



Embedded Lock Recognizer

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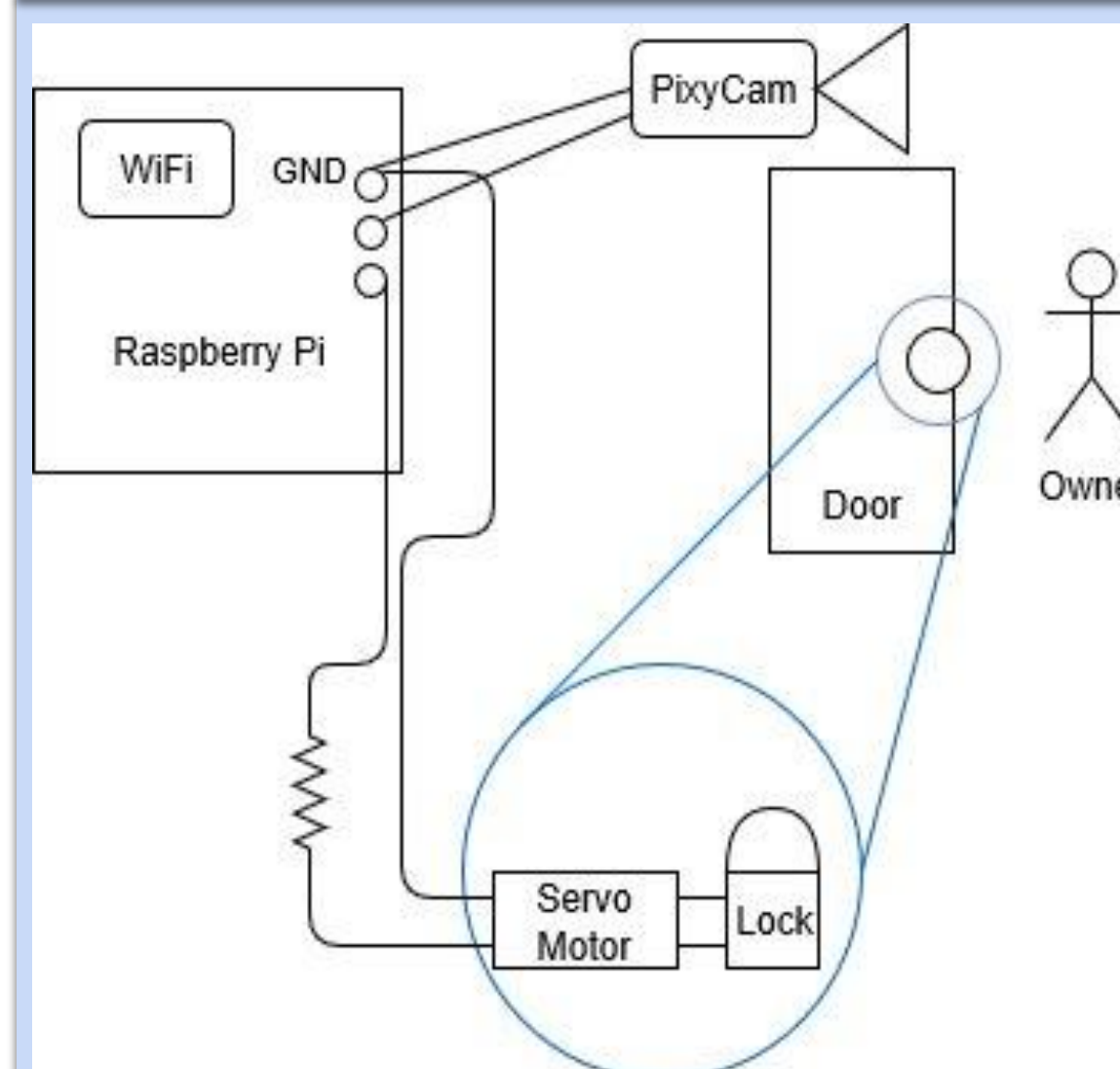
Goal and Objective

Build an embedded IoT lock system able to detect, identify, and unlock for the people that are recognized as owners. This embedded device will be able to add security to any system. The secure lock system is based on image recognition and secured networking, and it provides reassurance to people and their belongings or homes by having authorization only for recognized owners. System will be designed so that it can work with any type of lock system (home door, locker, safe).

