

Software Design Document

Project Name: PSec (Portable Security)	Team ID: 4
Team Members: Thijs Frauenfelder, Katy Radzkova, Ayolt ten Have, Victor Zugravu, Frank Bosman, Mikus Vancans	Mentor(s): Priya Naguine & Radu Basarabá

Instructions:

- i) You must explain all the given sections clearly and concisely.
- ii) You must fill in the basic information about your projects such as Project Name, Team Members, Team ID, and Mentor(s). ✓
- iii) Make sure to consider the checklist of the Design phase provided in the Security by Design document.
- iv) The length of the document should be 4 to 8 pages (including the diagrams).

1. Introduction

Psec is a mobile security system that users can install themselves without the need for a specialised technician or any tools. The system can be placed down wherever users think is best for their security and where they feel most comfortable. Once a user finds the optimal spot for the Psec, it can be powered up, from where it starts its startup sequence, allowing you to log in and begin viewing from the camera's perspective from the web app.

The product consists of two parts, a physical installation consisting of a camera, microphone, motion detector, a keypad and the raspberry pi encased in a secure box and a digital web interface where the user can monitor the area, listen in if something is happening and get notifications once an intruder is detected.

The Raspberry Pi is able to host the digital interface, encrypt the data that is transferred online and process the data from the sensors. A keypad, which can be located near the camera system, can be used to temporarily disable the security system, for instance when the user does not wish to have it on alert while they are at home, using a temporary keycode provided by the web app interface.

2. Functional/Non-Functional Requirements

As the requirements from the RAD have not been changed as of yet, the same requirements apply.

