MEGA JOURNAL OF CASE REPORTS

OPEN ACCESS

Review Article

Compiled Date: June 30, 2025

Quantum AI in Healthcare: The Next Frontier of Computational Power for Medical Breakthroughs

Soren Falkner

Vienna University of Technology, Faculty of Computer Engineering, Vienna, Austria

Abstract

The convergence of quantum computing and artificial intelligence (AI) is poised to revolutionize healthcare, offering unprecedented computational power to tackle complex medical challenges. Quantum AI leverages the principles of quantum mechanics to enhance AI algorithms, enabling breakthroughs in drug discovery, personalized medicine, medical imaging, diagnostics, and healthcare data management. This synergy allows for the simulation of molecular interactions at an atomic level, accelerating the identification of novel drug candidates and optimizing treatment strategies based on an individual's unique genetic and molecular profile. Furthermore, quantum-enhanced AI can analyze vast and intricate medical datasets with greater speed and precision, leading to earlier and more accurate diagnoses, improved medical imaging techniques, and the development of highly personalized therapies. While still in its nascent stages, Quantum AI holds immense promise for transforming healthcare, paving the way for more efficient, effective, and personalized medical interventions.

Keywords: Quantum computing; Artificial intelligence (AI); Healthcare, Drug discovery; Personalized medicine; Medical imaging; Diagnostics; Quantum machine learning (QML); Quantum algorithms

Introduction

The 21st century has witnessed a remarkable acceleration in scientific and technological advancements, profoundly impacting various sectors of human endeavor. Among these transformative forces, Artificial Intelligence (AI) and quantum computing stand out as paradigms poised to reshape our understanding and interaction with the world. AI [1-15], with its ability to learn from data and perform complex tasks, has already permeated numerous aspects of our lives, from powering personalized recommendations to driving autonomous vehicles. Simultaneously, quantum computing, leveraging the enigmatic principles of quantum mechanics, promises to unlock computational capabilities far exceeding those of even the most powerful supercomputers for specific classes of problems. As these two revolutionary fields converge, a new frontier emerges: Quantum Artificial Intelligence (Quantum AI). This synergistic fusion holds particularly profound implications for the realm of healthcare, offering the potential to overcome long-standing challenges and usher in an era of unprecedented medical breakthroughs.

The healthcare industry grapples with intricate complexities, ranging from deciphering the intricate mechanisms of disease at the molecular level to managing vast and heterogeneous datasets for effective diagnosis and treatment. Traditional computational approaches often fall short when confronted with the scale and complexity inherent in these challenges. For instance, the process of drug discovery **[16-32]**, which involves screening billions of potential molecular candidates and predicting their interactions with biological targets, can take years and cost billions of dollars. Similarly, analyzing the vast amounts of genomic, imaging, and clinical data required for truly personalized medicine presents a formidable computational hurdle. Quantum AI offers a compelling solution by harnessing the unique capabilities of quantum computing to enhance the power and efficiency of AI algorithms **[33-48]**. Quantum computers operate on the principles of quantum mechanics, utilizing qubits that can exist in multiple states simultaneously (superposition) and exhibit interconnectedness (entanglement). These quantum phenomena allow for exponentially greater computational power and the ability to explore vast solution spaces in parallel, offering a significant advantage over classical bits that can only represent 0 or 1. When integrated with AI, quantum computing can accelerate machine learning algorithms, enabling them to learn from and identify patterns in complex medical datasets with unprecedented speed and accuracy. This synergy paves the way for advancements across the entire healthcare spectrum. In the realm of drug discovery, Quantum AI can revolutionize the process by enabling highly accurate simulations of molecular interactions. This capability allows researchers to predict the efficacy and toxicity of drug candidates with far greater precision, significantly reducing the time and cost associated with traditional experimental methods. By simulating how a drug molecule interacts with its target protein at the atomic level, quantum computers can identify promising candidates with a higher degree of certainty, accelerating the development of novel therapeutics for a wide range of diseases, including cancer, Alzheimer's, and infectious diseases. Furthermore, Quantum AI can aid in the design of novel biomaterials and the optimization of drug delivery systems, leading to more effective and targeted treatments. Beyond drug discovery, Quantum AI holds immense **[49-68]** for the realization of truly personalized medicine. Each individual's genetic makeup, lifestyle, and environmental factors contribute to their unique susceptibility to disease and response to treatment. Analyzing this complex interplay of factors to tailor medical interventions requires immense computational power. Quantum-enhanced AI algorithms can sift through vast amounts of multi-omics data (genomics, transcriptomics, proteomics, etc.) to identify subtle patterns and biomarkers that would be intractable for classical AI. This capability can lead to more accurate risk assessments, earlier disease detection, and the development of individualized treatment strategies optimized for each patient's specific biological profile. Imagine a future where cancer therapies are precisely tailored to the genetic mutations driving an individual's tumor, maximizing efficacy and minimizing side effects. Quantum AI brings this vision closer to reality.

