Project 5

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In this project, we developed a combination lock system using the ATMega32 microcontroller. The combination lock allows users to set a single-use password, lock and unlock the system, and includes security features to prevent unauthorized access. The primary objective was to create a secure lock mechanism that only permits access with the correct password and adds functionality to block access after repeated failed attempts.

The circuit is built around the ATMega32 microcontroller, which is connected to the keypad which serves as the user interface. The keypad allows the user to enter and manage their passwords. The user can type in numbers for their password, then enter ‘D’ to enter and check if the correct password was entered. The LCD display helps to give visual feedback to the user by showing the current status of the system, such as whether it is locked or unlocked, and indicating the success or failure of unlock attempts. Additionally, a buzzer is integrated to play distinct sounds for locking, unlocking, and failed attempts, giving the user some audio cues as well.

Our C program is structured to initialize the necessary components, including the ADC, LCD, keypad, and buzzer. During normal operation, the program continuously scans the keypad for user input. Depending on whether the system is in setting, locking, or unlocking mode, the input is processed accordingly. When setting a new password, the system checks against the most recently used passwords to ensure it is not reused. If the system is locked, it compares the entered passcode with the current one and provides feedback through the LCD and buzzer. In case of repeated incorrect attempts, the system activates a lockout period of 10 seconds to prevent further input.