3. Architectural Design

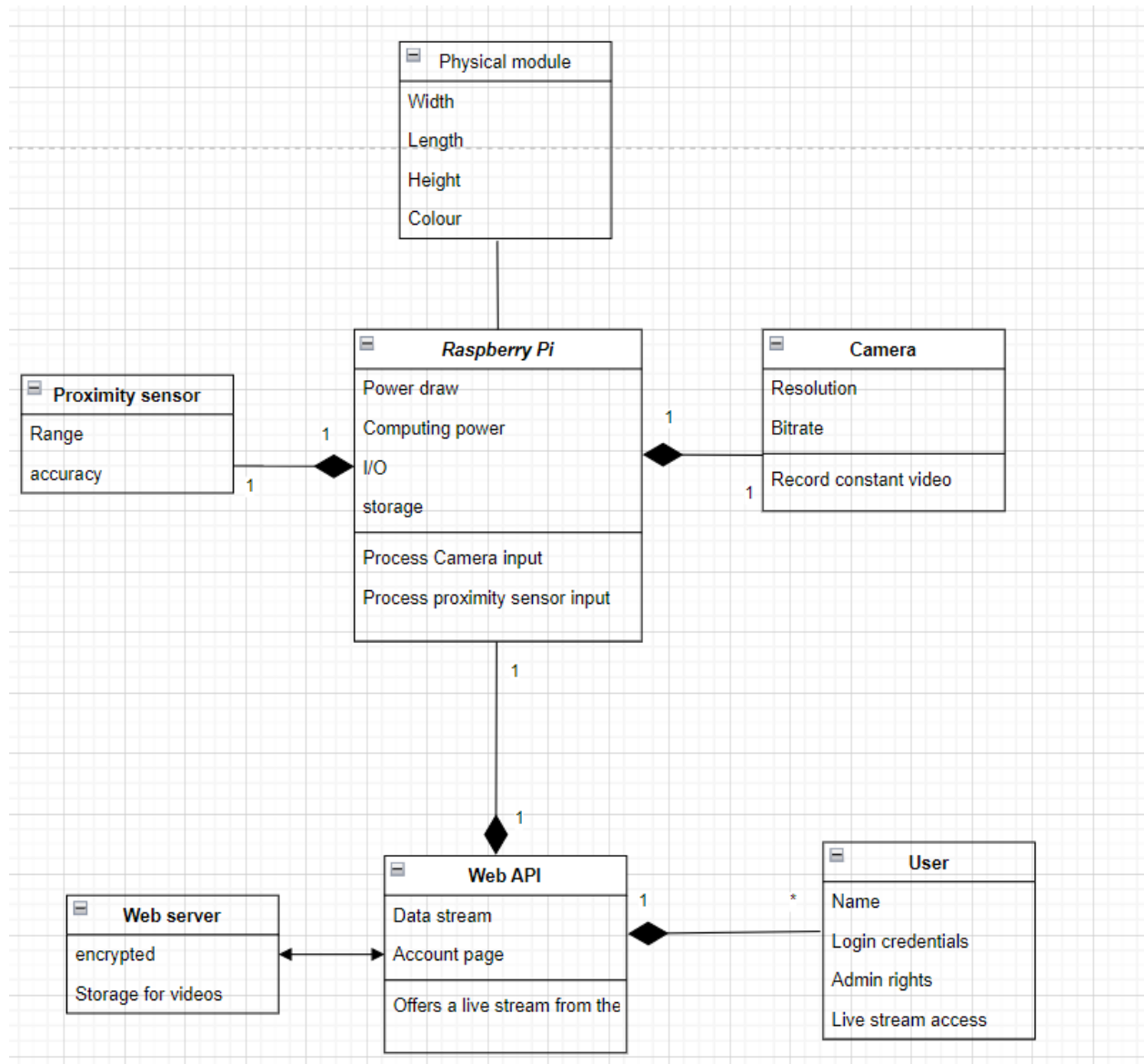
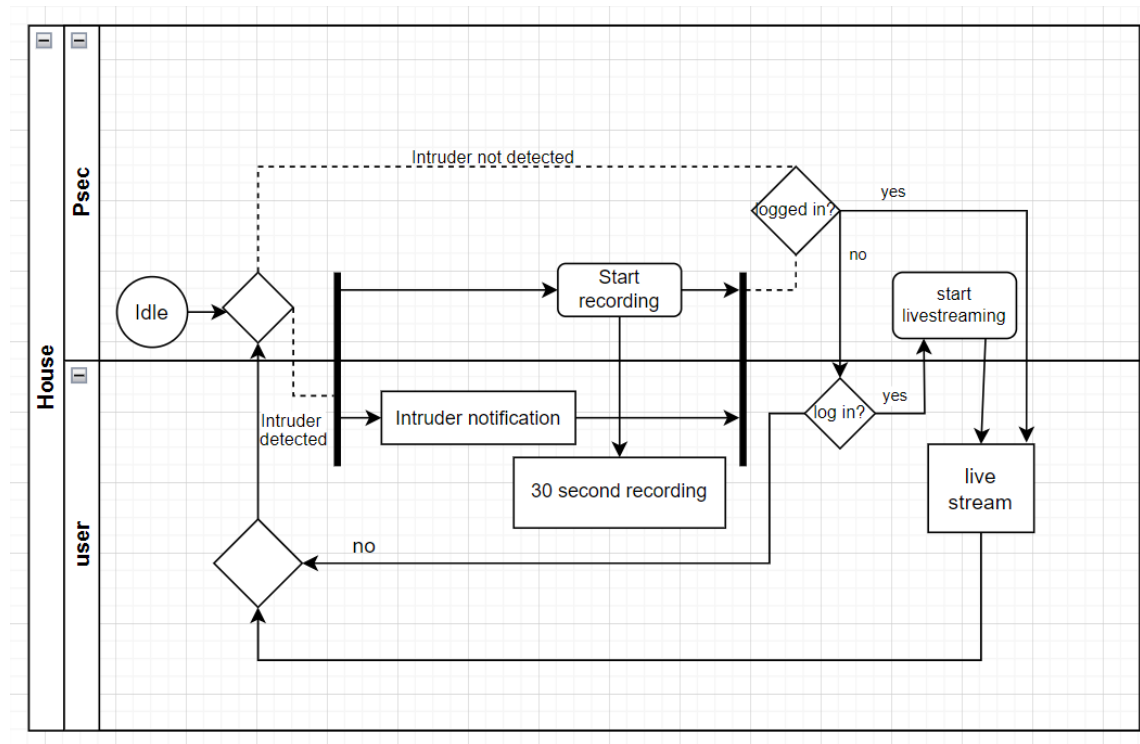


Fig 1, Class diagram

In the class diagram above, we can observe how our system is organised. The physical product is centred around the Raspberry Pi which is connected to a camera and a proximity sensor. The raspberry pi communicates with the web API which processes the live stream and provides easy access to it to the user.



