Biometric Attendance Using

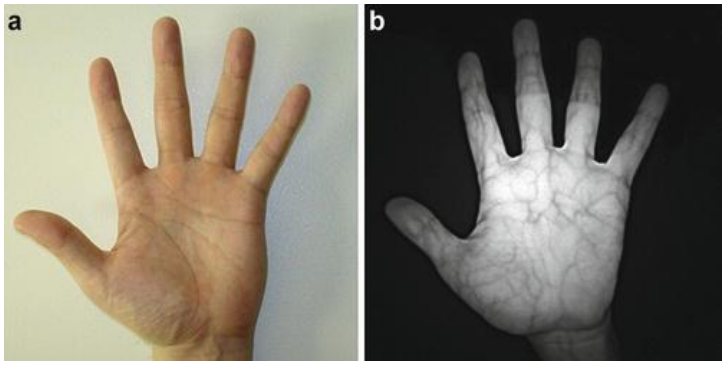
Vein Scanner

Abstract:

Every person has a unique vein pattern in their palms. Palm vein authentication is the process of using this pattern to identify who we are. Palm vein recognition examines the unique patterns in our palm veins. We can use this biometric attribute for an attendance system in the office, school, university and also used in the airport for people's recognization.

Introduction:

Biometrics are physical or behavioral human characteristics that can be used to digitally identify a person to grant access to systems, devices, or data. Examples of these biometric identifiers are fingerprints, facial patterns, voice or typing cadence. Each of these identifiers is considered unique to the individual, and they may be used in combination to ensure greater accuracy of identification. Each of them fingerprints is a very popular biometric attribute. But palm vein is also an important biometric attribute.



We know veins are blood vessels that carry deoxygenated(carbon dioxide) blood from the tissues back to the heart. Here palm veins also do this kind of work. The palm vein image sensor is used for palm vein authentication. The device captures an image of the vein pattern in the palm by emitting near-infrared rays that are absorbed by the

deoxygenated hemoglobin in the veins and then reflected the device for image capturing. The Japanese company Hitachi and Fujitsu are also working on a palm vein scanner technology project.

Things used in this project:

Hardware Components:

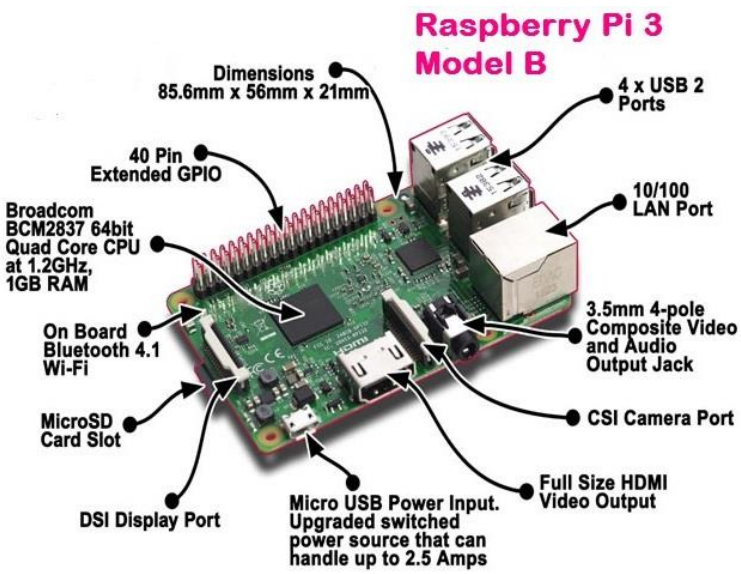
1. Raspberry Pi 3 Model B:

   The Raspberry Pi is an open-source, Linux-based, credit card size computer board. The Raspberry Pi 3 Model B is the third generation Raspberry Pi. This powerful credit-card-sized single-board computer can be used for many applications and supersedes the original Raspberry Pi Model B+ and Raspberry Pi 2 Model B. This board consists of Broadcom 1.2 GHz Quad-core processor. It has a 40 pin GPIO header port for using external program handling. It works on 5voltages,2.5 amp using an external adapter.

