DESIGN MOCKUP

1. Empathise
2. Define the problem
3. Ideate the problem
4. Prototyping
5. Test

1. Empathise :

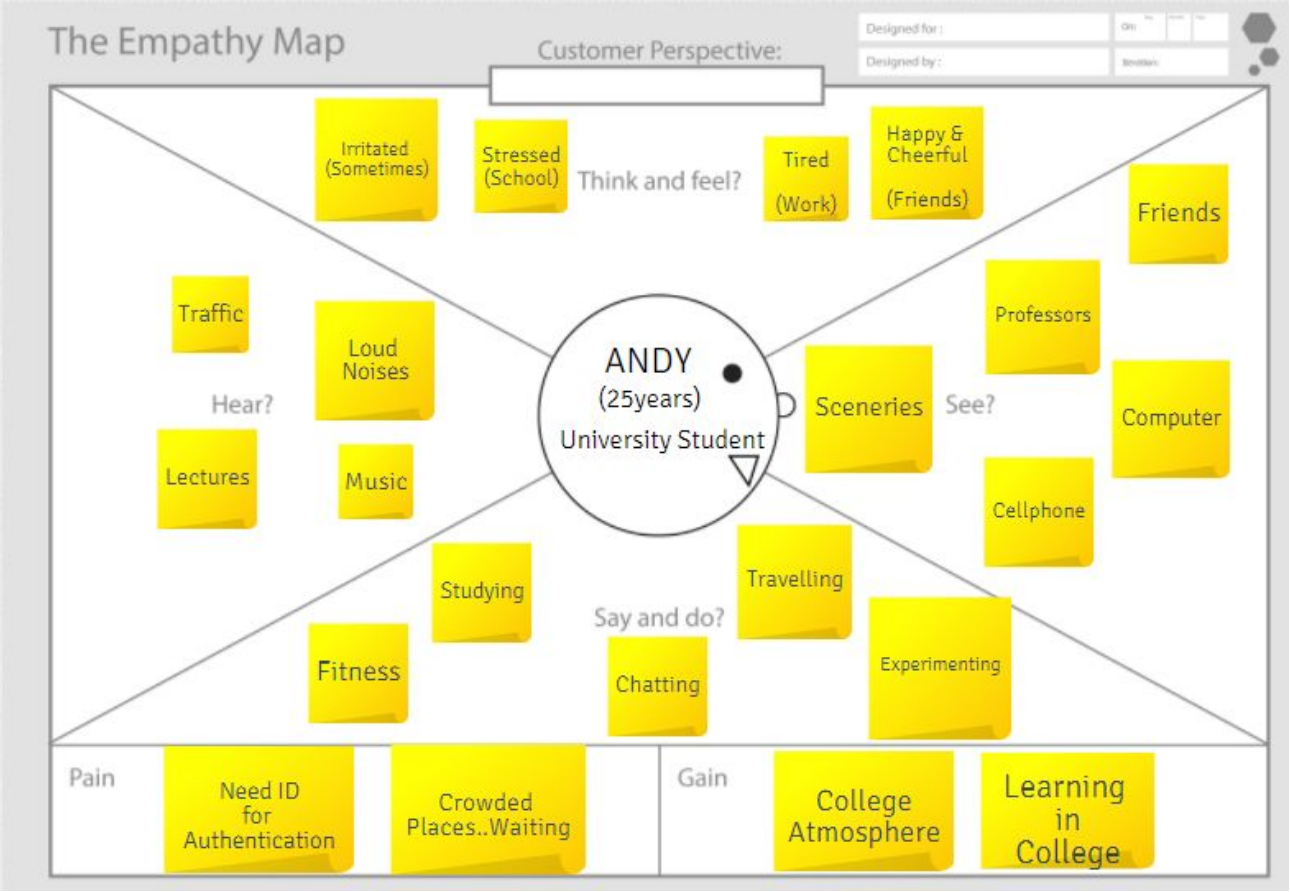

Fig1: Empathy map of university student

Observations:

From the empathy map it can be observed that :

- Andy's is a typical university student **(Think and Feel)**
- She has a busy schedule with lectures and travelling **(Hear)**
- She spends of most of her time in the university **(See)**
- She faces difficulty waiting in places where ID card is needed for authentication **(Pain)**

2. Define the problem Statement :

Fingerprint based authentication System

Build a low-cost Internet of Things (IoT) based Biometric system used for authentication using Raspberry Pi and cloud computing with use of Cryptographic algorithms to maintain the security of biometric traits.The system can be used for maintaining security by recognizing biometric traits of a person.