The impact of Quantum AI extends to medical imaging and diagnostics. Analyzing medical images, such as MRI scans and X-rays, often requires identifying subtle anomalies that can be indicative of disease. Quantum machine learning algorithms can be trained on large datasets of medical images to identify these patterns with greater accuracy and speed than current AI systems. This can lead to earlier and more reliable diagnoses, improving patient outcomes, particularly for time-sensitive conditions. Moreover, quantum sensors have the potential to revolutionize medical imaging techniques by offering higher resolution and sensitivity, enabling the detection of diseases at their earliest, most treatable stages. Furthermore, Quantum AI can address the growing challenges associated with managing and analyzing the ever-increasing volumes of healthcare data. Quantum computing offers the potential for enhanced data security through quantum cryptography, safeguarding sensitive patient information. Simultaneously, quantum-enhanced AI can efficiently process and analyze these vast datasets to identify trends, predict outbreaks of infectious diseases, optimize hospital resource allocation, and improve the overall efficiency of healthcare systems. This can lead to better healthcare delivery, reduced costs, and improved public health outcomes. The convergence of quantum computing and artificial intelligence represents a transformative frontier in computational power with profound implications for healthcare. Quantum AI holds the potential to revolutionize drug discovery, personalize medicine, enhance medical imaging and diagnostics, and optimize healthcare data management. While the field is still in its nascent stages and faces significant technological and algorithmic challenges, the potential benefits for human health are immense. Continued research and development in Quantum AI [69-77] are crucial to unlock its full potential and usher in a new era of medical breakthroughs, ultimately leading to more effective, efficient, and personalized healthcare for all. The journey into this quantum-enhanced future of medicine promises to be one of profound discovery and innovation, with the potential to alleviate suffering and extend human well-being in unprecedented ways.

Challenges

While the potential of Quantum AI to revolutionize healthcare is undeniable, the path towards realizing this transformative vision is fraught with significant challenges. Overcoming these hurdles will require concerted efforts from researchers, industry stakeholders, and policymakers alike.

Hardware Development and Stability

The most fundamental challenge lies in the development of robust and scalable quantum hardware. Current quantum computers are still in their nascent stages, characterized by:

- **Limited Qubit Count**: The number of qubits available in current quantum processors is still relatively small, limiting the complexity of the problems they can tackle. Many healthcare applications demand a significantly larger number of stable and high-quality qubits to achieve a quantum advantage over classical computers.

- **Qubit Coherence and Stability**: Quantum states are inherently fragile and susceptible to environmental noise, leading to decoherence the loss of quantum properties. Maintaining qubit coherence for sufficiently long computation times is a major technological hurdle. Error correction techniques are being developed, but they introduce significant overhead in terms of the number of physical qubits required.
- **Connectivity and Control**: Efficiently controlling and entangling a large number of qubits with high fidelity is a complex engineering challenge. Scalable architectures with high connectivity between qubits are crucial for running complex quantum algorithms.
- **Accessibility and Cost**: Access to quantum computing resources is currently limited and expensive. Democratizing access through cloud-based platforms and reducing the cost of hardware will be essential for wider adoption and research in Quantum AI for healthcare.

Algorithm Development and Quantum Software

Developing quantum algorithms that can effectively leverage the power of quantum computers for specific healthcare applications is another significant challenge.

