

Implementation of Fingerprint Based Payment System using the UIDAI Infrastructure in India for Multi Retail Chains

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Abstract - Making payments across the globe by swiping your finger without revealing the personal and financial information of the citizen has been a major area of research. The proposed model uses the existing Aadhar infrastructure to enable payment by swiping finger across the globe. This will enable the citizens to make seamless payment without the hassle of carrying plastic cards (Debit Card, Credit Card). The research problem identified here was to remove the dependency on any physical objects and to make payments across different POS (Point of Sales) systems. A research group has predicted that the biometrics market in India will rise to a total value of \$3 billion by 2021 and this value is predicted based on a CAGR rate of around 31% during 2016. [13]. With the launch of Aadhar (Unique Identification Number) getting recorded by UIDAI(Unique Identification Authority of India), now private organisations can use the database to enable personalised services by verifying their biometric information securely[14].

Keywords: fingerprint recognition, payment, aadhaar, UIDAI, biometric, multi retail chains

I. INTRODUCTION

[1] More than 1 billion Aadhaar card has been issued and distributed as per information released by the Govt. of India (by April, 2016). This indicates that the govt. was successfully able to store the personal information i.e Biometric Information, Bank Details of 1 billion citizens. 93% of these users are 18+, based on the projected population of 2015. So everyone who owns an Aadhar Card is connected to the larger network by sharing their personal information and getting listed in the secured i.e encrypted govt. database. [2] As per Reserve Bank of India, 7,22,20,394 actual transactions using POS(Point of Sale) systems happened through credit cards issued by different banks in India which amounted to 226942.99 million rupees.

Similar to this, 112868336 transactions happened through debit cards which amounted to 134631.91 million rupees.

All these transactions made by the citizens were facilitated by using a Point of Sales system and a physical i.e plastic card, where there was no security measure to verify if the person possessing the card is the real owner, other than the pin code. This whole system has dependency on the physical cards which is required to make the payments.

In today's world when we are moving to paperless infrastructure, physical cards have become a challenge in making transactions across the country. Also, with the growing trust of people on biometric enabled devices, we need a system that enables us to make seamless payment across the country by just swiping our finger without sharing the personal Biometric information with different private parties.

II. FINGERPRINT TECHNOLOGY

A fingerprint is a pattern of fine ridges and valleys(spaces between ridges) on the surface of a finger, and a fingerprint sensor makes a digitized image of it. The sensing resolution is 500ppi (pixel per inch; also known as 500dpi, i.e., dots per inch) in most cases, which is equivalent to 20 pixels in 1 millimeter. The obtained image size is typically in the range of between 300×300 and 512×512 pixels, which makes the area covering the fingerprint between 15 to 25 millimeters square. [3]

The fingerprint technology works in two different modes: Enrollment and Authentication. Enrollment is the process where the images of the fingerprints are acquired as images and the different attributes and patterns are extracted and saved in the server to create a Biometric Template which is unique for each individual.

The UIDAI Fingerprint Image Standard follows ISO/IEC 19794-4 Fingerprint Image Data Standard and the Minutiae Format Standard is ISO/IEC 19794-2 Minutiae Format Standard as standard.[4]

Authentication is the process where the user swipes his finger and the system captures the image of the fingerprint and send it to the server for matching it with the already existing biometric template saved during the enrollment mode. The authentication process provided by UIDAI is 1:1 verification, and a single finger verification will be sufficient for authenticating the user.

The UIDAI software supports both Raw Image as well as Compressed image format to provide maximum flexibility during authentication. [4]

III. AADHAR AUTHENTICATION PROCESS

UIDAI offers Aadhaar bridge API/SDK, which enables Public and Private Organisations to authenticate a user by sending their Aadhaar Number and Biometric information/Demographic Information. The personal information of the user is not disclosed but instead the server validates and returns the result in Boolean value i.e either Yes or No.

