ISSN:0976-0172
Journal of Bioscience And Technology
www.jbstonline.com

SECURE AND EFFICIENT CLOUD-CENTRIC INTERNET OF MEDICAL THINGS-ENABLED SMART HEALTHCARE SYSTEM WITH PUBLIC VERIFIABILITY

Dr. Santhosh[1],Assistant[2], M. Kokila Reddy[3],M. Srija[4], N. Vaishnavi[5]

[1]professor, santhosh.boddupalli@gmail.com

[2,3,4,5]UG Students, Department of CSE, Malla Reddy Engineering College, Hyderabad, TS, India.

ABSTRACT

The advent of Internet-of-Medical-Things (IoMT) technology has significantly elevated the quality of life by seamlessly interconnecting biomedical sensors in the realm of e-health. Concurrently, another noteworthy technological advancement in the field of e-healthcare involves the outsourcing of medical data to the cloud. While these innovations hold immense promise, their adoption comes with challenges, most notably concerning the privacy of medical data and the resource constraints inherent in sensor devices. This article introduces a cutting-edge, secure, and efficient cloud-centric IoMT-enabled smart healthcare system with a focus on public verifiability.

A key innovation of this system is the implementation of an escrow-free identity-based aggregate signcryption (EF-IDASC) scheme, introduced within the context of this article, to fortify data transmission security. The proposed smart healthcare system seamlessly retrieves medical data from multiple sensors embedded on a patient's body, utilizes signcryption to secure and aggregate this data under the novel EF-IDASC scheme, and subsequently outsources the aggregated information to a medical cloud server through a smartphone. Notably, the system ensures the utmost privacy by safeguarding the identity and medical data of the patient, thereby addressing a critical concern in the integration of IoMT and cloud technologies for healthcare applications.To provide a comprehensive understanding of its functionality, this article conducts an in-depth analysis of the proposed smart healthcare system's performance, specifically focusing on energy consumption. Additionally, a comparative assessment is conducted, benchmarking the performance of the proposed EF-IDASC scheme against other related schemes. Through these evaluations, this research aims to

ISSN:0976-0172
Journal of Bioscience And Technology
www.jbstonline.com

underscore the practical viability, security, and efficiency of the presented cloud-centric IoMT-enabled smart healthcare system in meeting the complex demands of contemporary e-healthcare scenarios.

I.INTRODUCTION

The convergence of Internet-of-Things (IoT) technology with healthcare, particularly in the form of the Internet-of-Medical-Things (IoMT), has ushered in a transformative era in the field of e-health. Among the notable advancements, the integration of biomedical sensors and the outsourcing of medical data to the cloud stand out as pivotal contributors to improved healthcare services. However, the realization of these technologies in the context of e-healthcare encounters challenges, with paramount concerns revolving around the privacy of medical data and the resource constraints inherent in sensor devices.

This article delves into the dynamic landscape of e-healthcare, presenting a state-of-the-art smart healthcare system that intricately combines the power of IoMT with cloud-centric solutions, placing a particular emphasis on ensuring public verifiability. At the heart of this innovative system lies an escrow-free identity-based aggregate signcryption (EF-IDASC) scheme, a novel contribution detailed within this article. The primary objective is to establish a secure, efficient, and privacy-centric framework for transmitting medical data seamlessly.

The proposed smart healthcare system orchestrates a sophisticated process wherein medical data from multiple sensors, embedded on a patient's body, is securely retrieved, signcrypted, and aggregated using the EF-IDASC scheme. Subsequently, this consolidated information is outsourced to a medical cloud server via a smartphone. A distinctive feature of the system is its unwavering commitment to safeguarding patient identity and medical data, addressing a critical concern inherent in the integration of IoMT and cloud technologies.

To provide a comprehensive evaluation, the article conducts a detailed performance analysis, with a specific focus on energy consumption. Furthermore, the proposed EF-IDASC scheme is rigorously compared with other related schemes to gauge its efficacy and applicability in the context of securing medical data transmission. This research aims to contribute valuable insights into the development of secure and efficient cloud-centric IoMT-enabled smart healthcare systems,

ISSN:0976-0172
Journal of Bioscience And Technology
www.jbstonline.com

fostering advancements in the delivery of contemporary e-healthcare services.