- **Quantum Algorithm Design**: Many classical AI algorithms do not have direct quantum counterparts that offer a significant speedup or advantage. Designing novel quantum algorithms tailored for tasks like drug discovery, medical image analysis, and genomic data processing requires deep expertise in both quantum computing and the specific healthcare domain.
- **Quantum Machine Learning (QML):** While QML is a rapidly growing field, the development of practical and impactful quantum machine learning models for healthcare is still in its early stages. Understanding the theoretical advantages of QML for specific medical tasks and developing efficient training methods are crucial areas of research.
- **Software and Programming Tools**: User-friendly and efficient software development kits and programming tools are needed to enable researchers and practitioners in healthcare to effectively utilize quantum computing resources and implement Quantum AI algorithms. The development of high-level abstractions and libraries tailored for healthcare applications will be essential.
- **Benchmarking and Validation**: Rigorous benchmarking and validation of quantum algorithms and QML models on real-world healthcare datasets are necessary to demonstrate their practical utility and ensure their reliability.

Data Integration and Accessibility

Healthcare data is often distributed, heterogeneous, and subject to strict privacy regulations. Effectively leveraging this data for Quantum AI applications [45] presents several challenges:

- **Data Silos and Interoperability**: Integrating data from various sources (e.g., electronic health records, imaging databases, genomic repositories) in a standardized and interoperable format is crucial for training robust Quantum AI models.

- **Data Privacy and Security**: Handling sensitive patient data requires strict adherence to privacy regulations (e.g., HIPAA, GDPR). Developing privacy-preserving Quantum AI techniques, such as federated quantum learning and quantum homomorphic encryption, will be essential.
- **Data Quality and Bias**: The performance of AI and Quantum AI models heavily relies on the quality and representativeness of the training data. Addressing issues of data bias and ensuring the availability of high-quality, annotated medical datasets are critical for developing fair and reliable Quantum AI solutions.
- **Data Volume and Dimensionality**: Healthcare datasets can be extremely large and high-dimensional, posing challenges for both classical and quantum machine learning algorithms. Developing efficient quantum algorithms for handling such data is an active area of research.

Interdisciplinary Collaboration and Expertise

The successful advancement and application of Quantum AI in healthcare require close collaboration between experts from diverse fields:

- **Quantum Computing Scientists**: Expertise in quantum hardware, algorithm design, and quantum software development is essential.
- **Artificial Intelligence Researchers**: Knowledge of machine learning, deep learning, and statistical modeling is crucial for developing and adapting AI techniques for quantum platforms.
- **Healthcare Professionals and Biomedical Researchers**: Domain expertise in medicine, biology, and drug discovery is necessary to identify relevant problems, provide valuable datasets, and validate the clinical utility of Quantum AI solutions.
- **Data Scientists and Engineers**: Skills in data management, integration, and analysis are needed to prepare and process healthcare data for Quantum AI applications.
- **Ethicists and Legal Experts**: Addressing the ethical and legal implications of using Quantum AI in healthcare, such as data privacy, algorithmic bias, and the responsible deployment of these powerful technologies, is crucial.

Ethical and Societal Implications

As Quantum AI becomes more integrated into healthcare, it is crucial to address the ethical and societal implications:

- **Algorithmic Bias and Fairness**: Ensuring that Quantum AI algorithms do not perpetuate or amplify existing biases in healthcare data is essential for equitable access and outcomes.
- **Data Privacy and Security in the Quantum Era**: While quantum cryptography offers enhanced security, the potential for quantum computers to break existing classical encryption methods necessitates the development of quantum-resistant security measures for sensitive healthcare data.
- **Transparency and Explainability**: Understanding how Quantum AI models arrive at their predictions and decisions

(explainability) is crucial for building trust and facilitating clinical adoption.

- **Regulatory Frameworks**: Establishing appropriate regulatory frameworks for the development and deployment of Quantum AI-powered medical devices and diagnostic tools will be necessary to ensure safety and efficacy.
- **Accessibility and Equity**: Ensuring that the benefits of Quantum AI in healthcare are accessible to all members of society, regardless of socioeconomic status or geographic location, is a critical consideration.

Future Works

The field of Quantum AI in healthcare is rapidly evolving, and numerous avenues for future research and development hold immense promise. Building upon the current foundational work, future efforts will likely focus on addressing existing challenges, exploring novel applications, and translating theoretical advancements into practical clinical tools.