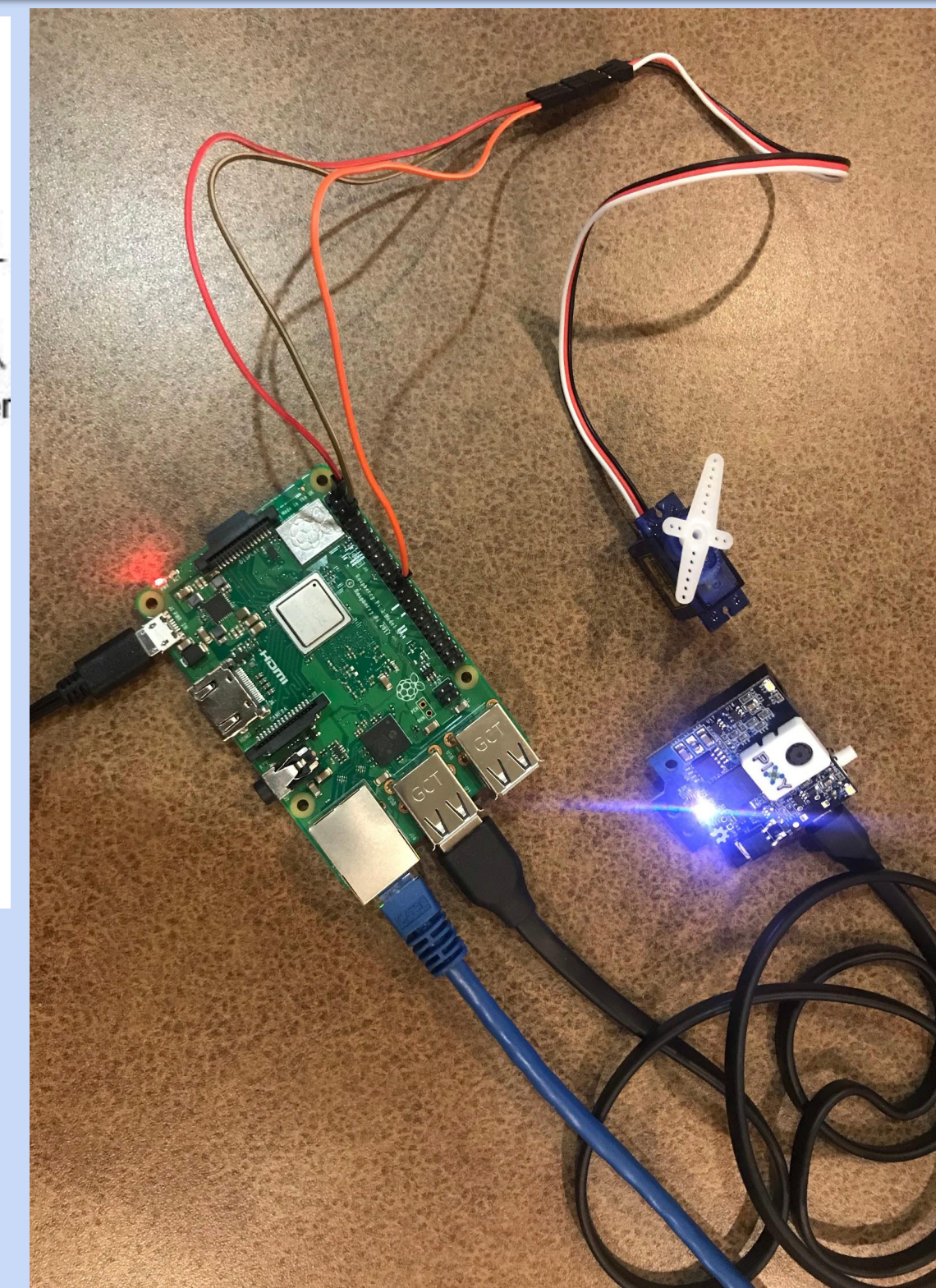
Approaches

- Using a Raspberry Pi camera to capture a face image of the person who wants to open the lock.
- Using client-server networking to send images to a server to process the image and do image processing such as facial detection and recognition using OpenCV libraries.
- Server responding to the Raspberry pi client a signal to open the lock or keep it closed whether the person is recognized as the owner
- Creating a private key to secure communication through networking.
- Modelling the lock and key system 3D print.

