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Biometric Security as a feature for unlocking purposes in a smart watch

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Abstract: This paper describes a smart watch which not only shows time but provides additional features like automatic door opening and starting the car engine. The watch is programmed using Arduino open source libraries and functions. With the development of this project we are providing a smartwatch in an affordable price. In this project we are providing facilities to unlock your car and door wirelessly through our smartwatch using a fingerprint sensor. The entire purpose of this project is to provide smart and secure functionalities to an already existing product in an affordable price.

Keywords: Arduino, RF-Transmitter, RF-Receiver, GSM board, Fingerprint scanner.

1.INTRODUCTION

Though smart watch has been commercially available since early 80's, it has not gained much publicity or interest from the consumer. However, in the past one year, it has gained significant momentum and 2013 was even said by analysts "could have been year of-the Smart Watch". That momentum was signified by the release of several smart watch products such as Pebble, Razer, LG, Motorola and even Google Android Wear. This paper is trying to explore what smart watch can or should do in order to save people time, by making some daily tasks processing easier and more efficient. One focus area is how the "human-smart watch" interaction should be designed in order to achieve that time-saving objective. The design is based on what technology is available today as well as what has been patented.

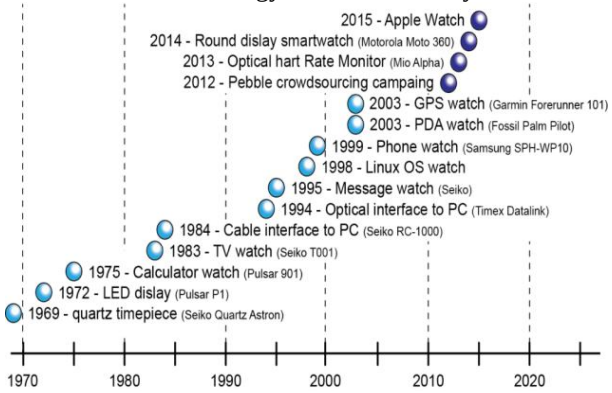

Fig 1.0: Timeline depicting the evolution of smartwatches.

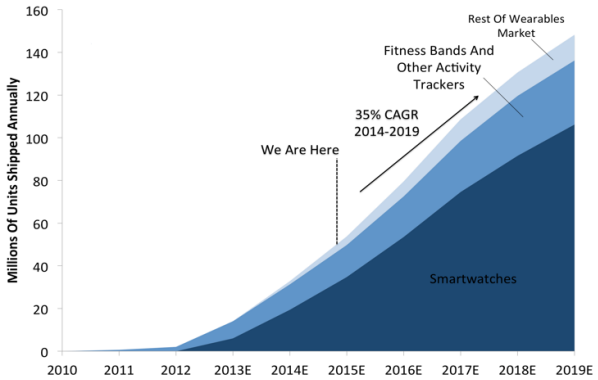

Fig 1.1: Growth in the market conditions with respect to smartwatch.

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Global Smartwatch Market has a potential to reach $32.9 billion by 2020, registering a CAGR of 67.6% during 2014 - 2020, according to new research published by Allied Market Research. Popular highlights of the Smartwatch Market that are noteworthy are, based on type, the Extension Smartwatch sales was the source for approximately 4/5th of the revenue generated by the global Smartwatch market in 2013. Standalone smartwatch, which was nearly 1/10th of the market in 2013, would swiftly take over the extension smartwatch and would match with the market size of extension smartwatch by 2017.

2.ARCHITECTURE

Arduino is advance microcontroller; it is the core part of our project. The Arduino is programmed using the Arduino Software (IDE), Where Arduino is connected with all sensors like fingerprint sensor, Bluetooth module and GSM module. It is programmed to read the data from those sensors and to perform appropriate actions. For example: Like whenever user scans his fingerprintthe Arduino matches it with stored fingerprint and takes appropriate action.
GSM Module:-The **Arduino GSM Shield 2** allows an Arduino board to connect to the internet, make/receive voice calls and send/receive SMS messages. It is possible to communicate with the board using AT commands. The GSM library has a large number of methods for communication with the shield.To interface with the cellular network, the board requires a SIM card provided by a network operator.