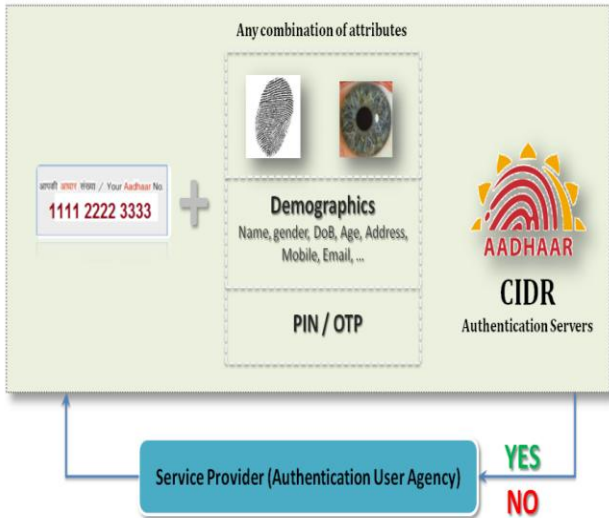


Figure : 1 UIDAI AADHAAR

III. USER ACCEPTANCE OF BIOMETRIC BASED PAYMENTS

In a survey done by Accenture [2015 Accenture Digital Consumer Survey][7] on 24000 consumers across six continents, it was revealed that 58% of the users are interested in using Biometrics to protect their security and privacy on the internet and 54% of the users are already aware of the the alternatives to usernames and password. As per Q2 2016 ACI Worldwide study of 6,035 consumers in

20 countries, 37% of Indian consumers have experienced financial fraud[10] Visa has announced that Two-thirds of consumers want to use biometrics while making payments. Half think payments are faster and easier with biometrics. Fingerprint recognition is the most popular form of biometric. 48% want to use biometric authentication for payments when on public transport. 47% want to use biometric authentication when paying at a bar or restaurant. 46% want to use it to purchase goods and services on the high street e.g. groceries, coffee and at fast food outlets.[8]

IV. BIOMETRIC SECURITY

The key to the strength and security of any biometric is its uniqueness. As per a research paper published by SANS Institute (U.S), Fingerprinting/IRIS/Retinal scans are typically considered as the most unique. As Fingerprints are personal to a user and because of its uniqueness it cannot be easily forged. This makes fingerprint based authentication more secure than the traditional password/physical payment approach. But this doesn't mean that the fingerprints cannot be replicated. There is a possibility that an impostor can make the system believe that impostor is the owner of the account and can perform dishonest act. Gummy fingers are artificial fingers made out of gelatin. An experiment was conducted by Tsutomu Matsumoto[16] on the possibility of using fake or artificial fingers and it was concluded that gummy fingers made from residual fingerprints was accepted by fingerprint devices from 11 vendors as real fingerprints.

Manufacturers will have to cautiously examine the various loop holes of fake or artificial fingers while manufacturing the biometric enabled Point of Sales system to avoid cases of fraudsters impersonating the consumers.