Advancements in Quantum Hardware and Architectures

- **Scaling Qubit Count and Improving Coherence**: A primary focus will be on developing quantum processors with significantly larger numbers of high-fidelity, long-coherence qubits. This will enable the tackling of more complex healthcare problems that are currently intractable for both classical and near-term quantum computers.
- **Developing Fault-Tolerant Quantum Computing**: Achieving fault-tolerant quantum computing, where errors can be effectively corrected, is a long-term goal that will be crucial for running complex and lengthy quantum algorithms required for many healthcare applications.
- **Exploring Novel Qubit Technologies**: Research into alternative qubit technologies (e.g., topological qubits, photonic qubits) that offer inherent advantages in terms of stability and connectivity will continue to be important.
- **Hybrid Quantum-Classical Architectures**: Developing efficient hybrid computing systems that optimally leverage the strengths of both quantum and classical processors will be crucial for near-term applications. This involves intelligently partitioning computational tasks and efficiently transferring data between the two types of computers.

Development of Advanced Quantum Algorithms and Software

- **Tailored Quantum Algorithms for Healthcare Problems**: Future research will focus on designing novel quantum algorithms specifically tailored for key healthcare applications, such as:
  - **Enhanced Molecular Simulation**: Developing more accurate and scalable quantum algorithms for simulating molecular interactions in drug discovery and materials science.
  - **Quantum Optimization for Treatment Planning**: Creating quantum algorithms to optimize complex treatment plans, such as radiation therapy and personalized drug cocktails, considering a multitude of patient-specific factors.

- **Quantum Pattern Recognition in Medical Imaging**: Developing quantum machine learning algorithms for more sensitive and accurate detection of anomalies in medical images.
- **Quantum Algorithms for Genomic Analysis**: Designing efficient quantum algorithms for tasks like variant calling, genome assembly, and the identification of complex genetic disease associations.

➢ **Advancements in Quantum Machine Learning (QML):**

- **Developing More Powerful and Expressive Quantum Neural Networks**: Exploring novel quantum circuit architectures and training methods for QML models that can outperform classical counterparts on relevant healthcare datasets.
- **Quantum Feature Engineering and Selection:** Investigating techniques to effectively encode classical healthcare data into quantum states and identify the most relevant features for quantum machine learning models.
- **Hybrid Quantum-Classical Machine Learning**: Developing hybrid approaches where quantum computers accelerate specific computationally intensive parts of classical machine learning pipelines.
- **User-Friendly Quantum Software and Programming Tools**: Creating more accessible and high-level programming languages, libraries, and development environments will be crucial for enabling a wider range of researchers and practitioners in healthcare to utilize quantum computing resources.

Addressing Data Challenges for Quantum AI in Healthcare

- ➢ **Privacy-Preserving Quantum AI Techniques**: Further research into and development of privacy-preserving quantum computing techniques, such as federated quantum learning and quantum homomorphic encryption, will be essential for enabling the secure analysis of sensitive healthcare data.
- ➢ **Quantum-Enhanced Data Integration and Analysis**: Exploring quantum algorithms and techniques for efficiently integrating and analyzing large, heterogeneous healthcare datasets from various sources.
- ➢ **Quantum Methods for Handling High-Dimensional Data**: Developing quantum algorithms that can effectively process and extract meaningful insights from the high-dimensional data prevalent in genomics, proteomics, and medical imaging.
- ➢ **Synthetic Data Generation using Quantum Models**: Investigating the potential of quantum generative models for creating realistic synthetic healthcare data to augment limited datasets and facilitate research while preserving patient privacy.

Fostering Interdisciplinary Collaboration and Education

- ➢ **Building Interdisciplinary Research Teams**: Encouraging and supporting collaborations between quantum computing scientists, AI researchers, healthcare professionals, biomedical researchers, data scientists, and ethicists will be crucial for driving innovation in this field.

- **Developing Educational Programs and Training Materials**: Creating educational resources and training programs to equip researchers and practitioners in healthcare with the necessary knowledge and skills to utilize Quantum AI effectively.
- **Establishing Shared Research Platforms and Resources**: Facilitating access to quantum computing resources and providing shared platforms for data and algorithm development will accelerate progress.