II.LITERATURE REVIEW

A Secure and Efficient Cloud-Centric Internet-of-Medical-Things-Enabled Smart Healthcare System With Public Verifiability,Mahender Kumar; Satish Chand,The potential of the Internet-of-Medical-Things (IoMT) technology for interconnecting the biomedical sensors in e-health has ameliorated the people's living standards. Another technology recognized in the recent e-healthcare is outsourcing the medical data to the cloud. There are, however, several stipulations for adopting these two technologies. The most difficult is the privacy of medical data and the challenge resulting from the resource constraint environment of sensor devices. In this article, we present the state-of-the-art secure and efficient cloud-centric IoMT-enabled smart healthcare system with public verifiability. The system novelty implements an escrow-free identity-based aggregate signcryption (EF-IDASC) scheme to secure data transmission, which is also proposed in this article. The proposed smart healthcare system fetches the medical data from multiple sensors implanted on the patient's body, signcrypts and aggregates them under the proposed EF-IDASC scheme, and outsources the data on the medical cloud server via smartphone. The system does not reveal any information about the identity and medical data of the patient. We further analyze the performance of the proposed smart healthcare system in terms of energy consumption. Moreover, we compare the performance of the proposed EF-IDASC scheme with other related schemes.

III.EXISTING SYSTEM

In the current landscape of healthcare technology, various implementations of Internet-of-Medical-Things (IoMT) have been integrated to enhance patient care and streamline medical processes. One prevalent approach involves the utilization of IoT devices and sensors for real-time health monitoring, allowing continuous data collection. Additionally, cloud computing has become an instrumental component in storing and processing vast amounts of medical data, offering scalability and accessibility. However, the existing systems face challenges related to security, privacy, and efficient data transmission, especially when outsourcing medical data to the cloud. The security concerns primarily revolve around the protection of sensitive medical information during data transmission and storage.

ISSN:0976-0172
Journal of Bioscience And Technology
www.jbstonline.com

Traditional encryption methods are often employed, but they may not provide the necessary level of security against sophisticated cyber threats. Moreover, the identity and medical data of patients may be at risk during the transmission process.

Efficiency becomes a crucial factor as the volume of medical data generated by IoMT devices increases. The existing systems may encounter bottlenecks in terms of data processing, leading to delays and potential disruptions in healthcare services. Furthermore, ensuring public verifiability, which is essential for building trust in the system, may be lacking in conventional approaches. In summary, while existing systems leverage IoMT and cloud computing for enhanced healthcare services, there exists a need for a more secure, efficient, and publicly verifiable framework. The integration of an escrow-free identity-based aggregate signcryption (EF-IDASC) scheme, as proposed in the project, introduces a novel solution to address the limitations of the current healthcare systems. This scheme aims to enhance the security of data transmission, protect patient privacy, and ensure efficient utilization of cloud resources in the context of Internet-of-Medical-Things-enabled smart healthcare systems.

IV.PROPOSED SYSTEM

The proposed system, "Secure and Efficient Cloud-Centric Internet of Medical Things (IoMT)-Enabled Smart Healthcare System with Public Verifiability," introduces a novel framework designed to overcome the limitations of existing healthcare systems, ensuring enhanced security, efficiency, and public verifiability. This innovative system integrates state-of-the-art technologies to address the challenges associated with data transmission, privacy, and resource utilization in the IoMT and cloud computing landscape.

Key Components of the Proposed System:

Escrow-Free Identity-Based Aggregate Signcryption (EF-IDASC) Scheme:

The core innovation of the proposed system lies in the implementation of an EF-IDASC scheme. This cryptographic scheme is designed to provide a robust and secure method for aggregating and signcrypting medical data, ensuring the confidentiality and integrity of information during transmission.

IoMT-Enabled Data Collection:

ISSN:0976-0172
Journal of Bioscience And Technology
www.jbstonline.com

The proposed system seamlessly integrates with IoMT devices and sensors embedded on a patient's body to collect real-time medical data. This includes vital signs, diagnostic information, and other relevant health metrics.

Dynamic Data Aggregation:

Leveraging the EF-IDASC scheme, the system dynamically aggregates medical data from multiple sensors. This ensures that the aggregated information remains secure, and the identity of the patient is protected throughout the data transmission process.