3. Ideate the problem :

The authentication methods used currently are entities that could be lost, stolen or easily forgotten like keys, ID cards and passwords. To overcome this issue, biometric authentication can be used wherein individual's biometrics traits are used for authentication like fingerprint, face recognition, retina detection etc. As no two individuals will have same biometrics, this kind of authentication method provides a unique identification.

In this paper, we are proposing a system which uses biometric system where fingerprint is considered for authentication. The hardware requirements and the process flow is further discussed in the prototyping.

4. Prototyping :

Architecture

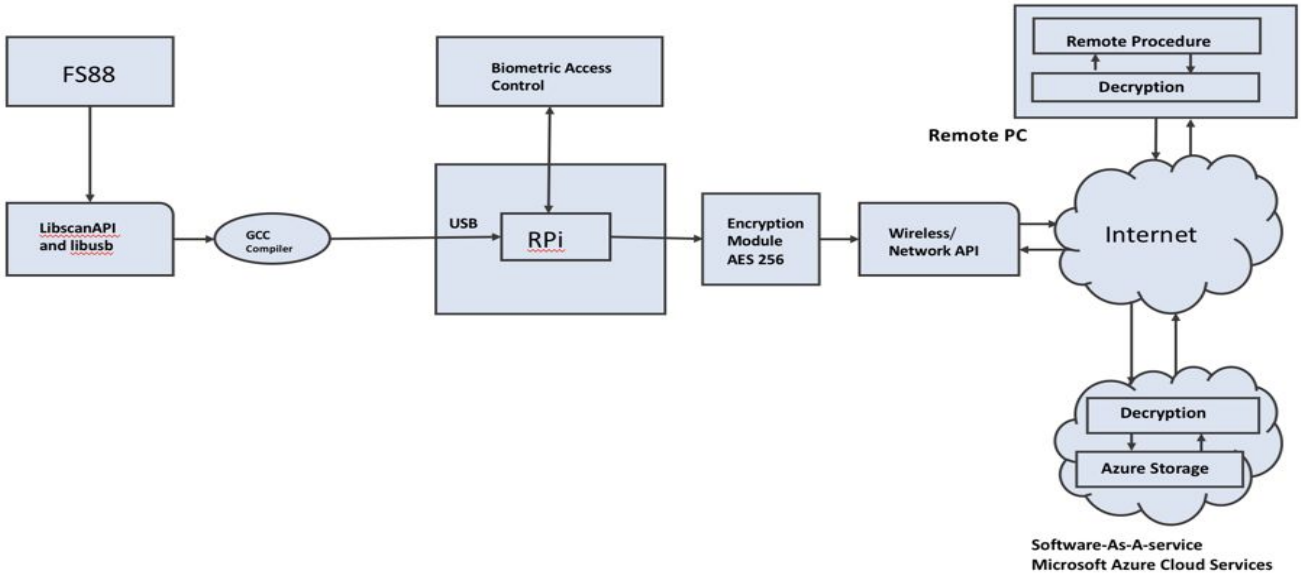

Fig2: Architecture of the proposed system

Hardware Components

1. Raspberry Pi

Raspberry Pi is a device which is small in size but provides us almost all the features that a desktop or Personal Computer provides. The Raspberry Pi has an ARM 700 MHz processor with 1GB memory. For storage, a MicroSD card is used. It has Graphic processor and also ethernet port for internet connections. USB ports are available for connecting external devices, Micro USB port is provided for power supply connection. Hardware devices can be connected through GPIO pins and HDMI port is available for display connection.