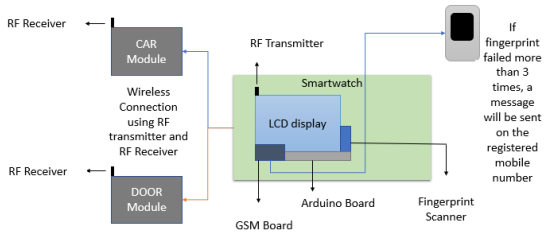

Fig 2.0: System Architecture

2.1 Module Description:

2.1.1 Smartwatch: This module comprises of Arduino board, Fingerprint scanner, GSM board and the Rf Transmitter. The functionality of this module is to check for the 'Authenticate' fingerprint; and perform the necessary tasks (ie. Open the car door, open the security gate and start the engine of the car).

2.1.2 Car Module: this module comprises of RF Receiver. The function of this module is to open the car door or to start the engine of the car based on the input provided by the user.

2.1.3 Door Module: this module comprises of RF Receiver. The function of this module is to open the door (Security/main gate) based on the input provided by the user.

3.MECHANISM

The figure below describes the working of the smartwatch.The user provides the fingerprint ;the fingerprint is authenticated via the ardinuoboard.Based on the fingerprint authenticity the ardinuo decides which action is to be performed by communicating with the the car module or the door module via a GSM board,RF transmitter and the RF receiver.If the fingerprint authentication fails;the user will receive a message on the number provided by user [GSM board(SIM card)] and the buzzer on the watch will start.

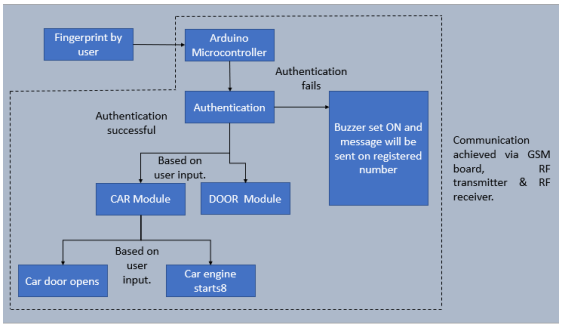

Fig 3.0: Working of smartwatch

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4.ALGORITHM/TECHNIQUE USED

Fiction Pattern Matching Algorithm:
During the enrollment phase, the sensor scans the user's fingerprint and converts it into a digital image. The minutiae extractor processes the fingerprint image to identify specific details known as minutia points that are used to distinguish different users. Minutia points represent locations where friction ridges end abruptly or where a ridge branches into two or more ridges. A typical good-quality fingerprint image contains about 20-70 minutiae points; the actual number depends on the size of the sensor surface and how the user places his or her finger on the sensor. The system stores the minutiae information— location and direction—along with the user's demographic information as a template in the enrollment database. During the identification phase, the user touches the same sensor, generating a new fingerprint image called a query print. Minutia points are extracted from the query print, and the matcher module compares the query minutia set with the stored minutia templates in the enrollment database to find the number of common minutia points. Due to variations in finger placement and pressure applied on the sensor, the minutia points extracted from the template and query fingerprints must be aligned, or registered, before matching. After aligning the fingerprints, the matcher determines the number of pairs of matching minutiae—two minutia points that have similar location and directions. The system determines the user's identity by comparing the match score to a threshold set by the administrator.

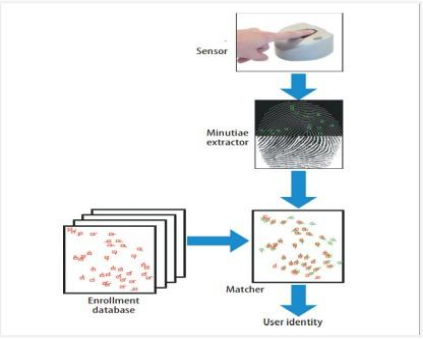

Fig 4.0: Fingerprint recognition

5.SECURITY

Smartwatches have quickly gone from sci-fi to commonplace, and it's easy to see why. Users can conveniently manage messages, music, fitness, and more right from their wrists as they go about the day. But enjoying the convenience of a smartwatch means trusting it to keep your data safe. The Smartwatch offers a variety of security features like while fingerprint authentication for the working of watch to be enabled ;the user can try it thrice if even after the third attempt the fingerprint is not authenticated the buzzer on the watch will be set ON and a message will be sent to the user's registered mobile number.

6.FUTURE SCOPE

The smartwatch is capable of automating enormous number of things that one could imagine right from making a call, to handling the devices at home with the help of cloud to instructing your devices to perform a particular action through the watch. In the near future will try to implement the watch for all the devices.(All devices which can be locked and unlocked)

7.CONCLUSION

With the help of this project we can unlock the door wirelessly. By using the fingerprint authentication, we can open the door of the vehicle and start its engine using our smart watch and also provides the security to the users.

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