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P.A.S.S. (Personnel Activated Security Device)

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What is P.A.S.S.

P.A.S.S. is a multistage point-of-entry security device. The purpose is to use multiple methods of identification instead of relying on a single method. All three identification methods must be satisfied to be granted access to the room. The three identification methods (device used) are:

- Personal Keycode Number (Keypad)
- Facial Recognition (Camera)
- Hand Area Analysis (Camera)



Keypad

The keypad is the simplest form of identification to use. This means it is also the easiest for someone to use a keycode number that is not theirs. While it is not very secure on its own, the keypad entry serves as a starting point for the rest of the system.

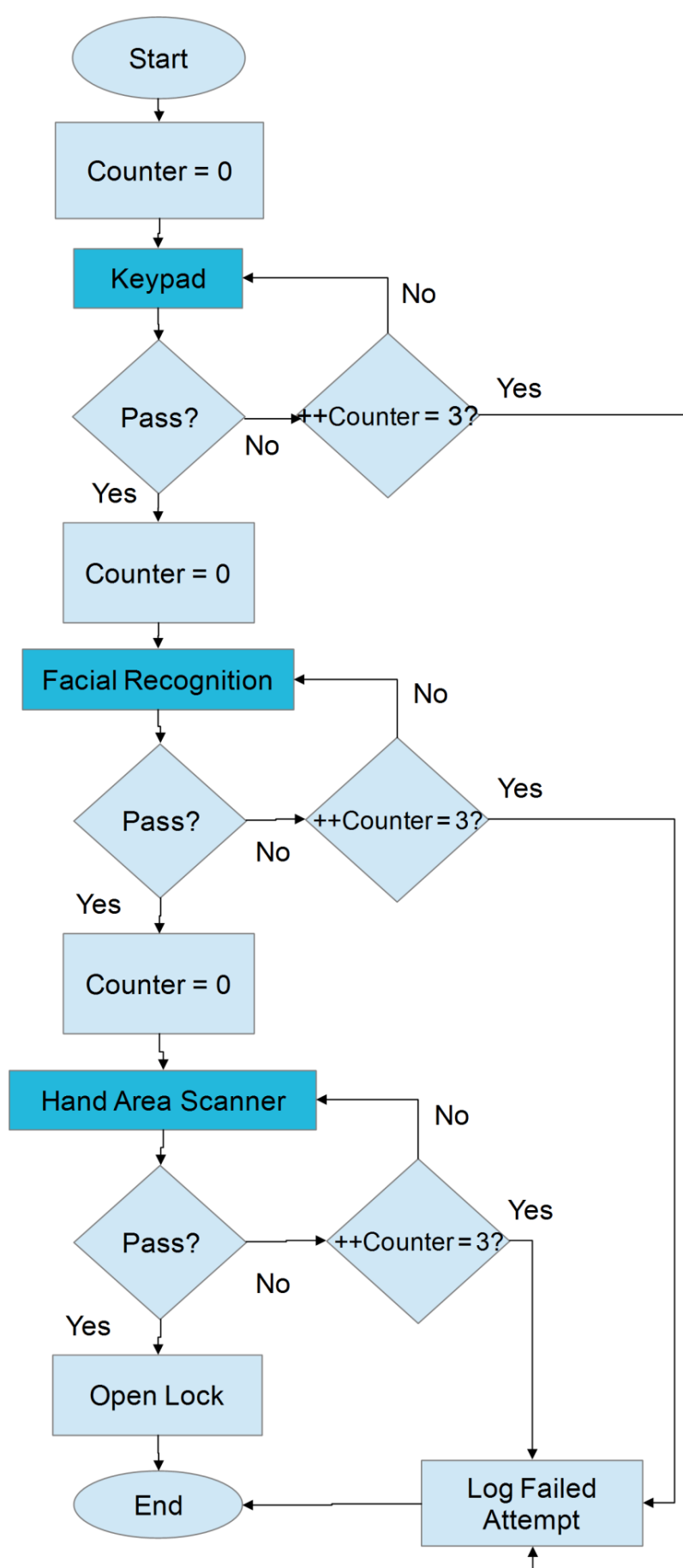


Facial Recognition

This method of identification is more difficult to break as it requires someone to either have an identical face as the user or have a good enough image of the user's face in the correct orientation and similar lighting conditions.

Hand Area Analysis

Measuring the area of the user's hand as a requirement for access adds another level to the security of the device and another level of difficulty for someone trying to break into a room.



The System

The first thing a user will do is input their personal keycode number. If a valid number is recognized, the camera for the Raspberry Pi will take their picture for analysis. After the face is recognized as valid the user will place their hand up for analysis. Once the hand area is found it will be compared to the value for that user and if acceptable the user is granted access to the room. If at any point in this process the keypad input fails three times, facial recognition fails once, or hand area analysis fails once the system is reset and must start again.



OpenCV and Eigenfaces

The program that is used for facial recognition is called OpenCV. It uses a low level of facial recognition implementing Eigenfaces to give a pass or fail. Eigenfaces is a name given to eigenvectors used in facial recognition. Given a set of accepted faces and a set of declined faces, given that all the pictures are taken under the same lighting and sized the same, will go pixel by pixel to get values used for eigenvector and coefficient calculation. Then when the faces are properly trained, we can take a picture of a face and related it to the training data to give entry.

NORTHROP GRUMMAN



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