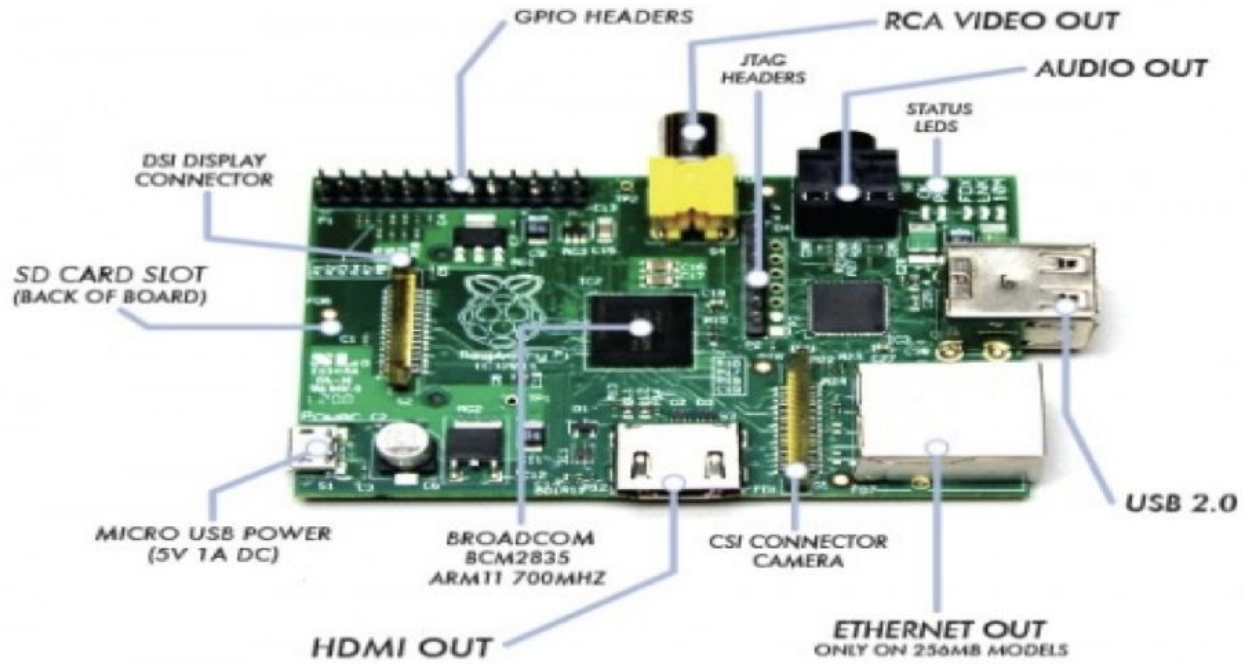

Fig3: Raspberry Pi

2. Fingerprint Scanner

Futronic FS88 is an fingerprint scanner which can be used for scanning the fingerprints. This is an USB device and can be connected to the Raspberry Pi. It is PIV Compliant and is certified by the FBI. It allows to capture dry, wet, blurred or any sort of distorted images of fingerprints.

Fig4: Futronic FS88 Fingerprint Scanner

C. Wifi Adapter

Raspberry Pi can be connected to any cloud service using Wi-Fi adapter. For connecting to internet Wi-Fi Antenna RPi Ralink is used.

Fig5: Wi-Fi Adapter connected to RPi

5. Testing :

Fingerprint based authentication:

Applying the True positive, False positive algorithm.

1. If we find the fingerprint matching we can authenticate the student (true positive).
2. If we don't find the fingerprint matching for the student, we need to add one for the new student or check what data we had previously for the same. (True Negative)
3. We verify the fingerprint with that we have in our database whether it matches or not, might the information has been changed so need to update the data with current info (False Positive)
4. When the person is not authenticated(False negative)

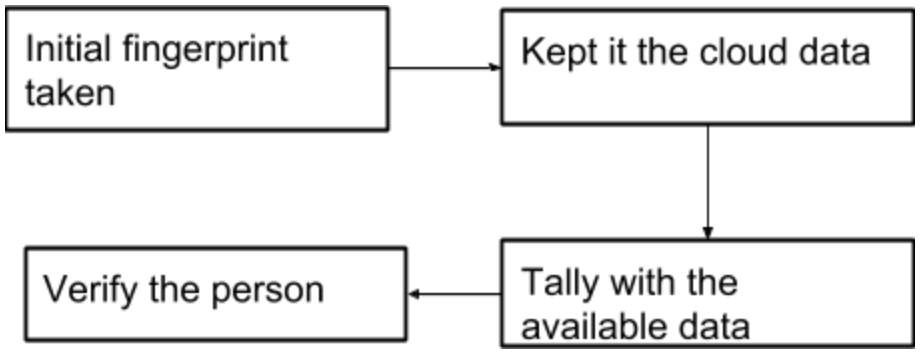

Fig5: Process Flow for testing