

Burglar Prevention System

Introduction

- The system described here is a home/office burglar prevention alarm built on an Arduino UNO. It is designed for indoor use in small spaces (rooms, apartments, garages). The user can arm or disarm the alarm by entering a secret code on the keypad.
- When armed, the PIR sensor watches for motion in the protected area. If the PIR detects an intruder, the system sounds a loud buzzer and automatically sends an SMS to the owner's phone via the cellular GSM network.
- The idea started from Mark Rober's glitter bomb for porch thieves.
- Thus, even a simple alarm can be a strong deterrent. Its low-cost and easy usage makes it a great system for usual resident.

General description

Block diagram



Hardware Design

- Components list
- Electric diagram
- Components list:
 1. Microcontroller board (Arduino UNO R3, DC 9V 1A, USB to Barrel Jack)
 2. Display (HD44780 + 20kΩ potentiometer)
 3. PIR motion sensor (HC-SR501)
 4. Keypad 3×4 (generic)
 5. SD Card module (generic)
 6. GSM module (SIM800L + 3dBi GSM antenna with a U.FL to SMA adapter + LM2596 DC-DC buck converter + USB-to-DuPont jumper cable adapter)

7. Buzzer (generic)
8. Servo Actuator (MG90S/SG90)
9. Power Supply (Power bank 5V)
10. Jump Wires
11. Breadboard
12. Fart Spray



Software Design

- Development environment: Arduino IDE
 - Libraries and 3rd party sources
 - Planned algorithms and structures to use
 - Environments: DEV and PROD
 - Sources and functions implemented: LCDDisplay, KeypadHandler, PIRSensor, GSMModule, AlarmSystem, setup(), loop()
-
- Development environment: Arduino IDE
 - Libraries and 3rd party sources:
 1. Display → LiquidCrystal_I2C.h
 2. PIR motion sensor → OUT pin
 3. Keypad 3×4 → Keypad.h
 4. SD Card module → SD.h, SPI.h
 5. GSM module → SoftwareSerial.h
 6. Buzzer → OUT pin
 7. Servo Actuator → Servo.h
 - Planned algorithms and structures to use:
 1. setup(): configure pin modes, initialize serial ports, initialize sd card and read the access code into memory
 2. main():
 1. keypad input: poll the keypad for any keypress; if a key is pressed, feed it into a code buffer; if # is pressed compare the entered code string to the access code
 2. armed state check: if system is armed, monitor PIR sensor; if motion detected, trigger alarm actions
 3. KeypadHandler
 4. LCDDisplay
 5. PIRSensor
 6. GSMModule
 7. SDManager
 8. AlarmSystem
 - Sources and functions implemented: [Source code](#)

Results

- System can be armed by set code
- Whenever motion is detected: receive sms, sound buzzer, emit fart spray
- Triggered alarm can be stopped only by entering the code

Conclusion

Resources

<https://docs.arduino.cc/hardware/uno-rev3/#features/>

<https://lastminuteengineers.com/sim800l-gsm-module-arduino-tutorial/#choosing-an-antenna/>

<https://lastminuteengineers.com/i2c-lcd-arduino-tutorial/>

<https://lastminuteengineers.com/arduino-micro-sd-card-module-tutorial/>

<https://www.electronics-lab.com/project/using-sg90-servo-motor-arduino/>

<https://lastminuteengineers.com/arduino-keypad-tutorial/>

<https://projecthub.arduino.cc/SURYATEJA/use-a-buzzer-module-piezo-speaker-using-arduino-uno-cf4191/>

<https://lastminuteengineers.com/pir-sensor-arduino-tutorial/>

[Export to PDF](#)

From:

<http://ocw.cs.pub.ro/courses/> - **CS Open CourseWare**

Permanent link:

<http://ocw.cs.pub.ro/courses/pm/prj2025/abirlica/gabriel.mirzea>



Last update: **2025/05/22 10:38**