Exploring Novel Applications of Quantum AI in Healthcare

Beyond the currently envisioned applications, future research may uncover novel ways in which Quantum AI can address unmet needs in healthcare, such as:

- **Quantum Sensors for Medical Diagnostics**: Developing highly sensitive quantum sensors for early and non-invasive disease detection.
- **Quantum Control of Biological Systems**: Exploring the potential of quantum computing for controlling and manipulating biological processes at the molecular level for therapeutic purposes.
- **Quantum Modeling of Biological Complexity**: Utilizing quantum computers to develop more accurate and comprehensive models of complex biological systems, leading to a deeper understanding of disease mechanisms.
- **Quantum-Enhanced Robotics for Surgery and Patient Care**: Investigating the use of quantum computing to optimize the control and precision of surgical robots and other assistive devices.

Addressing Ethical and Societal Implications Proactively

- **Developing Ethical Frameworks for Quantum AI in Healthcare**: Establishing ethical guidelines and principles for the development and deployment of Quantum AI in healthcare to ensure fairness, transparency, and accountability.
- **Investigating and Mitigating Potential Biases in Quantum AI Models**: Developing methods to identify and mitigate biases in quantum machine learning models trained on healthcare data.
- **Ensuring Equitable Access to Quantum AI-Powered Healthcare**: Addressing potential disparities in access to Quantum AI-driven medical advancements and working towards equitable distribution of benefits.
- **Engaging the Public and Policymakers**: Fostering open discussions and engaging with the public and policymakers to address concerns and build trust in the use of Quantum AI in healthcare.

Conclusion

The confluence of quantum computing and artificial intelligence heralds a paradigm shift in the landscape of healthcare. Quantum AI, by harnessing the extraordinary computational power of quantum mechanics to enhance AI algorithms, offers a potent arsenal to tackle the intricate challenges that have long hampered medical progress. From accelerating the laborious process of drug discovery and enabling the realization of truly personalized medicine to revolutionizing medical imaging and diagnostics, and optimizing the management of complex healthcare data, the potential impact of this synergistic field is immense and far-reaching. While the journey towards realizing the full potential of Quantum AI in healthcare is still in its early stages, the theoretical underpinnings and initial advancements offer a compelling glimpse into a future where medical interventions are more precise, effective, and tailored to the individual. The ability to simulate molecular interactions with unprecedented accuracy, analyze vast and complex biological datasets with unparalleled speed, and identify subtle patterns in medical images with enhanced sensitivity promises to unlock new frontiers in our understanding and treatment of disease. However, the path forward is not without its hurdles. Significant challenges remain in the development of stable and scalable quantum hardware, the design of effective quantum algorithms and software, the secure and ethical integration of diverse healthcare data, and the fostering of true interdisciplinary collaboration. Addressing these challenges will require sustained and focused efforts from researchers, engineers, clinicians, policymakers, and ethicists alike.

References

1. Dr Leila Ostovar, Dr Kamal Khadem Vatan, Dr Omid Panahi, (2020). Clinical Outcome of Thrombolytic Therapy, Scholars Press Academic Publishing. ISBN: 978-613-8- 92417-3.
2. Dr Omid Panahi, Dr Faezeh Esmaili, Dr Sasan Kargarnezhad (2024), Искусственныйинтеллект в стоматологии, SCIENCIA SCRIPTS Publishing. ISBN: 978-620-6622801.
3. Panahi O. The evolving partnership: surgeons and robots in the maxillofacial operating room of the future. J Dent Sci Oral Care. 2025;1(1):1–7.
4. O. Panahi. (2025). The Future of Medicine: Converging Technologies and Human Health. Journal of Bio-Med and Clinical Research. RPC Publishers. 2(1).
5. O. Panahi. (2025). Nanomedicine: Tiny Technologies, Big Impact on Health. Journal of Bio-Med and Clinical Research. RPC Publishers. 2(1).
6. O. Panahi. (2025). The Age of Longevity: Medical Advances and The Extension of Human Life. Journal of Bio-Med and Clinical Research. RPC Publishers. 2(1).
7. Panahi O. Predictive Health in Communities: Leveraging AI for Early Intervention and Prevention. Ann Community Med Prim Health Care. 2025; 3(1): 1027.
8. Panahi, O. (2025). Digital Health Equity: Leveraging IT and AI for Community Well-being. Ann Community Med Prim Health Care, 3(1), 1028.
9. Dr. Omid Panahi, Innovations in Surgical Healthcare: The Future of Medicine. Journal of Surgical Case Reports and Investigations (JSCRI) 2025. 1(1). 01-08.
10. Dr. Omid Panahi. Advancing Healthcare: A Surgical and Oral Medicine Perspective. Journal of Surgical Case Reports and