   The specifications are:

   - Quad-Core 1.2GHz Broadcom BCM2837 64bit CPU
   - 1GB RAM
   - BCM43438 wireless LAN and Bluetooth Low Energy (BLE) on board
   - 100 Base Ethernet
   - 40-pin extended GPIO
   - 4 USB 2 ports
   - 4 Pole stereo output and composite video port
   - Full-size HDMI
   - CSI camera port for connecting a Raspberry Pi camera
   - DSI display port for connecting a Raspberry Pi touchscreen display
   - Micro SD port for loading your operating system and storing data

- Upgraded switched Micro USB power source up to 2.5A



2. Breadboard:

   A thin plastic board is used to hold electronic components (transistors, resistors, chips, etc.) that are wired together. Used to develop prototypes of electronic circuits. The breadboard contains spring clip contacts typically arranged in matrices with certain blocks of clips already wired together. The components and jump wires (assorted wire lengths with pins at both ends) are plugged into the clips to create the circuit patterns. The boards also typically include metal strips along the side that are used for common power rails and signal buses.

3. Resistor 100 ohms
4. Infrared LEDs
5. Jumper wires
6. Raspberry Pi Camera Module

Software Components:

1.OpenCV-Python

OpenCV-Python is a library of Python bindings designed to solve computer vision problems.

Python is a general-purpose programming language started by Guido van Rossum that became very popular very quickly, mainly because of its simplicity and code readability. It enables the programmer to express ideas in fewer lines of code without reducing readability.

Compared to languages like C/C++, Python is slower. That said, Python can be easily extended with C/C++, which allows us to write computationally intensive code in C/C++ and create Python wrappers that can be used as Python modules. This gives us two advantages: first, the code is as fast as the original C/C++ code (since it is the actual C++ code working in the background), and second, it is easier to code in Python than C/C++. OpenCV-Python is a Python wrapper for the original OpenCV C++ implementation.

OpenCV-Python makes use of Numpy, which is a highly optimized library for numerical operations with a MATLAB-style syntax. All the OpenCV array structures are converted to and from Numpy arrays. This also makes it easier to integrate with other libraries that use Numpy such as SciPy and Matplotlib.

2.TensorFlow

TensorFlow is an end-to-end open-source platform for machine learning. It has a comprehensive, flexible ecosystem of tools, libraries, and community resources that lets researchers push the state-of-the-art in ML, and developers easily build and deploy ML-powered applications.

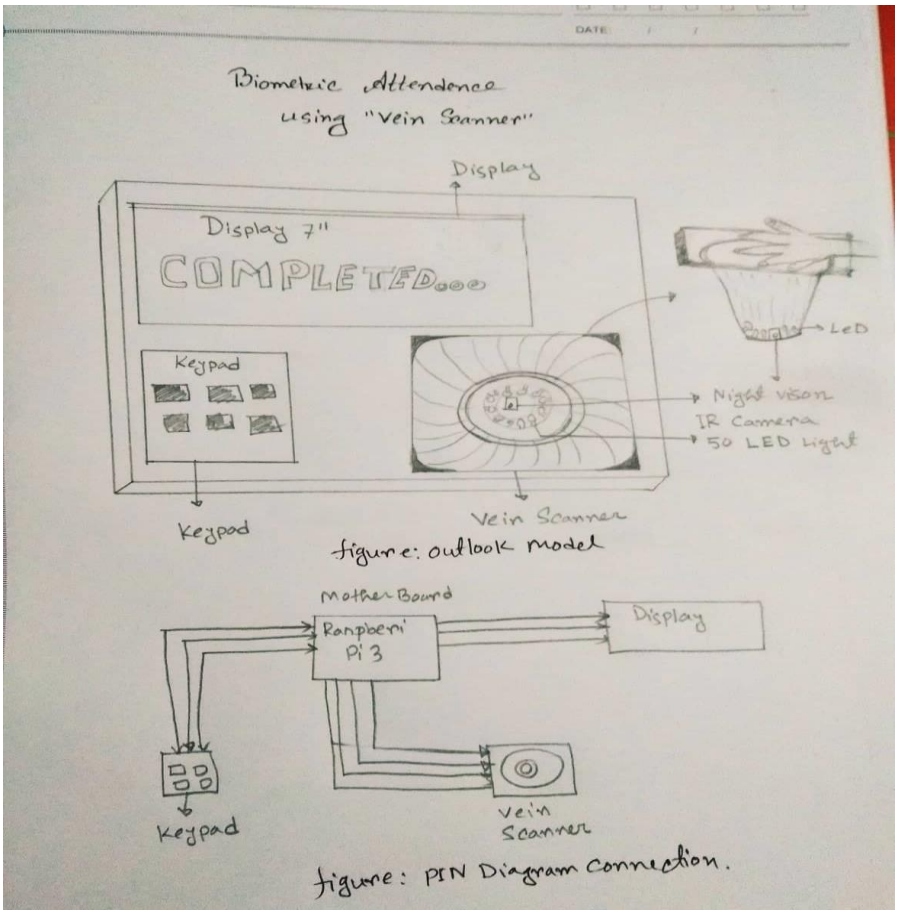
TensorFlow offers multiple levels of abstraction so you can choose the right one for your needs. Build and train models by using the high-level