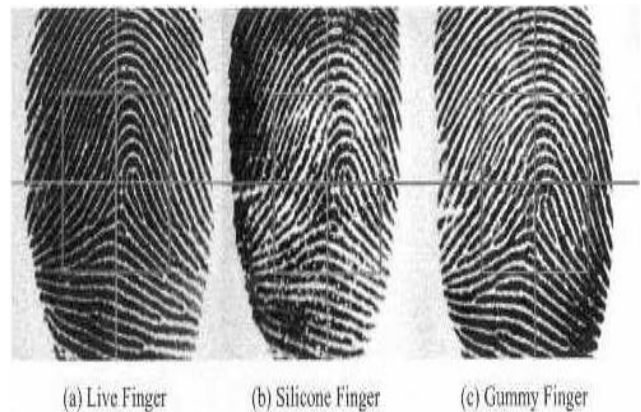
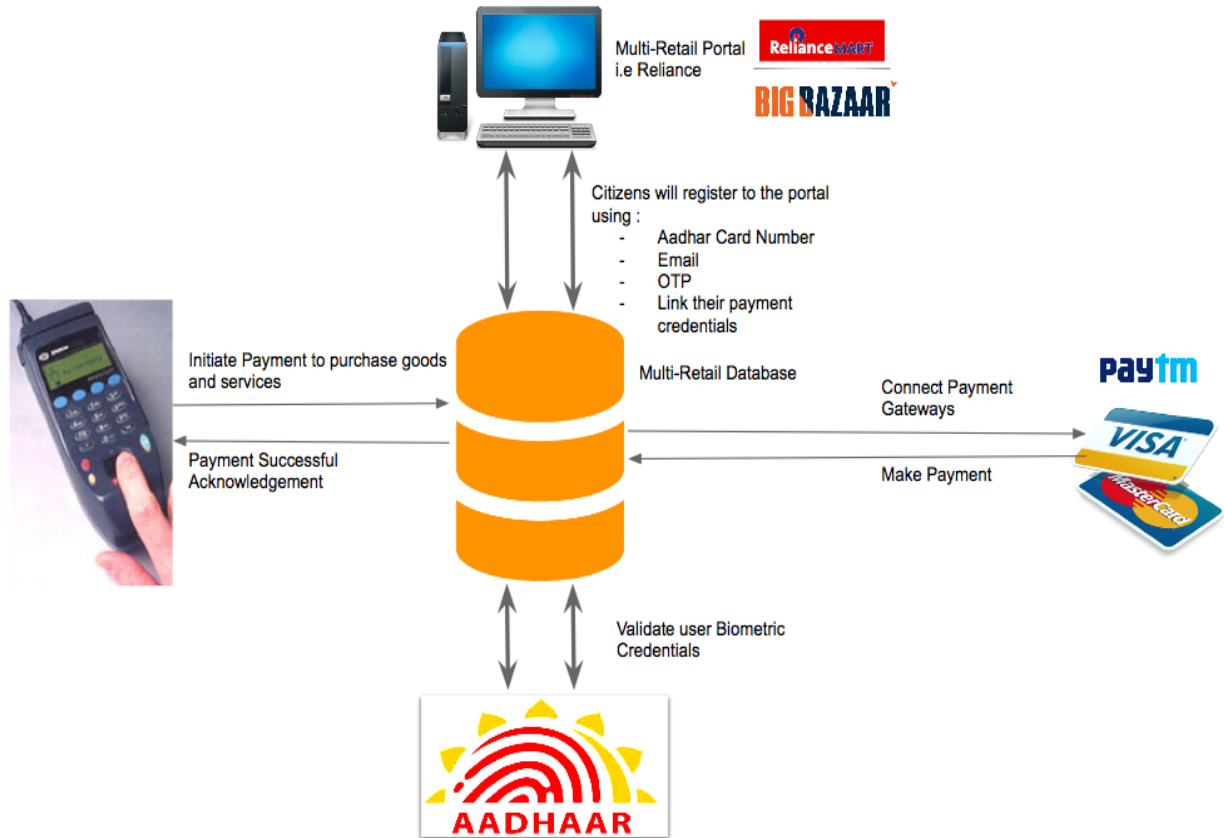


Figure : Biometric finger scan

V. PROPOSED MODEL

Based on the literature review of Biometric Technology and UIDAI, a model can be created which enables a user to directly validate his fingerprint at any Point of Sales system i.e Big Bazaar, Reliance Mart by directly accessing the UIDAI database without sharing the fingerprints with any other outside party. The payment is triggered as per the user's pre authorised and connected payment gateways i.e Paypal, Paytm during the account setup in the online portal, which can be hosted by private parties.



VI. CONCLUSION

This paper presented the model to seamlessly enable payments across different Point of Sales system owned by multi real companies by using the pre-existing biometric records of the Indian citizens saved in the UIDAI database. Based on the data provided by Visa and other sources, the acceptance rate of biometric based payments has shown very positive results. There are still security risks in using Biometric based authentication, and it can be mitigated by the vendors if they are conscious of the existing vulnerabilities present in the market during the manufacturing process.

VII. FUTURE SCOPE

Further research can be done to design a technology stack based on the proposed model and Public/Private APIs can be developed so that different industries can directly integrate with technology stacks readily available to facilitate plug and use. Also, multiple utility applications can be designed based

on the proposed model which will help offer personalised systems not just limiting to payments but also understanding the user behaviour using business intelligence tools.

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