Cloud-Centric Storage and Processing:

The system utilizes cloud computing resources for efficient storage and processing of the aggregated medical data. Cloud-based servers facilitate scalability, ensuring that the system can handle the increasing volume of data generated by IoMT devices.

Secure Data Outsourcing via Smartphone:

The proposed system employs smartphones as secure gateways for outsourcing aggregated medical data to the cloud server. This adds an additional layer of security and convenience for patients and healthcare providers.

Privacy Preservation:

The system prioritizes patient privacy by not revealing any information about the identity and medical data of the patient during the transmission and storage processes. This is achieved through the secure implementation of the EF-IDASC scheme.

Public Verifiability Mechanism:

To instill trust and transparency, the proposed system incorporates a public verifiability mechanism. This ensures that stakeholders, including patients and authorized entities, can verify the integrity and authenticity of the aggregated medical data.

Performance Analysis:

The proposed system undergoes a comprehensive performance analysis, focusing on energy consumption, processing speed, and overall efficiency. This analysis provides insights into the system's capabilities and its suitability for real-world healthcare applications.

Through the integration of these components, the proposed system aims to establish a new standard in secure, efficient, and publicly verifiable IoMT-enabled smart healthcare systems. The innovative use of the EF-IDASC scheme ensures that the system addresses the

ISSN:0976-0172
Journal of Bioscience And Technology
www.jbstonline.com

intricacies of data transmission, privacy concerns, and resource optimization, paving the way for advancements in contemporary e-healthcare scenarios.

User Registration:

Facilitate a user-friendly registration process, collecting necessary information such as name, contact details, and other relevant details. Verify user identity through secure verification methods.

Verification Process:

Implement a secure verification process to ensure the authenticity of user-provided information. This may involve email verification, mobile number verification, or other secure methods.

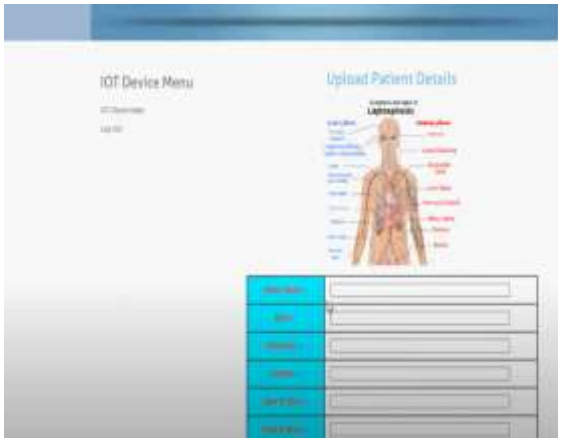
KPS Login System:

KPS login is a user authentication platform, but without additional details, specific features or purposes are not discernible.

Limited Information:

Without context, the term "KPS login" lacks clarity; for accurate details, refer to official documentation or support channels.

ISSN:0976-0172
Journal of Bioscience And Technology
www.jbstonline.com



User Roles and Permissions:

Implement a role-based access control system, designating roles such as patients, healthcare providers, and administrators. Define permissions based on roles to control access to different functionalities.

V.CONCLUSION

In conclusion, the "Secure and Efficient Cloud-Centric Internet of Medical Things (IoMT)-Enabled Smart Healthcare System with Public Verifiability" project represents a significant advancement in addressing the complex challenges inherent in modern healthcare data management. By introducing a novel framework that seamlessly integrates IoMT with cloud-centric solutions, emphasizing security, efficiency, and public verifiability, this project contributes to the evolution of smart healthcare systems. The implementation of the Escrow-Free Identity-Based Aggregate Signcryption (EF-IDASC) scheme serves as a cornerstone for achieving a heightened level of security during data transmission. This cryptographic innovation, detailed within the project, ensures the confidentiality and integrity of medical data while dynamically aggregating information from multiple sensors embedded on a patient's body. The proposed system adeptly leverages cloud computing resources to facilitate scalable storage and efficient processing of the aggregated medical data. The integration of smartphones as secure gateways for data outsourcing adds an extra layer of accessibility and convenience for both patients and healthcare providers.