The activity diagram exhibits the flow of the system. In the idle state, Psec checks for activity and if found, it proceeds to send a notification to the user as well as then takes a video of the next 30 seconds which it uploads to the dashboard of the user. If the user is logged in, the system provides a continuous live stream beside the intruder detection.

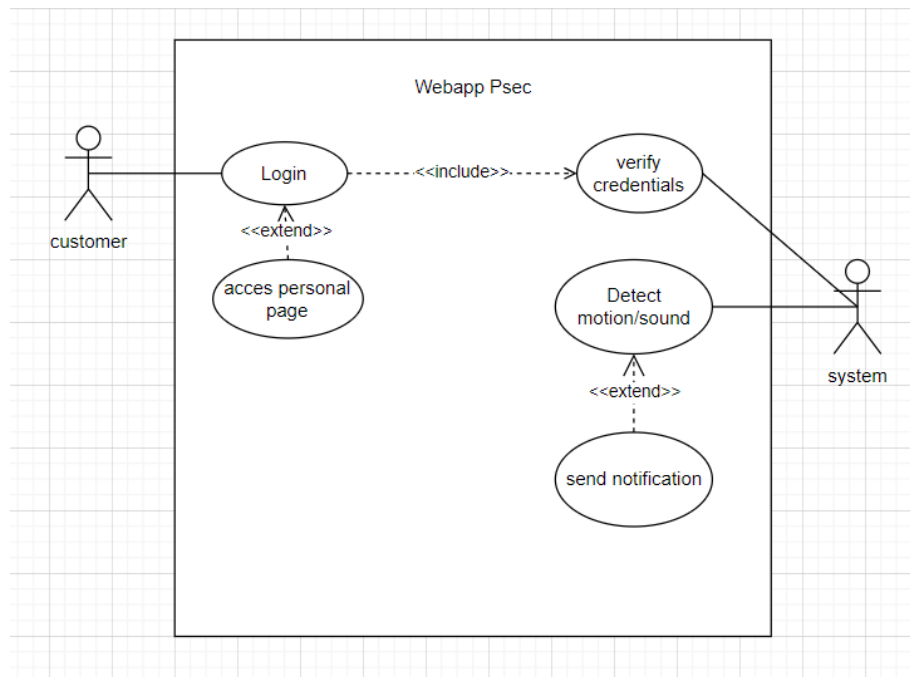


Fig 3, Use case diagram of the web interface

The two actors that will interact with the web interface of the system are the owner of the security system and the system itself. The owner may log in through the web interface. The System will then verify the login credentials. Given that the credentials are correct the owner then has access to their personal page and security system.

