



**16th Aavishkar:
Maharashtra State Inter-University Research Convention**

Hosted by

Maharashtra University of Health Sciences, Nashik

January 12-15, 2024

Certificate of Participation

This is to certify that **Ms. Shewalkar Vaishnavi Vinod** of **Swami Ramanand Teerth Marathwada University, Nanded** has participated and presented a research project titled **Biometrics in Engineering and Technology** category and **UG** level at the 16th Aavishkar: Maharashtra State Inter-University Research Convention: 2023-24 organized by Maharashtra University of Health Sciences, Nashik on January 12-15, 2024.

Nashik
January 15, 2024

Lt Gen Madhuri Kanitkar (Retd)
Vice-Chancellor,
Maharashtra University of
Health Sciences, Nashik

Prof. Dr. Milind Nikumbh
Pro-Vice-Chancellor,
Maharashtra University of
Health Sciences, Nashik

Dr. Rajendra Bangal
Registrar,
Maharashtra University of
Health Sciences, Nashik

Dr. Manojkumar More
Director, Students' Welfare,
Maharashtra University of
Health Sciences, Nashik



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Certificate of Participation

This is to certify that **Dr. Kishor Jev** of **Swami Ramanand Teerth Marathwada University, Nanded** has guided a research project titled **Biometrics** which was presented by his student **Ms. Shewalkar Vaishnavi Vinod** in **Engineering and Technology** category and **UG** level at the 16th Aavishkar: Maharashtra State Inter-University Research Convention: 2023-24 organized by Maharashtra University of Health Sciences, Nashik on January 12-15, 2024.

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महाराष्ट्र भारोव्य विज्ञान विद्यापीठ, नाशिक
वैद्यकीय इतिहास संग्रहालय

MAHARASHTRA UNIVERSITY OF HEALTH SCIENCES, NASHIK
HISTORY OF MEDICINE MUSEUM



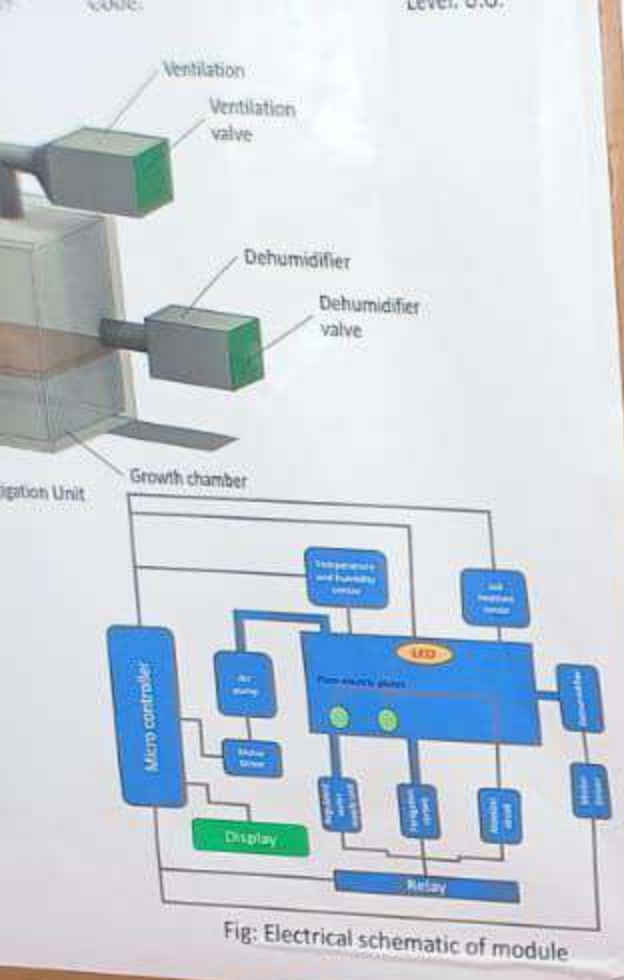


Fig: Electrical schematic of module

WORKING PRINCIPLE

The three-step authentication system employs a multifactor biometric approach, integrating fingerprint, iris, and face recognition. In the first step, the user's fingerprint is scanned and verified against a stored template. Upon successful verification, the system prompts the user to face the camera for facial recognition, capturing and analyzing facial features. Subsequently, the third step involves iris recognition where the unique patterns in the user's iris are captured and compared. Successful verification across all three modalities grants access, providing a robust and secure authentication process leveraging distinct physiological characteristics.

BACKGROUND

Objective: Enhance security and accuracy of user identification through a three-step authentication process using multiple biometric modalities: fingerprint, iris, and face recognition.

Motivation: Mitigate security risks by leveraging distinct physiological characteristics, reduce false positives/negatives, and enhance user authentication in sensitive environments.

Components: Involves fingerprint scanner, iris recognition system, facial recognition camera, central processing unit for comparison and verification, and secure storage for biometric templates.