Emphasizing privacy preservation, the system refrains from revealing any identifiable information during data transmission and storage. The public verifiability mechanism contributes to transparency and trust, allowing stakeholders to independently verify the

ISSN:0976-0172
Journal of Bioscience And Technology
www.jbstonline.com

authenticity and integrity of the aggregated medical data. The project's comprehensive performance analysis, with a focus on energy consumption and efficiency, underscores its practical viability and suitability for real-world healthcare applications. By addressing the limitations of existing systems and introducing innovative solutions, this project contributes to the ongoing efforts to enhance the security, efficiency, and transparency of IoMT-enabled smart healthcare systems.

In essence, the "Secure and Efficient Cloud-Centric IoMT-Enabled Smart Healthcare System with Public Verifiability" project not only offers a solution to current challenges in healthcare data management but also sets a benchmark for the future development of robust, privacy-centric, and publicly verifiable healthcare systems in the era of Internet-of-Medical-Things.

VI.REFERENCES

1. Y. Zhang, R. Deng, D. Zheng, J. Li, P. Wu and J. Cao, "Efficient and robust certificateless signature for data crowdsensing in cloud-assisted industrial IoT", *IEEE Trans. Ind. Informat.*, vol. 15, no. 9, pp. 5099-5108, Sep. 2019.

2. M. Kumar and S. Chand, "A lightweight cloud-assisted identity-based anonymous authentication and key agreement protocol for secure wireless body area network", *IEEE Syst. J.*, May 2020.

3. W. Sun, Z. Cai, Y. Li, F. Liu, S. Fang and G. Wang, "Security and privacy in the medical Internet of Things: A review", *Security Commun. Netw.*, vol. 2018, Jan. 2018.

4. A. Zhang, J. Chen, R. Q. Hu and Y. Qian, "SeDS: Secure data sharing strategy for D2D communication in LTE-advanced networks", *IEEE Trans. Veh. Technol.*, vol. 65, no. 4, pp. 2659-2672, Apr. 2016.

5. Z. Li, Z. Yang and S. Xie, "Computing resource trading for edge-cloud-assisted Internet of Things", *IEEE Trans. Ind. Informat.*, vol. 15, no. 6, pp. 3661-3669, Jun. 2019.

6. W. Wang, P. Xu and L. T. Yang, "Secure data collection storage and access in cloud-assisted IoT", *IEEE Cloud Comput.*, vol. 5, no. 4, pp. 77-88, Jul./Aug. 2018.

7. D. He, S. Zeadally and L. Wu, "Certificateless public auditing scheme for cloud-assisted wireless body area networks", *IEEE Syst. J.*, vol. 12, no. 1, pp. 64-73, Mar. 2018.

8. V. Sureshkumar, R. Amin, V. R. Vijaykumar and S. Rajasekar, "Robust

ISSN:0976-0172
Journal of Bioscience And Technology
www.jbstonline.com

secure communication protocol for smart healthcare system with FPGA implementation", *Future Gener. Comput. Syst.*, vol. 100, pp. 938-951, Nov. 2019.

9. H. Xiong and Z. Qin, "Revocable and scalable certificateless remote authentication protocol with anonymity for wireless body area networks", *IEEE Trans. Inf. Forensics Security*, vol. 10, no. 7, pp. 1442-1455, Jul. 2015.

10.J. Shen, S. Chang, J. Shen, Q. Liu and X. Sun, "A lightweight multi-layer authentication protocol for wireless body area networks", *Future Gener. Comput. Syst.*, vol. 78, pp. 956-963, Jan. 2018.

11.J. A. Akinyele, M. W. Pagano, M. D. Green, C. U. Lehmann, Z. N. J. Peterson and A. D. Rubin, "Securing electronic medical records using attribute-based encryption on mobile devices", *Proc. 1st ACM Workshop Security Privacy Smartphones Mobile Devices*, pp. 75-86, 2011.

12.C. Hu, H. Li, Y. Huo, T. Xiang and X. Liao, "Secure and efficient data communication protocol for wireless body area networks", *IEEE Trans. Multi-Scale Comput. Syst.*, vol. 2, no. 2, pp. 94-107, Apr.–Jun. 2016.

13.B. Chandrasekaran, R. Balakrishnan and Y. Nogami, "Secure data communication using file hierarchy attribute based encryption in wireless body area networks", *J. Commun. Softw. Syst.*, vol. 14, no. 1, pp. 75-81, 2018.