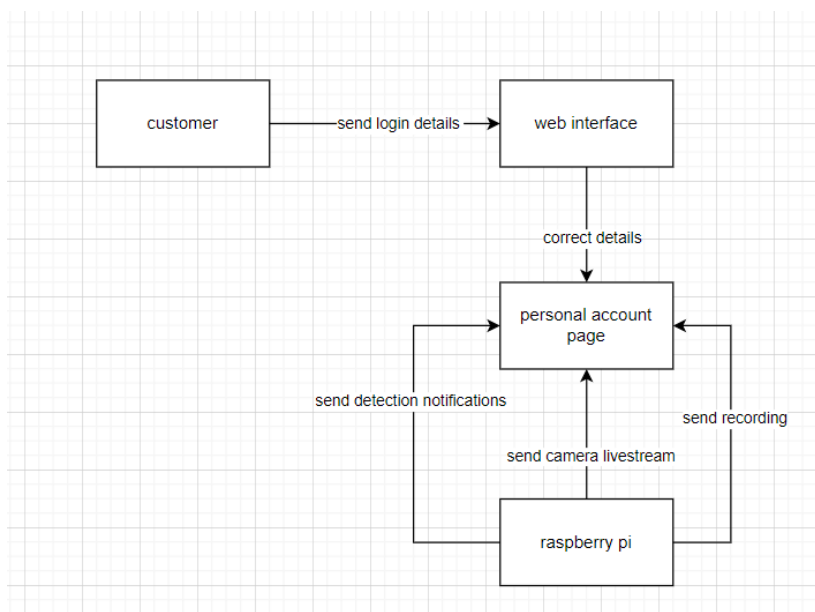
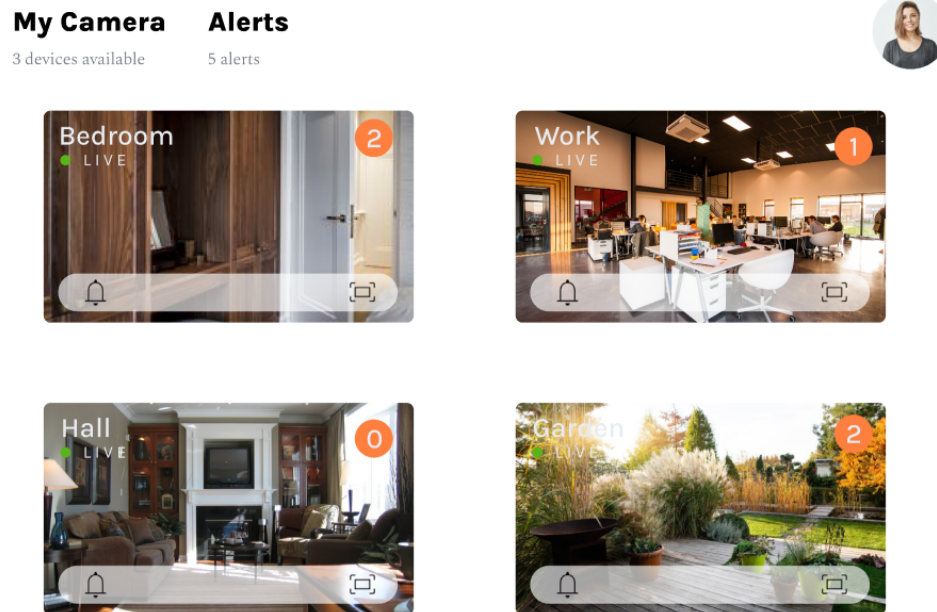


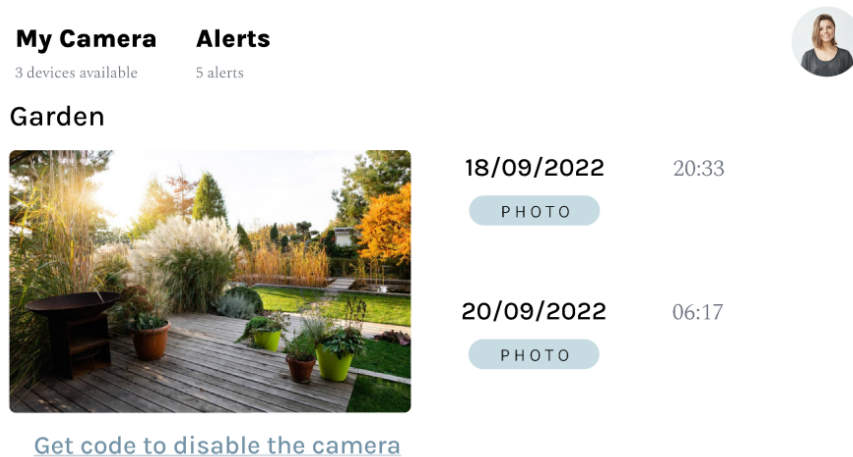
Fig 4, Data flow diagram

Most of the data in the system will flow from the Raspberry Pi to the web interface. This will be through the personal account of the owner of the security system. The data that will come from the user will only be their login credentials which will be verified by the system and allow them to connect to their personal account.

4. Product User Interface



Main page with an overview of all the spaces (in our case only one space according to the limitations presented earlier), quick access to the alerts info and Livestream.



Individual camera page. Provides access to the Livestream of the area, an overview of the previous alerts with an option to access the photo. Also contains a link that provides a randomly generated temporary code that allows the user to disable the camera.

Module 5- Computer Systems (2022-23) Project

UNIVERSITY
OF TWENTE.

