

Our project consists of a facial recognition program that will use deep learning to recognize faces and activate a motor that will unlock a dorm room lock.

We will use OpenCV to create 128-d encodings of faces from many images of a given person. These encodings for each person will be stored on a remote server and will be accessed from a Raspberry Pi and a mobile app through the Internet. We will use a Raspberry Pi with a camera peripheral directed through the peephole on the door to detect phases and compare them to our database of recognized faces. If the face is found in the database, the Raspberry Pi will activate a motor that will turn the lock from the inside of the room.

- The first software component on the Raspberry Pi will consist of a Python script that uses OpenCV to recognize faces on a live stream. This data will then be sent to a server through HTTP to determine if the door should be unlocked.
- The second software component on the Raspberry Pi is a script that activates the motor depending on the response from the server.
- Another software component will be on the remote server and will be able to accept data, compare it to known face encodings and return a boolean indicating whether or not the door should be unlocked.
- The final software component will be an iOS application which will allow the user to upload pictures of people to give them access, to grant access remotely with the press of a button and to receive notifications when someone unlocks the door, with a picture of the individual.

Prototype:

The prototype will be experimental because we will start by creating the facial recognition program on a powerful computer with an integrated camera before moving on to the Raspberry Pi. The code will have to be significantly modified to work on a the Raspberry Pi which has much less computing power.

The prototype will be vertical because we will be exploring facial recognition, the activation of motors by a Raspberry Pi and the creation of a remote server independently at first to get a strong understanding of each component of the project before bringing it together. For instance, we will start by making the Raspberry Pi turn a motor without taking into account how the other parts of the project will lead to this action.

Hardware:

- Raspberry Pi
- Peripheral Raspberry Pi Camera
- Servo motor

Challenges anticipated:

- Creating an efficient facial recognition script that will run smoothly on a Raspberry pi, which does not have much computing power for such a task.
- Obtaining a clear and non-distorted video stream through the peephole with the peripheral camera.
- Designing a motor attachment that will be able to turn the lock consistently