Keras API, which makes getting started with TensorFlow and machine learning easy.

If you need more flexibility, eager execution allows for immediate iteration and intuitive debugging. For large ML training tasks, use the Distribution Strategy API for distributed training on different hardware configurations without changing the model definition.

Working Procedure:

Step1: At first draw the model of the whole system how the model works.



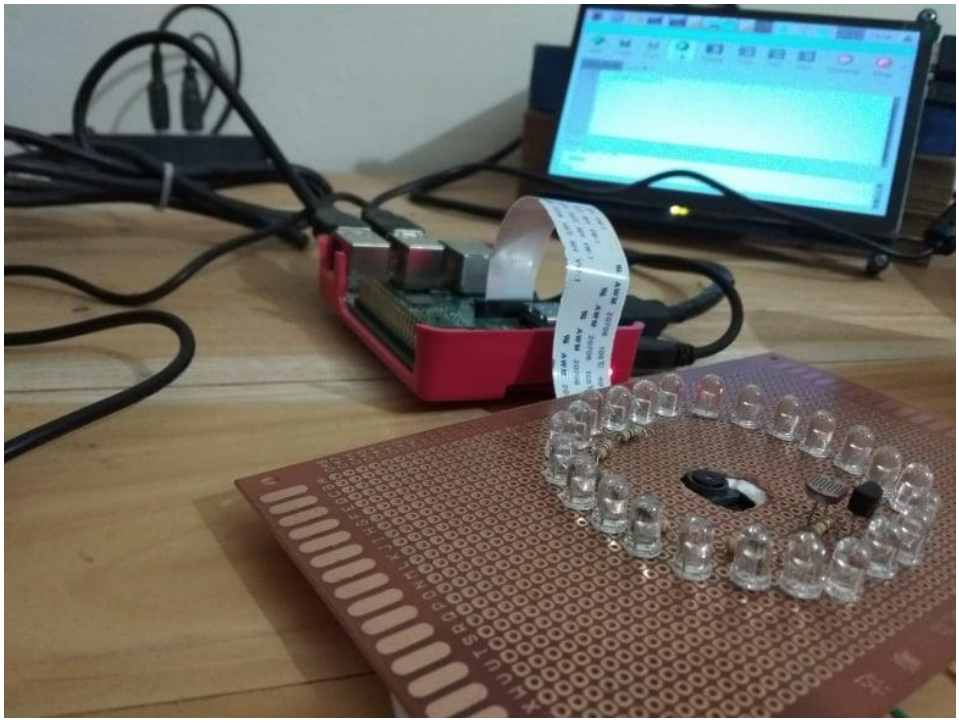
Step2: Then connected the LEDs with 100-ohm resistors and creating the circuit and connect the breadboard for the power supply.

Step3: Power to the Rasberry pi using an adapter and an 8Gb micro sd card for giving the operating system. Here using LINUX for an operating system.

Step4: Then connecting Raspberry Pi Camera Module with CSI camera port of raspberry pi for getting the capture an image.

Step5: After capturing the image, use the image processing unit of python called OPEN CV for a better and smoothing picture or image.

Step6: Then Using TENSOR FLOW for an authentication process.



Results:

Conclusion:

Although This works is not properly done, but this is a new challenge of an attribute of bioinformatics. If we are using this technology, the biometric systems are updated and also more secured for the next generation.