Door lock and motion – activated lamp project

Problem
Many home entrances may require combined security and automatic lighting. Residents may forget to turn on the porch light when it is dark, and unauthorized access attempts can go unnoticed. The goal of this project was to create a system that:

- turns on outdoor lights automatically when motion is detected and it is dark;
- unlocks the door only with the correct password;
- activates an alarm if the wrong password is entered multiple times.

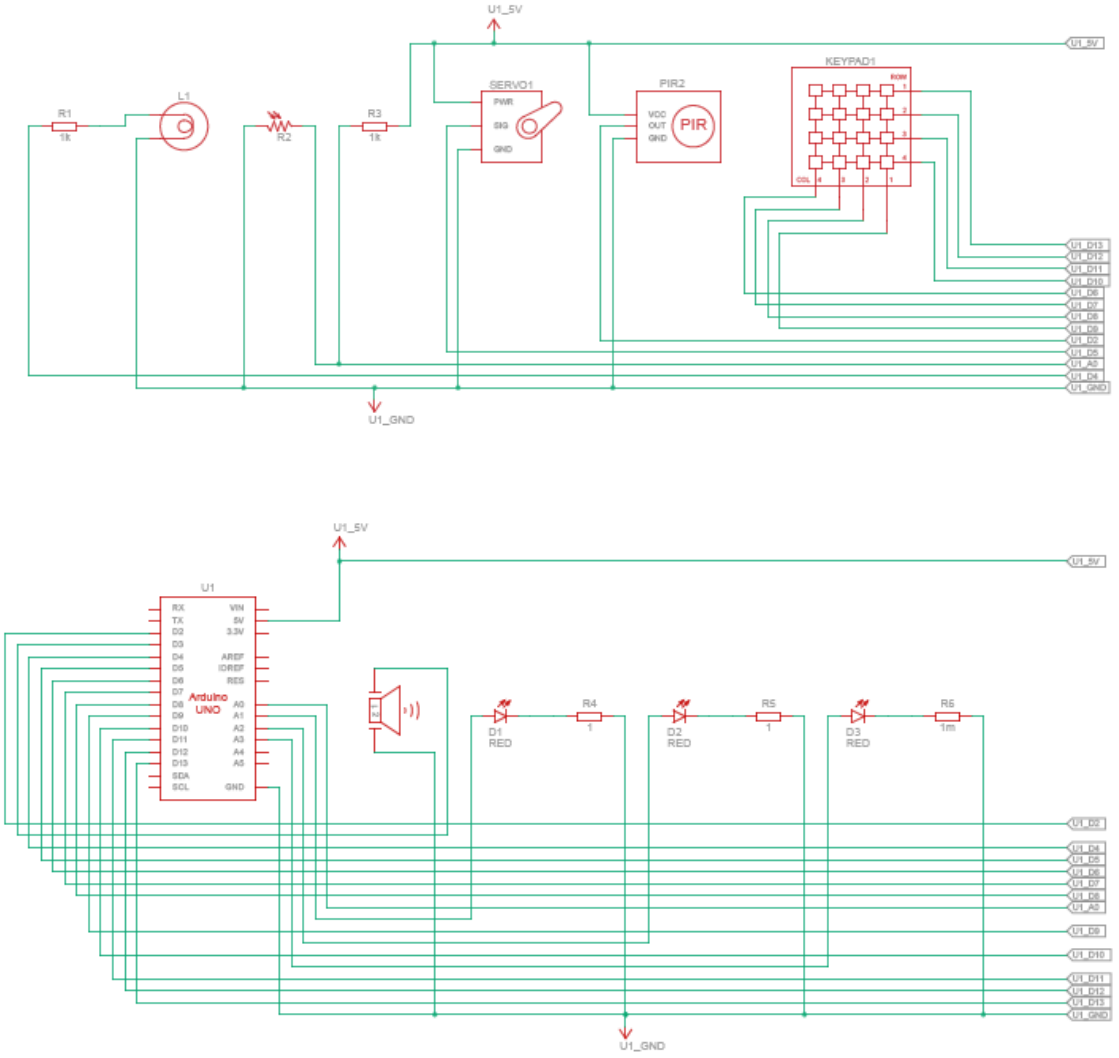
Design
The system is built using an Arduino Uno. A PIR sensor detects motion near the door, while a photoresistor measures light levels. If someone approaches the door at night, the light turns on automatically. A keypad is used for entering a password and a servo motor simulates the door lock mechanism. When the correct password is entered, the servo rotates to unlock the door. If the wrong password is entered too many times, the system triggers a piezo buzzer and flashing LEDs as an alarm.

Parts List

- Arduino Uno board
- PIR motion sensor
- Photoresistor + resistor
- Servo motor (door lock simulation)
- 4x4 keypad
- Piezo buzzer
- 3x LEDs + resistors
- Wires and breadboard
- Light bulb with resistor

Wiring/Schematic

- PIR sensor – D2
- Photoresistor – A0
- Light bulb – D4
- Servo – D5
- Buzzer – D3
- Keypad – D6 - D13
- LEDs – A1 - A3



What works

- Password input and validation.
- Correct password unlocks servo.
- Alarm system works after 3 failed attempts (LEDs blink + buzzer).
- The PIR sensor successfully detects movement, allowing the lamp to turn on automatically when the photoresistor measures low light levels.

Future improvements

- Add an LCD screen for clearer feedback messages.
- Allow changing the password via the keypad instead of hardcoding it in the program.