sPi - Camera Surveillance System

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1 Repository

All the related files are stored in this repository:
https://github.com/r0mac09/MS-sPi.git

2 User (customer) needs

An unknown, uninvited person or an object is at the user's front door while that person is away from home or isn't expecting any visitors.

3 Description of the solution

A system using a RaspberryPi and a Pi camera to stream/process (depending on the processing needs) data from the house straight to the user of the service's servers(a more powerful laptop in our case) to be processed with minimum latency to determine if unknown entities are present at the front door (this is just an use case) and notify the user and, if possible, to take an action.

4 User requirements and features

- A system which provides information about the environment

- Alerts during user specified periods, if there's any movement, a person or something changed in a specific area

- Communicates with the user through an app or a website

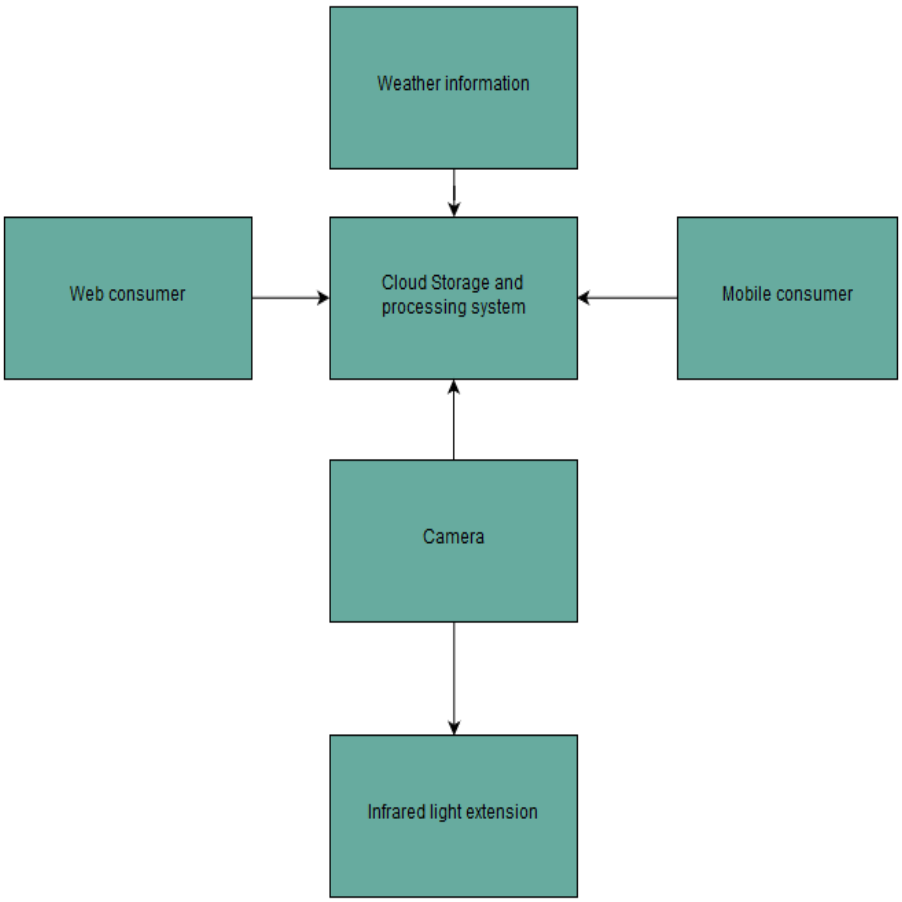
- The system should run in an environment that provides a 24/7 access

- The system should recognize objects or persons

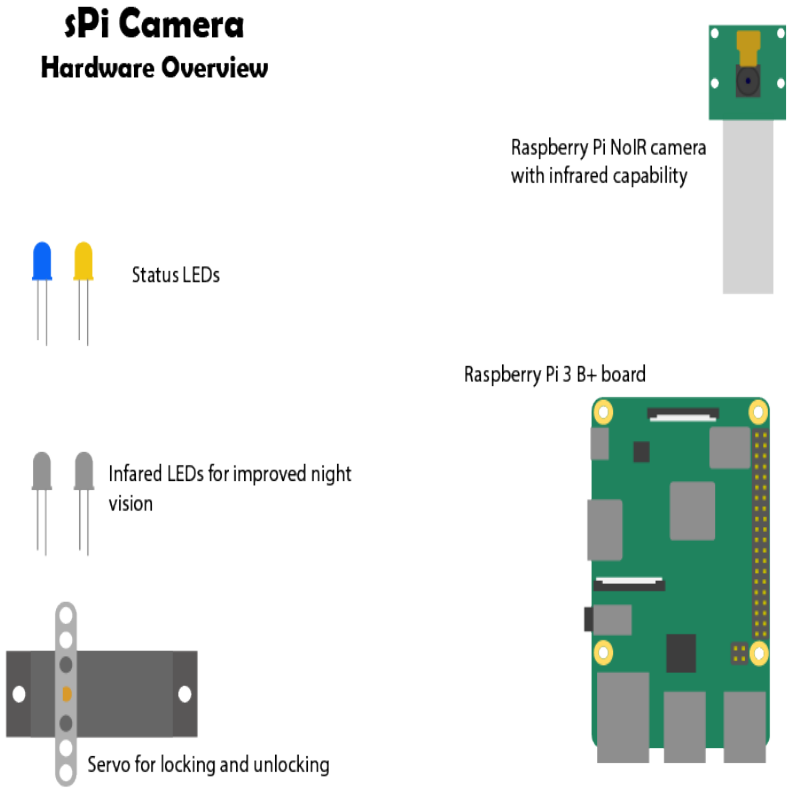
- The system may provide access to history data for a certain period of time

- The system may be suitable for outdoors (weatherproof)

5 System overview



6 Circuit design



7 Software design

7.1 Python modules

smtplib:
defines an SMTP client session object that can be used to send mails to any Internet machine
email.mime:
creates email and MIME objects from scratch

RPi.GPIO:
provides a class to control the GPIO on a Raspberry Pi
NumPy:
provides converting images to numerical arrays
OpenCV:
provides Image processing, face detection and recognition
Pillow lib:
provides handling Images

8 Results and further work

The current version of the project supports the following functionalities:

· Face Recognition

· Notification via mail

· Status LEDs

The following list of extensions and improvements was identified to be supported in the future:

· A servo for locking and unlocking the door

· Infrared lights for improved night vision

· Cloud and on machine storage

9 References

1.OpenCV [last seen May 2019]: *https://opencv.org/*

2.DrawIO [last seen May 2019]: *https://draw.io*

3.smtplib [last seen May 2019]: *https://docs.python.org/3/library/smtplib.html*

4.Email.mime [last seen May 2019]: *https://docs.python.org/2/library/email.mime.html*

5.NumPy [last seen May 2019]: *https://www.numpy.org/*

6.Face Recognition [last seen May 2019]: *https://circuitdigest.com/microcontroller-projects/raspberry-pi-and-opencv-based-face-recognition-system*