HW4: Color sequence door unlock system

Goal

The goal is to design and implement a color-sequence-based door unlocking system using Arduino, APDS-9960 RGB color sensor, servo motor, button and indicator LEDs.

Design summary

- The system uses an external button interrupt to start the sequence generation.
- A hardware timer interrupt (Timer2) triggers periodic 10 ms ticks used for LED blinking when the user shown sequence is incorrect.
- The APDS-9960 RGB sensor communicates via I2C to detect user color input.
- EEPROM stores two values: a “magic” byte (for data validation) and the door state (open or closed).
- LEDs indicate the generated color sequence and provide feedback for incorrect input. Correct sequence triggers servo motor to open doors.

Timing budget

- Timer interrupt period: 10ms.
- Servo open duration 3 seconds.
- Button debounce 60 ms.

Test results

- The system correctly displays random 3-color sequences.
- APDS-9960 detects color input from the user.
- Servo opens doors when the sequence is correctly entered and closes after 3 seconds.
- Door state persists across power cycles via EEPROM.

Known issues

- Currently supports only fixed-length sequences.