Fingerprint Lock

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Introduction

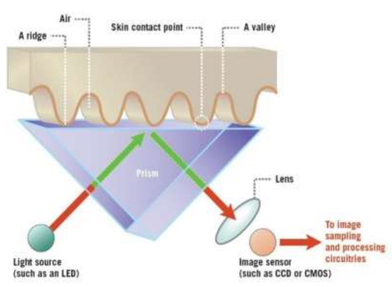
- People need to get strong their security.
- There should be an access controller which is controlled by unique property of people
- Biometric identifications are more useful for access control.
- The project's main idea is using fingerprint identification for locking.

Application Areas

- Fingerprint access controller can be used different places, such as door locks, work places, phones etc.

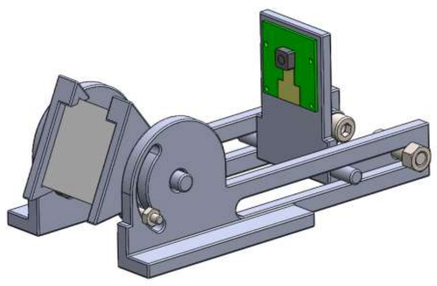
Specifications and Design Requirements

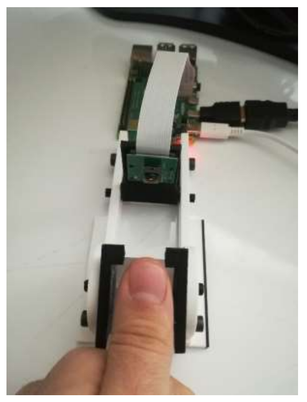
- The project has hardware and software parts. There is an optical fingerprint scanner in this project. And, for fingerprint recognition, some filtering and matching alghorithms are used. Finally, there is a solenoid lock which controlled by Raspberry Pi.



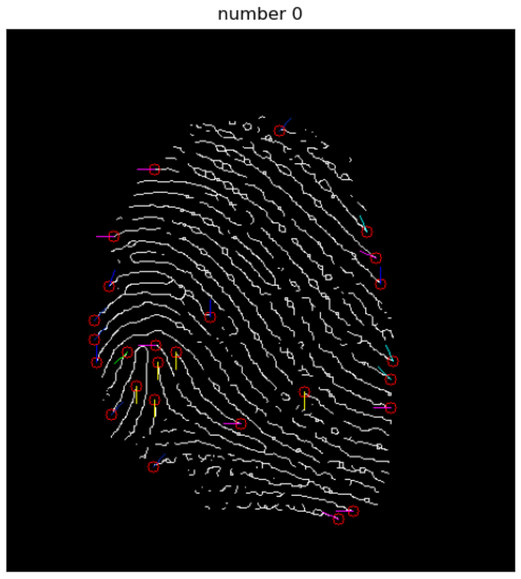
Results and Discussion

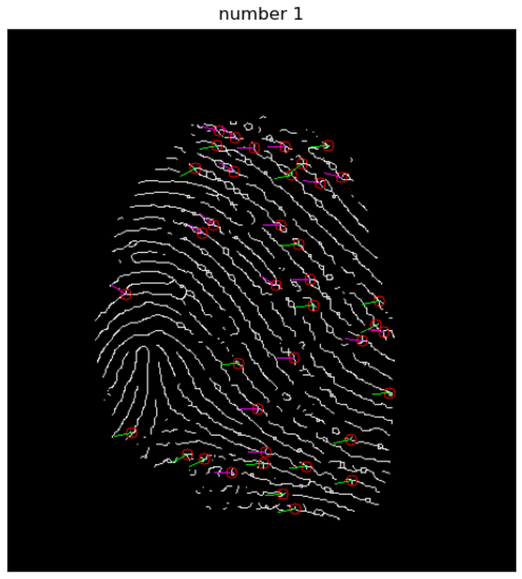
- Here, the scanner design of the project is seen below both design image and printed version.





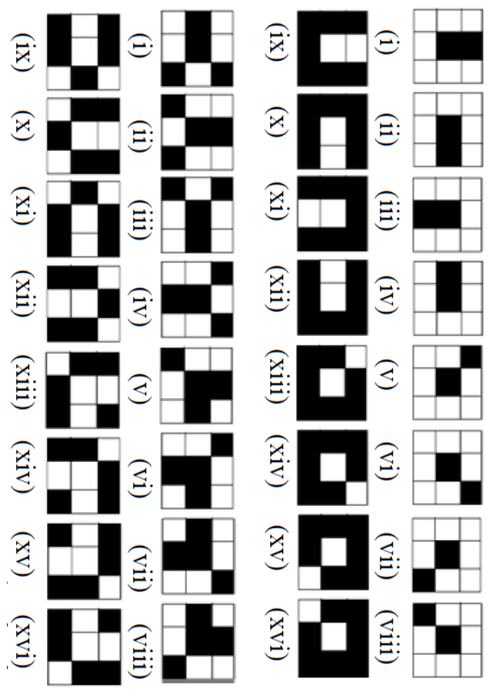
- The figure below shows some minutiae points of a fingerprint image.





Solution Methodology

- Most of fingerprint recognition systems used minutiae based recognition. There are several type of minutiae points.
Two of these types are important for us, bifurcation and termination.
At right there are several minutiae point patterns. To get these patterns The input image should be preprocessed. These preprocess steps are gray scaling, binarization, erosion, dialation, thinning and etc.



- After some pre processing operations, we should detect minutiae points and orientations.
At right there is a figure about preprocessing step results.

- If we have the keypoints, we can use matching alghoritms such as SIRF, ORB etc.

References

- FCV2000 (Fingerprint Verification Competition) Sources *http://bias.csr.unibo.it/fvc2000/download.asp*
- R. Bansal, P. Sehgal, P. Bedi, "Minutiae Extraction from Fingerprint Images", University od Delhi, September 2011
- Open Course: Lecture – 19 Biometrics, Prof. Phalguni Gupta *https://www.youtube.com/watch?v=0OGUjpRbPEU&list=WL&index=157&t=0s*
https://nptel.ac.in/

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