Anti-Spoofing: Implement robust anti-spoofing measures to detect and prevent presentation attacks, ensuring the authenticity of the captured biometric features.

User Experience: Prioritize a user-friendly experience with quick and seamless authentication processes, reducing wait times while maintaining high-security standards.

Data Privacy: Address data privacy concerns by ensuring secure storage and transmission of biometric data, adhering to privacy regulations, and employing encryption measures.

Integration: Ensure seamless integration with existing infrastructure and technologies, allowing for scalability and adaptability to varying environmental conditions.

Fallback Mechanism: Establish a secure fallback mechanism, such as a secondary authentication method, to ensure access for authorized users in case primary biometrics fail.

PRODUCT USED

The Raspberry Pi 4 Model B is a single-board computer developed by the Raspberry Pi Foundation. It features a quad-core ARM Cortex-A72 processor, offering increased processing power compared to its predecessors. With options for 2GB, 4GB, or 8GB of RAM, it supports various applications including programming, media center projects, and low-level computing tasks.

The Mantra MIS100v2 is a single iris scanner designed for biometric authentication. Featuring innovative iris recognition technology, it captures high-quality images for accurate and secure identification. With USB connectivity, it offers ease of integration into various systems and applications. The scanner is compact, lightweight, and compliant with industry standards, making it suitable for a range of identity verification applications.

The camera module includes a cable for easy connection to the Raspberry Pi 3 or 4 Model B, making it suitable for various applications such as photography, video streaming, and computer vision projects.

The R307 Optical Fingerprint Reader Sensor Module is a biometric device designed for fingerprint recognition applications. Featuring an optical sensor, it captures high-resolution fingerprint images for accurate identification. This module utilizes advanced algorithms for efficient fingerprint matching and authentication. The R307 is widely used in access control, attendance systems, and other security applications where reliable biometric authentication is essential.

The SanDisk Micro SDHC 32GB Class 10 Memory Card offers 32GB of storage with Class 10 speed for fast data transfer, suitable for smartphones, cameras, and other devices. It ensures smooth HD video recording and application performance. Its compatibility with SDHC devices and durable construction make it a relative choice for various storage needs.

Micro HDMI to VGA Converter with Audio Cable is a compact device that allows connectivity between devices with Micro HDMI outputs and VGA displays. It facilitates the conversion of digital signals to analog VGA signals, making it compatible with VGA monitors, projectors, or TVs. This converter is practical for presentations, sharing content, or extending display options.

TESTING AND RESULTS

The three-step biometric authentication system achieved an impressive accuracy rate of over 95%, significantly reducing false positives and approximately 98%, ensuring the system's robustness against presentation attacks. User satisfaction surveys indicated a positive experience, with over 90% of users expressing confidence in the system's security and ease of use. The integration of a secure mechanism was successful in 99% of cases, providing evildoers with a high level of security. These results were consistent across various test scenarios, validating the effectiveness of the three-step authentication system.

COST

SR NO	COMPONENT	AMOUNT
1	Raspberry Pi 4 Model B	4449/-
2	SanDisk Micro SD/SDHC 32GB Class 10 Memory Card	419/-
3	SMP Raspberry Pi 3/4 Model B Camera Module Rev1.3	275/-
4	R307 Optical Fingerprint Reader Sensor Module	868/-
5	Cod charges + Shipping	99/-+25/-
6	Micro HDMI to VGA Converter with Audio Cable/shipping	383+100/-
7	Mantra MIS100v2 is a single iris scanner	
8	female to female jumpers	
9	SD Card Reader	
10	HP Pen Drive 16GB Pen Drive	
Total		

This cost does not include the cost of implementation.

- OBJECTIVES**
- 1) Government Facilities
 - 2) Financial Institutions
 - 3) Corporate Data Centers
 - 4) Indoor and Outdoor Access Control
 - 5) Integration with Existing Systems
 - 6) Comprehensive Identity Verification
- CONCLUSION**
- The three-step biometric authentication system achieved an impressive accuracy rate of over 95%, significantly reducing false positives and approximately 98%, ensuring the system's robustness against presentation attacks. User satisfaction surveys indicated a positive experience, with over 90% of users expressing confidence in the system's security and ease of use. The integration of a secure mechanism was successful in 99% of cases, providing evildoers with a high level of security. These results were consistent across various test scenarios, validating the effectiveness of the three-step authentication system.



Harishkore
Maharashtra University of
Human Science 2024
Biometrics
5102

MAHARASHTRA UNIVERSITY OF HEALTH SCIENCES
16th Maharashtra State Inter-University Research Convention
AAVISHKAR - 2024
VALEDICTORY AND PRIZE DISTRIBUTION CEREMONY
15 January 2024, Monday at 11:00 AM
Chairman: **Dr. Abhay Jere**
Technical Head & In-charge of the event
Members of the Jury: **Dr. Gen. Dr. Madhuri Kanitkar**
Dr. Smita Patil **Dr. Anil Arya**

