Faculty of Engineering and Technology

Computer Science Department

Computer Security (COMP432)

Project Proposal

Secure Identification Through Vein Recognition: A Study of Biometric Advancements

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Abstract

In this research, we will address several topics, which are as follows:

- Introduction to Vein Recognition.
- Types of Vein Recognition.
- How Vein Recognition works.
- Advantages of Vein Recognition.
- Limitations and Challenges.
- Applications of Vein Recognition.
- Comparison with Other Biometric Techniques.
- Security and Privacy Aspects.
- Recent Research and Developments.
- Future Trends and Opportunities.
- Conclusion.

Introduction

In the introduction, we will take about the following points:
- A general definition of biometric systems
- What are Biometric systems?
- What is Vein Recognition?
- Why we chose to focus on Vein recognition
- Where Vein recognition is used?

Research plan

In the research plan, we will cover the following aspects:

- This research aims to explore vein recognition technology.
- It will review previous studies on vein recognition.
- It will explain how the vein recognition system works.
- The research will analyze the applications and advantages of vein recognition.
- The study will compare vein recognition to other biometric systems.
- It will highlight the possible challenges and future improvements for vein recognition.

Literature review

This part of the literature review will address the following points:

- Previous research and studies on vein recognition
  → Review of academic papers, findings, and experiments in the field.

- Different types of vein biometrics
  → Finger vein, palm vein, wrist vein, and dorsal hand vein recognition.

- Common databases used in research
  → Publicly available data such as CASIA, PUT Vein, and HKPU used for system training and recognition system testing.

- Hardware used in vein recognition
  → Description of imaging devices and sensors, especially Near-Infrared (NIR) cameras, and their impact on system performance and cost.

- Vein image preprocessing techniques
  → Methods used to improve image quality before analysis, such as noise reduction, contrast enhancement, and normalization.

- Algorithms used for pattern recognition
  → Traditional techniques (e.g., line tracking, pattern matching) and modern approaches (e.g., machine learning, deep learning models like CNNs).

- Performance metrics
  → Evaluation criteria including accuracy, speed, false acceptance rate (FAR), and false rejection rate (FRR), as reported in research studies.

Milestones

The following section of the Milestones will explore these key aspects:

1. Historical Background and Evolution

- When the technology started and how it evolved.
- When the first device for scanning veins was made.
- Important events or progress in development.

2. Technological Advancements

- Technologies used in vein recognition (e.g., infrared, image processing).
- When AI and deep learning were added to improve accuracy and speed.
- Big improvements in recognition accuracy and processing speed.

3. Real-World Applications

- Case studies of real-life implementations.
- When vein recognition started being used in banks, hospitals, etc.
- Major studies or product launches that helped it grow.

Conclusion

In the conclusion, we will highlight the following points:

- In conclusion, vein recognition technology offers high security and accuracy due to the uniqueness and internal nature of vein patterns.
- Through this research, we explored its working mechanisms, types, and applications.
- Despite facing some challenges, vein recognition has great potential for future development.
- Vein recognition holds promise for real-world use in secure systems.

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