Flutter and Raspberry Pi based Baggage Application

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ABSTRACT

There are no fingerprints of two people the similar. And identical twins have various fingerprints of the same DNA. That uniqueness makes it possible to use fingerprints in all kinds of forms, including background checks, biosecurity, identifying mass disasters and, of course, in criminal cases. For more than 100 years, fingerprint recognition has been used to locate criminals and resolve cases and is a very useful method for enforcing legislation. Besides, Facial acknowledgement needs fewer human resources than other safety steps, including fingerprinting. It also requires no physical contact or overt connection with people. Rather, AI is used to render the operation automatic and smooth. Therefore, the idea is to design a application that will simply unlock or lock the baggage by using Raspberry Pi device. The proposed system will have many features such as: face recognition, fingerprint recognition, item recognition. Finally, the proposed system is tested and proved its effectiveness and functionality.

KEYWORDS

Internet of thing, Raspberry Pi, Security, Face recognition, fingerprint recognition, item recognition, Firebase, SSH connection.

1 INTRODUCTION

This application allows users to save their luggage information such as: Two Blue Jean, or One White Shampoo in the Firebase database. Moreover, when users are going to travel somewhere, applications give them the choice of face or fingerprint identification when they want to unlock it after locking their luggage in the application.

2 System Design

2.1 Hardware

The major Components are

2.1.1 Raspberry Pi. I have used Raspberry Module as our computation device which hosts my scripts and controls servo motor after reading signals from baggage application. Processor speed ranges from 700 MHz to 1.4 GHz for the Pi 3 Model B+ or 1.5 GHz for the Pi 4; on-board memory ranges from 256 MiB to 1 GiB random-access memory (RAM), with up to 4 GiB available on the Pi 4...

2.1.2 Servo Motor SG90 9G Micro Servo Motors

2.1.3 Portable Charger that 22000mAh Input 5V 2.4A, 12W Max Output 5V 2.4A Each Port, Total 5V 5.8A Max

2.1.4 Galaxy Note 10 Front cameras 10MP (ƒ/2.2) Ultrasonic Fingerprint sensor

2.2 Software
The major software utilized is listed below:

2.2.1 Raspberry Pi OS. It is Debian-based operating system for Raspberry Pi.

2.2.2 Dart Programming environment. I have used dart programming language to build the baggage application

2.2.3 Visual Studio Code. I have used dart programming language and flutter library to build and design the application.

2.2.3 Firebase. I have used Google Cloud Firestore for reading or sending data to the mobile application.

3 Implementation
3.1 Face and Fingerprint recognition
When people go on a journey, the safety of their luggage has a great importance for that journey. No matter how valuable things people carry on, there are always items they do not want to lose in their suitcases. So now their suitcases are only urgent with a face or fingerprint. In my proposed system, I take this feature into consideration. Fig.2 illustrates the flowchart for the Face and Fingerprint recognition.
### 3.2 Item recognition
I used a flutter plugin to use the capabilities of Firebase ML, which includes all of Firebase's cloud-based ML features, and ML Kit, a standalone library for on-device ML, which can be used with or without Firebase. Firebase Machine Learning is a mobile SDK that offers Google's machine training knowledge in an effective, but easy-to-use kit for Android and iOS applications. You can automate the features you need with just a few lines of code, whether you

are new or advanced in machine learning. To begin with, there is no need for profound neural network understanding or model optimization. Firebase ML offers simple APIs to help you use the TensorFlow Lite models for your smartphone applications.
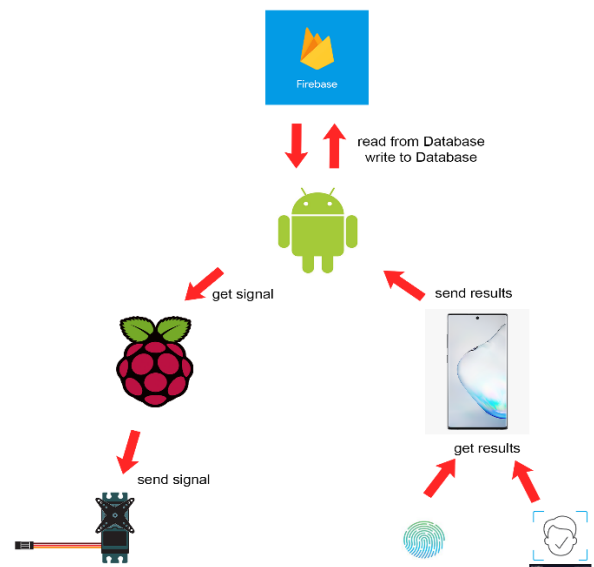
However, still there are some parts that is need to decide by user. The reason of this issue is item recognition system produce several item names that is in the taken picture. Since there could be multiple items in the picture. User should pick on of them to put its information to database.
3.3 Mobile Application

DataFlow
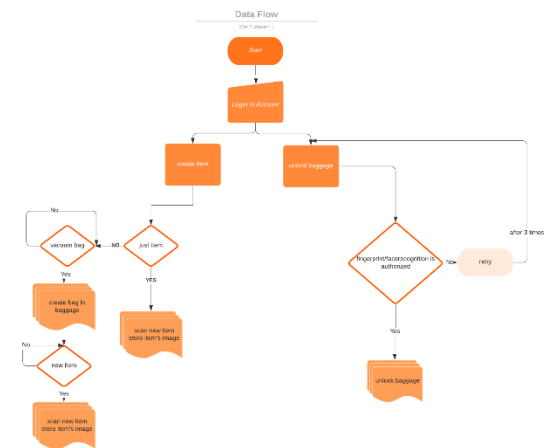
ControlFlow

Conclusion

I built an Android application that have remote access to Raspberry Pi via Ssh, have access to Cloud Firestore, Firebase Storage, and Firebase authentication. It uses phone's own local authorization tools such as camera or fingerprint. I have reached my goal for sensing signal. I believe my application will be beneficial for people.

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