My Camera

3 devices available

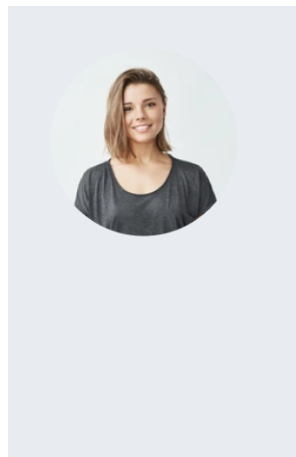
Alerts

5 alerts



Work	06/08/2022	12:31	PHOTO
Bedroom	08/08/2022	10:04	PHOTO
Bedroom	11/09/2022	23:49	PHOTO
Garden	20/09/2022	06:17	PHOTO
Garden	18/09/2022	20:33	PHOTO

The Alerts page provides a list of all the alerts with information about the area name, date and time of alert and a link to access the photo taken after the motion was detected.



username

example@gmail.com

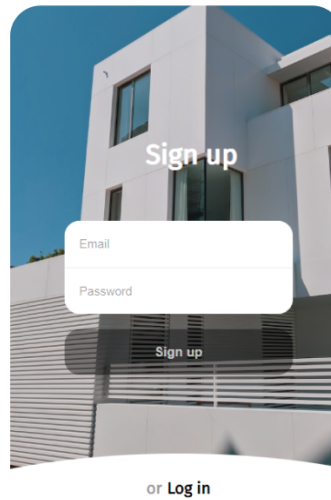
[change password](#)

[add camera](#)

Profile page. Allows users to change the password as well as add another camera (not a part of MVP).

Module 5- Computer Systems (2022-23) Project

UNIVERSITY
OF TWENTE.



Sign up/Log in page. Required to authorise a user so that to have access to his/her personal digital space and its functionality. Needed to ensure security of the stored data and privacy of the users' data (sign up to setup the PSec digital space).

5. Prevention/Mitigation Criteria (Security Controls)

- Video streams should be encrypted through the HLS video encryption protocol.
- All web traffic should be made using HTTPS, which is HTTP transferred over an encrypted TLS/SSL connection.
- Passwords should be hashed both in the browser and on the server side with an SHA-256 hashing algorithm.
- Passwords should be salted and peppered both in the browser and on the server side.
- The user must be able to access only their own cameras and recordings via their personal log in details.
- The server should only have ports open relevant to HTTPS (port 443), so attackers can't access it through SSH or other file transfer protocols.
- The recordings should be stored on the camera so that they only have to be transferred through the internet if you want to watch the recordings on your device.
- All text inputs (like login and register pages) need to be sanitised to prevent SQL injections.
- The SQL server will be hosted locally on the Pi to reduce the number of attack vectors.

6. The cost involved (if any):

- Costs for security
 - Streaming encryption (AES-128), done by week 8
 - HTTPS encryption, done by week 8
 - Password handling, done by week 8
 - Authorisation, done by week 7
 - Input sanitisation, done by week 7
 - Port closing, done by week 7
- Costs for Hardware

Item	Price	Comments
Raspberry Pi 4	/	Already attained
Web camera	16€	Web camera
Microphone	8€	Microphone
Small display	/	Display , already attained
Keypad	/	Keypad , already attained
Power supply	/	Already attained
Motion sensor	2.30€	Motion Sensor

Total:	~27€	
--------	------	--

7. Conclusion:

To conclude, the Psec system is meant to be a simple and mobile security solution for a wide range of potential users. The inner workings of the system are straightforward, however, they are well thought out and function well together and still provide optimal intruder detection in a small package.

The web application itself features a simple and sleek design, an interface easy to understand for most users. This includes simple menus for use when the user is on the go as well as interface buttons which are easy to hit, improving accessibility for the users. The structure, as well as the security features of the system, make sure the intended user is the only person with access to the web app and its features.

The user's passwords will be kept safe as well as any online traffic occurring between Psec and the web application. Measures will be put in place to make sure intruders do not have the chance to inject SQL lines or communicate through any of the Raspberry Pi's ports.

As for costs, on the security side, it is quite clear what needs to be done and some parts will warrant a couple of hours to be properly installed, however, we plan on having most of those done within the next weeks. For hardware, we already are in possession of more than half the required parts, however, the sensors are still missing. The cost of these combines to roughly 27€.