Investigations (JSCRI) 2025. 1(1). 21-27.
11. Dr. Omid Panahi. The Interconnectedness of Modern Medicine: Surgery, Oral Health, and Implantology. Journal of Surgical Case Reports and Investigations (JSCRI) 2025. 1(1). 09-14.
12. Dr. Omid Panahi. Holistic Approaches in Healthcare: Integrating Surgical and Oral Therapies. Journal of Surgical Case Reports and Investigations (JSCRI) 2025. 1(1). 15-20.
13. Panahi O. The oral-systemic link: Using AI to analyze dental data for cardiovascular risk assessment. Ann Cardiol. 2025; 2(1): 1008.
14. Dr. Omid Panahi. Health in the Age of AI: A Family and Community Focus. Archives of Community and Family Medicine. 2025; 8(1): 11-20.
15. Dr. Omid Panahi. Forging a Healthier Future Through Responsible AI in Families and Communities. Archives of Community and Family Medicine. 2025; 8(1): 21-30.
16. Panahi O (2025) Robotic Surgery Powered by AI: Precision and Automation in the Operating Room. SunText Rev Med Clin Res 6(2): 225.
17. Panahi, D. U., & HOC, A. (2025). Networks: Applications. Challenges, Future Directions, Scholars' Press, ISBN, 978-3.
18. Omid Panahi (2024) f: Expanding Access to Oral Healthcare. Journal of Dental Science Research Reviews & Reports. SRC/JDSR-203.
19. Omid P, Reza S. How Artificial Intelligence and Biotechnology are Transforming Dentistry. Adv Biotech & Micro. 2024; 18(2): 555981.
20. Omid Panahi. “AI: A New Frontier in Oral and Maxillofacial Surgery". Acta Scientific Dental Sciences 8.6 (2024): 40-42.
21. Omid Panahi*and Reza Safaralizadeh. AI and Dental Tissue Engineering: A Potential Powerhouse for Regeneration. Mod Res Dent. 8(2). MRD. 000682. 2024.DOI:10.31031/MRD.2024.08.000682.
22. Omid Panahi*. Artificial Intelligence: A New Frontier in Periodontology. Mod Res Dent. 8(1). MRD. 000680. 2024.DOI: 10.31031/MRD.2024.08.000680.
23. Omid, P. (2024). Empowering Dental Public Health: Leveraging Artificial Intelligence for Improved Oral Healthcare Access and Outcomes. JOJ Pub Health, 9(1), 555754.
24. Omid P. Artificial Intelligence in Oral Implantology, Its Applications, Impact and Challenges. Adv Dent & Oral Health. 2024; 17(4): 555966.
25. Omid Panahi. “AI Ushering in a New Era of Digital Dental-Medicine". Acta Scientific Medical Sciences 8.8 (2024): 131-134.
26. Panahi, O., &Zeinaldin, M. (2024). AI-Assisted Detection of Oral Cancer: A