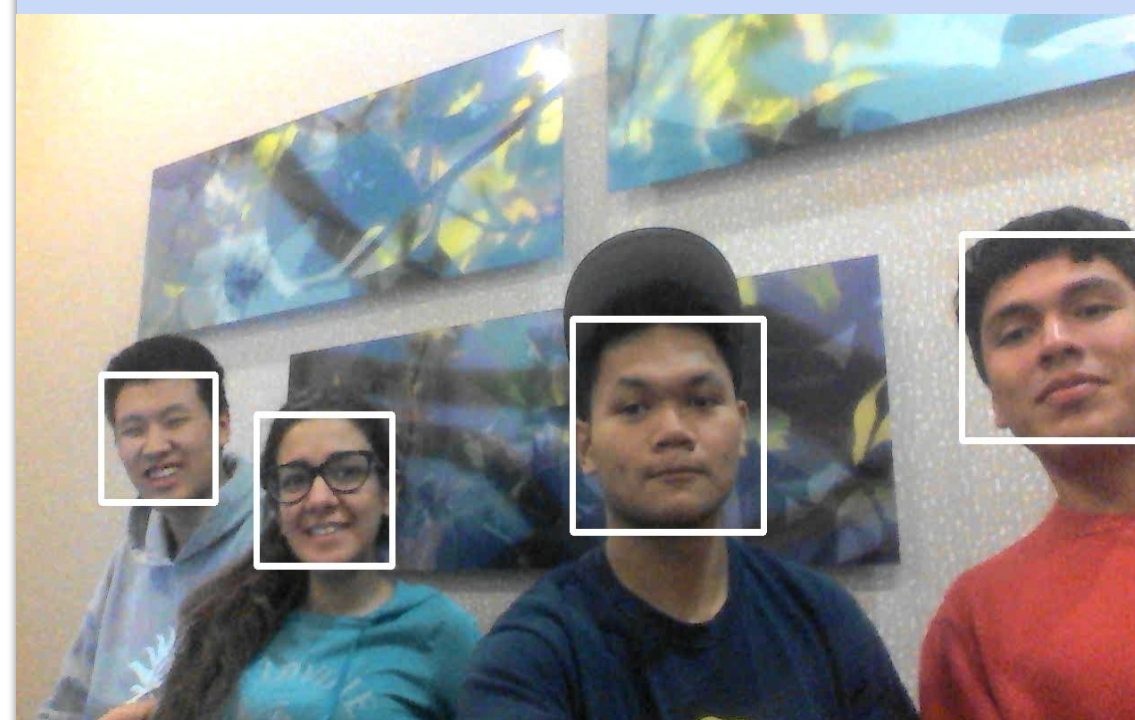
Diagrams and Images



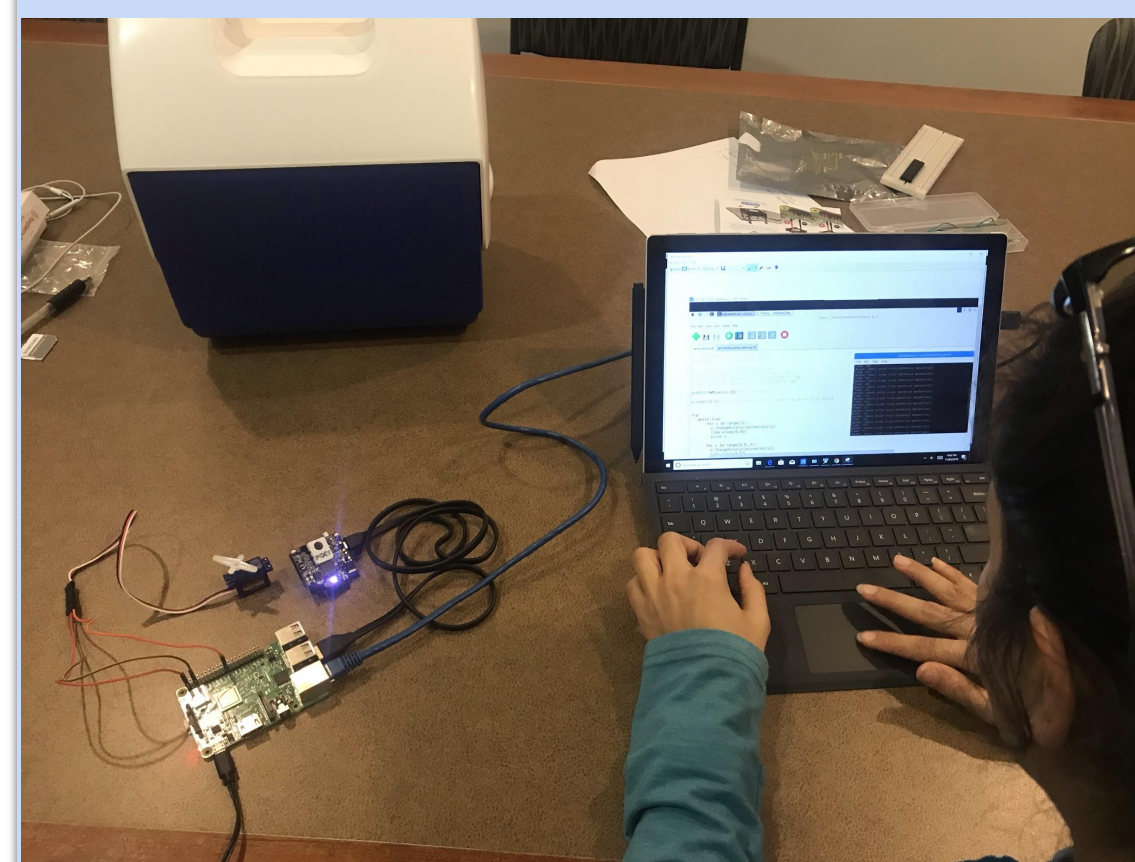
hardware architecture design



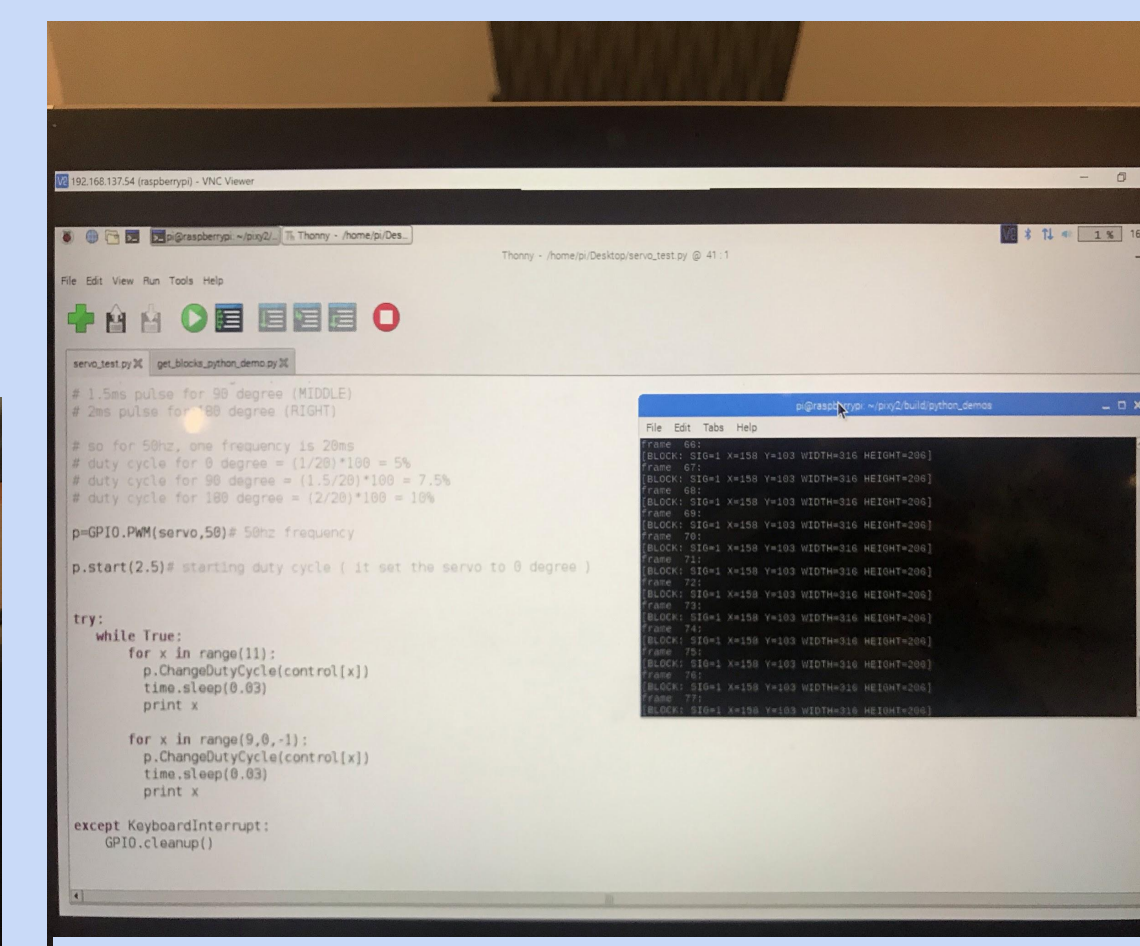
raspberry pi signalling servo



face detection and recognition



raspberry pi + servo + camera working



raspberry pi to laptop networking

Progress and Challenge

- Raspberry pi, pi camera, servo and laptop are connected together.
- Successfully enabled network for raspberry pi by ethernet cable or by wifi access.
- Pi cam can capture images, but not able to store images and send through network yet.
- Source code for face recognition have been finished and it works successfully.
- The code for signalling the servo works, and the servo is connected successfully.

Future Work

- Be able to store images in raspberry pi when pi cam captures them and send it by network.
- Be able to receive the images from raspberry pi to the laptop to do image process. After that, the laptop should send a signal to pi.
- Pi should be able to receive signal from laptop and twist the servo to open the lock.
- Design and build a lock system that can house the embedded lock recognizer device.



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