14.F. Li, M. K. Khan, K. Alghathbar and T. Takagi, "Identity-based online/offline signcryption for low power devices", *J. Netw. Comput. Appl.*, vol. 35, no. 1, pp. 340-347, 2012.

15.A. A. Omala, N. Robert and F. Li, "A provably-secure transmission scheme for wireless body area networks", *J. Med. Syst.*, vol. 40, no. 11, pp. 247, 2016.

16.A. Yin and H. Liang, "Certificateless hybrid signcryption scheme for secure communication of wireless sensor networks", *Wireless Pers. Commun.*, vol. 80, no. 3, pp. 1049-1062, 2015.

17.A. Zhang, L. Wang, X. Ye and X. Lin, "Light-weight and robust security-aware D2D-assist data transmission protocol for mobile-health systems", *IEEE Trans. Inf. Forensics Security*, vol. 12, no. 3, pp. 662-675, Mar. 2017.

18.C. Zhou, "Comments on 'light-weight and robust security-aware D2D-assist data transmission protocol for mobile-health systems", *IEEE Trans. Inf. Forensics Security*, vol. 13, no. 7, pp. 1869-1870, Jul. 2018.

19.C. Zhou, "An improved lightweight certificateless generalized signcryption scheme for mobile-health system", *Int. J. Distrib. Sens. Netw.*, vol. 15, no. 1, pp. 1-16, 2019.

ISSN:0976-0172
Journal of Bioscience And Technology
www.jbstonline.com

20.S. S. D. Selvi, S. S. Vivek, J. Shriram, S. Kalaivani and C. P. Rangan, "Identity based aggregate signcryption schemes", *Proc. Int. Conf. Cryptol. India*, pp. 378-397, 2009.

21.H. Wang, Z. Liu, Z. Liu and D. S. Wong, "Identity-based aggregate signcryption in the standard model from multilinear maps", *Frontiers Comput. Sci.*, vol. 10, no. 4, pp. 741-754, 2016.

22.J. Kar, "Provably secure identity-based aggregate signcryption scheme in random oracles", *IACR Cryptol. ePrint Arch.*, vol. 2013, pp. 580-587, Jan. 2013.

23.Z. Eslami and N. Pakniat, "Certificateless aggregate signcryption: Security model and a concrete construction secure in the random oracle model", *J. King Saud Univ. Inf. Sci.*, vol. 26, no. 3, pp. 276-286, 2014.

24.S. Niu, Z. Li and C. Wang, "Privacy-preserving multi-party aggregate signcryption for heterogeneous systems", *Proc. Int. Conf. Cloud Comput. Security*, pp. 216-229, 2017.

25.M. Kumar and S. Chand, "SecP2PVoD: A secure peer-to-peer video-on-demand system against pollution attack and untrusted service provider", *Multimed. Tools Appl.*, vol. 79, pp. 6163-6190, Dec. 2019.

26.G. S. Aujla, R. Chaudhary, K. Kaur, S. Garg, N. Kumar and R. Ranjan, "SAFE: SDN-assisted framework for edge–cloud interplay in secure healthcare ecosystem", *IEEE Trans. Ind. Informat.*, vol. 15, no. 1, pp. 469-480, Jan. 2018.

27.Y. Liu, Y. Zhang, J. Ling and Z. Liu, "Secure and fine-grained access control on e-healthcare records in mobile cloud computing", *Future Gener. Comput. Syst.*, vol. 78, pp. 1020-1026, Jan. 2018.

28.Y. Yang and M. Ma, "Conjunctive keyword search with designated tester and timing enabled proxy re-encryption function for e-health clouds", *IEEE Trans. Inf. Forensics Security*, vol. 11, no. 4, pp. 746-759, Apr. 2016.

29.Y. Zhang, D. Zheng and R. H. Deng, "Security and privacy in smart health: Efficient policy-hiding attribute-based access control", *IEEE Internet Things J.*, vol. 5, no. 3, pp. 2130-2145, Jun. 2018.

30.Y. Yang, X. Zheng and C. Tang, "Lightweight distributed secure data management system for health Internet of Things", *J. Netw. Comput. Appl.*, vol. 89, pp. 26-37, Jul. 2017.