Logo

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A 2FA Security System for securing single-entry rooms

DMN sYSTEMS

DMN Alarms

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Table of Contents

[Introduction 2](#_Toc116660732)

[Hardware 3](#_Toc116660733)

[Circuit Diagrams 3](#_Toc116660734)

[Hardware Requirements: 4](#_Toc116660735)

[Data, Data Storage and Data Processing 5](#_Toc116660736)

[What Data is gathered 5](#_Toc116660737)

[How it will be stored 5](#_Toc116660738)

[How it will be processed 5](#_Toc116660739)

[Security 5](#_Toc116660740)

[How to secure stored data 5](#_Toc116660741)

[Physical security 5](#_Toc116660742)

[The UI, User and User Testing 5](#_Toc116660743)

[The UI 5](#_Toc116660744)

[The User 6](#_Toc116660745)

[User Testing 6](#_Toc116660746)

[Versioning 6](#_Toc116660747)

# Introduction

Our IoT application is an alarm system for single-entry rooms containing valuable documents of some form. After passing fingerprint and facial recognition, the electric strike door lock is unlocked, and entry is granted. There is a door sensor to detect when the door is open and closed. A Database is used to store fingerprint, facial images, date, and time of access. Each stage of the process is accompanied by a speaker, buzzer, and LCD display to guide the user through the system. A flask website is to be used to facilitate a typical front-end user.

Team Members Roles:

David Campion: Frontend + UX

Michael Flynn: Database + Testing

Nathan Field: Backend + Testing

Nikita Fedans: Backend + Architecture

# Hardware

## Circuit Diagrams

**Circuit:**

Diagram

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**Fritzing circuit commentary:**

* Raspberry pi 3 used for diagram. (4 was unavailable)
* Assuming LEDs need 2.2 forward voltage, the resistor needed is a 68.75 ohm one.
* The grounds of all the LEDs may be connected, and then plugged into a single ground pin on the pi, freeing up n-1 ground pins.
* Momentary switch button will be used for sending a signal to raspberry pi.
* No physical pull down resistor is needed for the switch since an internal pull down resistor may be assigned to a pin through code.
* LCD display requires a large number of wires and specific part was unavailable in fritzing.
* On the PIR sensor in the fritzing diagram, the VCC, OUT, and GND are inverted compared to the PIR sensors bought from pihut, so exercise caution when wiring the real thing.

**Problems to solve:**

* Research how to restrict the “Field of vision” of the pir sensor to only see a specific area.
* Build homemade door sensor.
* Cross-communication of 2 raspberry pi’s for each side of a doorway.

## Hardware Requirements:

**Acquired:**

1x pir sensor

1x pi camera module (specially made, plugs into special port)

1x buzzer (works with GPIO and 220-ohm resistor)

1x speaker (hdmx, connected to aux, perhaps powered through USB)

**Purchases required:**

1x fingerprint sensor <https://thepihut.com/products/round-all-in-one-capacitive-fingerprint-sensor-d?variant=41540357849283>

1x USB to UART <https://thepihut.com/products/usb-to-uart-module-micro-mini-type-a-or-type-c?variant=41771472584899>

1x 1.3” IPS LCD Display <https://thepihut.com/collections/raspberry-pi-screens/products/1-3-ips-lcd-display-module-for-raspberry-pi-pico-240x240>

1x electric strike lock <https://www.amazon.co.uk/gp/product/B0027VB810?psc=1>

1x door switch (commercial or built)

1x button

# Data, Data Storage and Data Processing

## What Data is gathered

## How it will be stored

## How it will be processed

# Security

## How to secure stored data

Spoofing – 2-factor biometric authentication makes it difficult to falsify identity when using this system.

Tampering – Only admin have access to configuration of this system. Data changes and errors may be logged on the database.

Repudiation – Actions on this system are logged and tracked.

Information Disclosure – Use of env variables to prevent unauthorized access to database, hashing passwords.

Denial of Service – Firewall

Elevation of privilege – Controlled access on routes

## Physical security

System mounted to wall.

Locking mechanism.

# The UI, User and User Testing

## The UI

Flask website

LCD display



## The User

Graphical user interface

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Graphical user interface, text, application

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**A picture containing graphical user interface

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**Graphical user interface, text, application

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## User Interaction Flowcharts

1. Entering from the outside, available here: <https://www.canva.com/design/DAFPBEU1cgY/_33aS6_us3ViciJL2B3JKQ/edit?utm_content=DAFPBEU1cgY&utm_campaign=designshare&utm_medium=link2&utm_source=sharebutton>
2. Exiting from the inside, available here: <https://www.canva.com/design/DAFPB6XopUE/RulFr5eydPou51SDKPa_SQ/edit?utm_content=DAFPB6XopUE&utm_campaign=designshare&utm_medium=link2&utm_source=sharebutton>

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## Diagram Description automatically generated

## User Testing

# Versioning

Version 1: Document Creation – 07/10/2022

Version 2: Introduction, Table of Contents and Hardware requirements – 08/10/2022

Version 3: Updated team roles, hardware requirements, STRIDE, User personas and circuit diagram – 14/10/2022