Comparative Analysis. Austin J Pathol Lab Med, 10(1), 1037.
27. Panahi O. AI in Surgical Robotics: Case Studies. Austin J Clin Case Rep. 2024; 11(7): 1342.
28. Panahi O, Zeinaldin M. Digital Dentistry: Revolutionizing Dental Care. J Dent App. 2024; 10 (1):1121.
29. Omid Panahi, Sevil Farrokh. USAG-1-Based Therapies: A Paradigm Shift in Dental Medicine. Int J Nurs Health Care. 2024;1(1):1-4.
30. Omid Panahi, Sevil Farrokh. Can AI Heal Us? The Promise of AI-Driven Tissue Engineering. Int J Nurs Health Care. 2024; 1(1):1-4.
31. O. Panahi. (2025). Algorithmic Medicine, Journal of Medical Discoveries, 2(1).
32. O. Panahi. (2025). Deep Learning in Diagnostics, Journal of Medical Discoveries, 2(1).
33. Panahi, O. (2023). KetenciÇay F. NanoTechnology. Regenerative Medicine and Tissue Bio-Engineering. ActaSci Dent Sci, 7(4), 118-122.
34. Panahi O, et al. (2025). Smart Robotics for Personalized Dental Implant Solutions. Dental. 7(1).
35. Panahi, P., Bayılmış, C., Çavuşoğlu, U., & Kaçar, S. (2021). Performance evaluation of lightweight encryption algorithms for IoT-based applications. Arabian Journal for Science and Engineering, 46(4), 4015-4037.
36. Panahi, U., & Bayılmış, C. (2023). Enabling secure data transmission for wireless sensor networks based IoT applications. Ain Shams Engineering Journal, 14(2), 101866.
37. Omid Panahi, and UrasPanahi. AI-Powered IoT: Transforming Diagnostics and Treatment Planning in Oral Implantology. J Adv ArtifIntell Mach Learn. 2025; 1(1): 1-4.
38. Panahi, P., &Dehghan, M. (2008, May). Multipath Video Transmission Over Ad Hoc Networks Using Layer Coding And Video Caches. In ICEE2008, 16th Iranian Conference On Electrical Engineering, (May 2008) (pp. 50-55).
39. bakikoyuncu, pejmanpanahi, Kalman Filtering of Link Quality Indicator Values for Position Detection by Using WSNS, Int'l Journal of Computing, Communications & Instrumentation Engg. (IJCCIE), volume 1, 2014.
40. PejmanPanahi and CneytBaylm, "Car indoor gas detection system", International Conference on Computer Science and Engineering (UBMK), 2017.
41. Panahi P. Providing consistent global sharing service over VANET using new plan. In 2009 14th International CSI Computer Conference. IEEE. 2009: 213-218.
42. Panahi P, Dehghan M (2008) Multipath Video Transmission Over Ad Hoc Networks Using Layer Coding and Video Caches. In ICEE2008, 16th Iranian Conference on Electrical Engineering pp. 50-55.

43. Dr Uras Panahi, Redes AD HOC: Aplicações, Desafios, DirecçõesFuturas, Edições Nosso Conhecimento, ISBN: 978-620-8-72962-2.
44. Dr Uras Panahi, Sieci AD HOC: Zastosowania, wyzwania, przyszłekierunki, WydawnictwoNaszaWiedza, ISBN: 978-620-8-72967-7.
45. Dr Uras Panahi, Reti AD HOC: Applicazioni, sfide e direzioni future, Edizioni Sapienza, ISBN: 978-620-8-72965-3.
46. Dr Uras Panahi, Redes AD HOC: Aplicaciones, retos y orientaciones futuras, Ediciones Nuestro Conocimiento, ISBN: 978-620-8-72966-0.
47. Dr Uras Panahi, Réseaux AD HOC: Applications, défis et orientations futures, Editions Notre Savoir, ISBN: 978-620-8-72964-6.
48. Dr Uras Panahi, AD HOC-Netze: Anwendungen, Herausforderungen, zukünftige Wege, Verlag Unser Wissen, ISBN: 978-620-8-72963-9.
49. Dr Omid Panahi, Dr Faezeh Esmaili, Dr Sasan Kargarnezhad (2024), KünstlicheIntelligenz in der Zahnmedizin, Unserwissen Publishing. ISBN: 978-620-3-6722696.
50. Dr Omid Panahi, Dr Faezeh Esmaili, Dr Sasan Kargarnezhad (2024), Artificial Intelligence in Dentistry, Scholars Press Publishing. ISBN: 978-620-6772118.
51. Dr Omid Panahi, Dr Faezeh Esmaili, Dr Sasan Kargarnezhad (2024), Inteligencia artificial enodontología, NUESTRO CONOC, MENTO Publishing. ISBN: 978-620-6622764.
52. Dr Omid Panahi, Dr Faezeh Esmaili, Dr Sasan Kargarnezhad (2024), L'intelligenceartificielledansl'odontologie, EDITION NOTRE SAVOIR Publishing Publishing. ISBN: 978-620-6622771.
53. Dr Omid Panahi, Dr Faezeh Esmaili, Dr Sasan Kargarnezhad (2024), Intelligenzaartificiale in odontoiatria, SAPIENZA Publishing. ISBN: 978-620-6622788.
54. Dr Omid Panahi, Dr Faezeh Esmaili, Dr Sasan Kargarnezhad (2024), Inteligência Artificial emMedicinaDentária, NOSSO CONHECIMENTO Publishing. ISBN: 978-620-6622795.
55. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Peridontium: Estrutura, função e gestãoclínica, lSBN: 978-620-8-74561-5.
56. Dr Omid Panahi, Dr Shabnam Dadkhah, AI in der modernen Zahnmedizin, ISBN:978-620-8-74877-7.
57. Dr Omid Panahi, Dr Shabnam Dadkhah, La IA en la odontologíamoderna, ISBN:978-620-8-74881-4.
58. Dr Omid Panahi, Dr Shabnam Dadkhah, L'IA dans la

