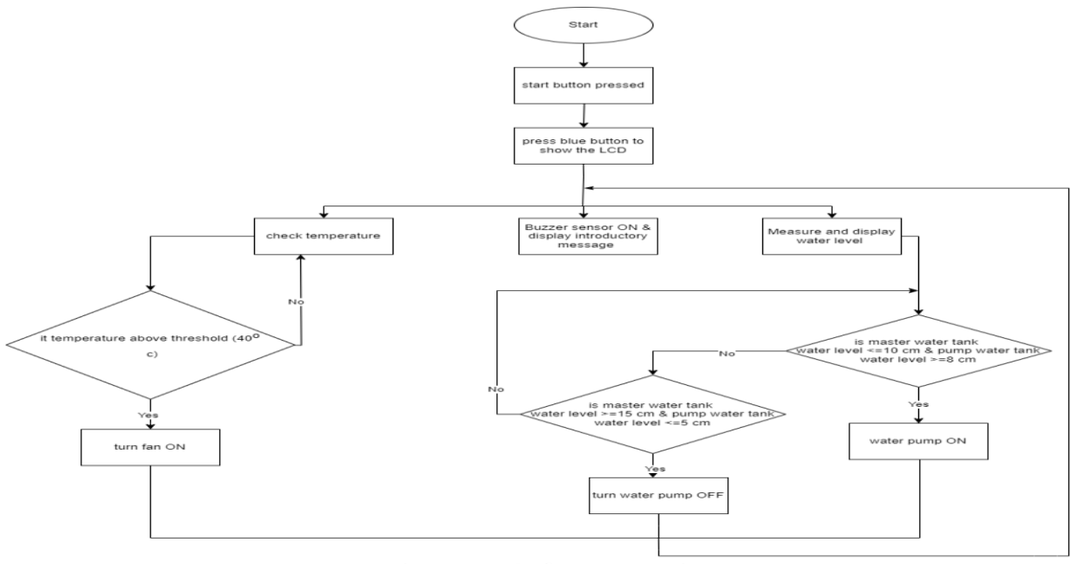

Figure 1: Software Design

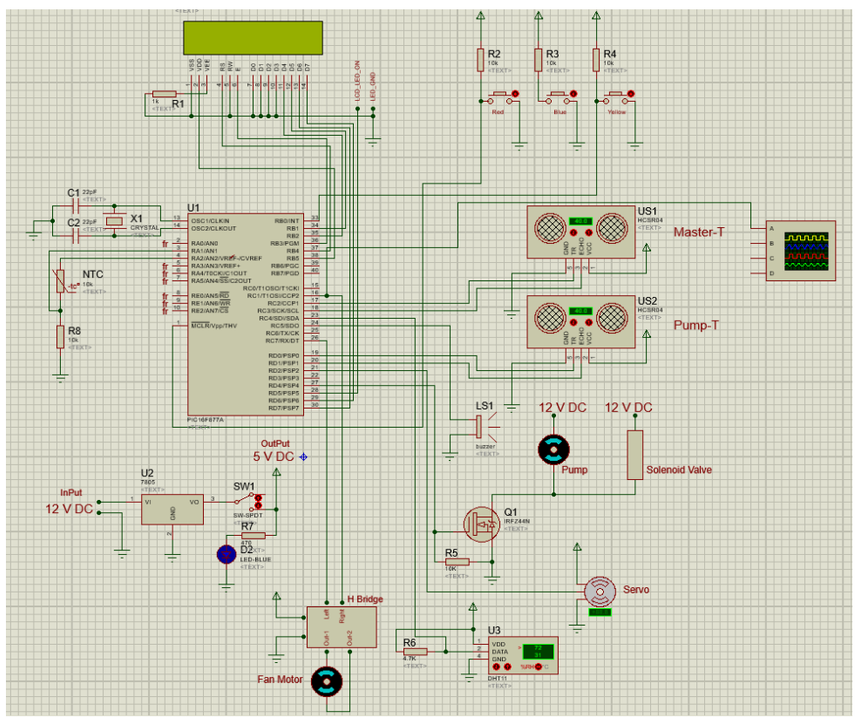

Figure 2:Hardware Design

Results

The system successfully meets its objectives through intelligent automation. Upon startup, it activates a buzzer and displays an introductory message on the LCD. Water levels in both tanks are measured and displayed. The water pump is activated if the master tank's water level falls below 10 cm and the pump tank level is above 8 cm. Conversely, the pump is deactivated when the master tank level exceeds 15 cm or the pump tank level drops below 5 cm, ensuring efficient water management. Additionally, the system monitors temperature and activates the fan if the temperature exceeds 40°C, maintaining optimal operating conditions. Figure 3 showcases the system's final implementation.

Figure 3: Final implementation

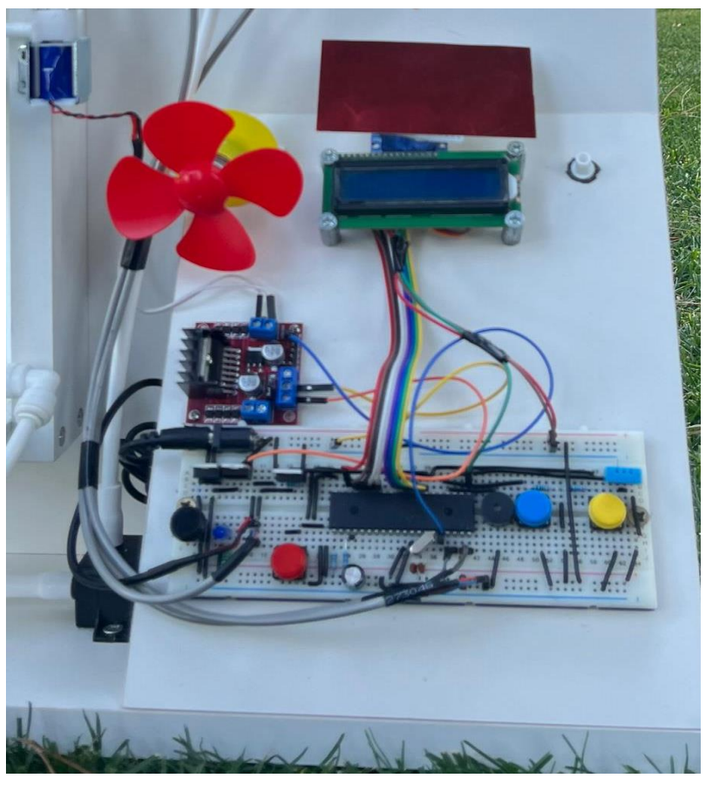

Figure 4: Final implementation

Conclusion

While building the dual-tank monitoring 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 efficiency and sustainability in resource management.