

**Faculty of Engineering and Technology**

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| **Computer Science Department** |

COMP432-COMPUTER SECURITY

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**Abstract:**

Fingerprint-based biometrics is a widely used method for authentication and identification due to its reliability, ease of use, and non-intrusiveness. However, ensuring both security and recognition accuracy remains a challenge. In this review, we explore the latest developments in fingerprint-based biometrics, focusing on security aspects and recognition accuracy. We discuss critical attacks on biometric systems, design considerations for robust countermeasures, and the impact of non-ideal conditions on accuracy.

Introduction:

Biometric authentication systems rely on unique physiological or behavioral characteristics to verify an individual’s identity. Among these, fingerprint-based biometrics has gained significant popularity. The process involves capturing the ridges and valleys of an individual’s fingerprint, converting them into a digital template, and comparing it with stored templates for authentication.

Challenges in Fingerprint-Based Biometrics:

* Security Challenges:
  + Attacks on User Interfaces: Adversaries can exploit vulnerabilities in the user interface (e.g., fake fingerprints or spoofing attacks).
  + Attacks on Template Databases: Protecting stored templates is crucial to prevent unauthorized access.
  + Privacy Concerns: Biometric data privacy is a growing concern, especially in large-scale deployments.
* Recognition Accuracy Challenges:
  + Poor Image Quality: Factors such as sensor quality, finger placement, and environmental conditions affect image quality.
  + Non-Ideal Conditions: Users may have dry or damaged skin, affecting recognition accuracy.
  + Template Matching Algorithms: Balancing false acceptance and false rejection rates is essential.

Conclusion:

Fingerprint-based biometrics remains a powerful for authentication, but addressing security challenges and maintaining high recognition accuracy are ongoing research goals.

Resources:

* [Symmetry | Free Full-Text | Security and Accuracy of Fingerprint-Based Biometrics: A Review (mdpi.com)](https://www.mdpi.com/2073-8994/11/2/141)
* **“Fingerprint Recognition” by Anil K. Jain, Arun Ross, and Salil Prabhakar**