dentisteriemoderne, ISBN:978-620-8-74882-1.
59. Dr Omid Panahi, Dr Shabnam Dadkhah, L'intelligenzaartificialenell'odontoiatria moderna, ISBN:978-620-8-74883-8.
60. Dr Omid Panahi, Dr Shabnam Dadkhah, Sztucznainteligencja w nowoczesnejstomatologii, ISBN:978-620-8-74884-5.
61. Dr Omid Panahi, Dr Shabnam Dadkhah, A IA namedicinadentáriamoderna, ISBN:978-620-8-74885-2.
62. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Dr Masoumeh Jabbarzadeh, DigitaleZahnmedizin und künstlicheIntelligenz, ISBN: 978-620-8-73910-2.
63. Dr Omid Panahi, DrSevil Farrokh Eslamlou, Dr Masoumeh Jabbarzadeh, Odontología digital e inteligencia artificial, ISBN: 978-620-8-73911-9.
64. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Dr Masoumeh Jabbarzadeh, Dentisterienumérique et intelligence artificielle, ISBN: 978-620-8-73912-6.
65. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Dr Masoumeh Jabbarzadeh, Odontoiatriadigitale e intelligenzaartificiale, ISBN: 978-620-8-73913-3.
66. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Dr Masoumeh Jabbarzadeh, Stomatologiacyfrowaisztucznainteligencja, ISBN: 978-620-8-73914-0.
67. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Dr Masoumeh Jabbarzadeh, Medicinadentária digital e inteligência artificial, ISBN: 978-620-8-73915-7.
68. Dr Omid Panahi, StammzellenausdemZahnmark, ISBN: 978-620-4-05355-4.
69. Dr Omid Panahi, Célulasmadre de la pulpa dental, ISBN: 978-620-4-05356-1
70. Dr Omid Panahi, Стволовыеклеткипульпызуба, ISBN: 978-620-4-05357-8.
71. Dr Omid Panahi, Cellules souches de la pulpedentaire, ISBN: 978-620-4-05358-5.
72. Dr Omid Panahi, Cellule staminalidellapolpadentaria, ISBN: 978-620-4-05359-2.
73. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Peridontium: Struktur, Funktion und klinisches Management, ISBN:978-620-8-74556-1.
74. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Peridoncio: Estructura, función y manejoclínico, ISBN:978-620-8-74557-8.
75. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Le péridontium : Structure, fonction et gestionclinique, ISBN:978-620-8-74558-5.
76. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Peridonio: Struttura, funzione e gestioneclinica, ISBN:978-620-8-74559-2.
77. Dr Omid Panahi, Dr Sevil Farrokh Eslamlou, Peridontium: Struktura,

funkcjaipostępowaniekliniczne, ISBN:978-620-8-74560-8.

Citation of this Article

Falkner S. Quantum AI in Healthcare: The Next Frontier of Computational Power for Medical Breakthroughs. Mega J Case Rep. 2025;8(6):2001-2014.

Copyright