

# Electronic Solutions for Artificial Intelligence Healthcare

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## 1. Introduction

At present, diverse, innovative technology is used in electronics and ubiquitous computing environments. This allows us to create a better world by providing the backbone for remarkable development in our human society in the fields of electronics, devices, computer science, and engineering. Healthcare and bioelectronics in artificial intelligence are becoming increasingly complex, sophisticated and fast [1].

For this purpose, this SI is open to receiving a variety of meaningful and valuable manuscripts concerning electronic solutions to the healthcare issue. Participants may write about one of the subjects listed below, but they are not limited to these.

- Electronic services respecting human beings and their lives.
- Electronic solutions to artificial intelligence and Big Data.
- Means of aiding and serving neglected people such as the disabled or elderly.
- Electronic engineering mathematical theories that deeply affect science and industry.
- Intelligent media techniques and services for systems engineering.
- A public electronic engineering integration system for the future systems.

There are a total of twenty-five papers, including review papers and research papers. This Special Issue consists of seven review papers [2–8] and eighteen research papers [9–26].

## 2. Review Papers

Among the review papers, Haider Dhia Zubaydi, et al [2] conducted a review research on “A Review on the Role of Blockchain Technology in the Healthcare Domain”. The review highlights the integrating blockchain into healthcare to resolve various main challenges of healthcare, such as medical security of privacy, inability to connect disparate systems, poor interoperability between various systems, validation, authentication, etc. Vasco Ponciano, et al [3] conducted a review research on “Is The Timed-Up and Go Test Feasible in Mobile Devices?” for a systematic review and presented the feasibility of the Timed-Up and Go test by the inertial sensors available in mobile devices to support the old adults' health care efficiently.

Mijin Kim, et al [4] conducted a review of “Revisit of Password-Authenticated Key Exchange Protocol for Healthcare Support Wireless Communication”. The review analyzed the security of the three-party password-authenticated key exchange (3WPAKE) and proposed a secure biometric-based efficient password-authenticated key exchange (SBAKE) protocol that fixes and enhances the security and efficiency of the existing 3PAKE for a healthcare system in the wireless environment. Vasco Ponciano [5], et al conducted a review research on “Identification of Diseases Based on the Use of Inertial Sensors” for a systematic review. The review focused on the use of inertial sensors, especially the accelerometer sensors embedded in smartphone and other devices to detect and identify diseases as Parkinson efficiently.

On the other hand, Jae-Sub Ko, et al [6] conducted a review research on an “Overview of Maximum Power Point Tracking Methods for PV System in Micro Grid”. The review



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proposed the various methods as artificial intelligence control and mixed methods for the MPPT of PV systems to track maximum power points using approximated values. Ivan Miguel Pires, et al [7] conducted research on “Measurement of Results of Functional Reach Test with Sensors” for a systematic review. The review highlighted the state-of-the-art use of sensors available on commonly used off-the-shelf mobile devices for the Functional Reach Test to measure the old adults' limitation of stability related to post-stroke and stroke treatment. Lastly, Ivan Miguel Pires, et al [8] conducted research on “Analysis of the Results of Heel-Rise Test with Sensors” for a systematic review. The review identified sensor techniques for the measurement of the Heel-Rise Test for the detection and the rehabilitation of patients' major health concern, stroke.

These review papers are considered to be basic research for “Electronic Solutions for Artificial Intelligence Healthcare” by providing insights for universal and security-enhanced healthcare using the state-of-the-art techniques and off-the-shelf devices. Thus, this special issue has compiled research papers that coincide with human respect and love of life.

### 3. Research Papers

Ikram U. Rehman, et al suggested “Multilayer Perceptron Neural Network-Based QoS-Aware, Content-Aware, and Device-Aware QoE Prediction Model” [9]. The suggested prediction model obtained accuracy measuring result as the visual perception of the medical experts. Ghulam Hussain, et al suggested an “Indoor Positioning System” [10] based on LSTM and two stage activity classification, accurately recognized physical activities and related action units (AUs) in the indoor positioning performance. Jean-Pierre Lomaliza, et al suggested “Improved Heart-Rate Measurement from Mobile Face Videos” [11]. The suggested system based on a correlation-based signal periodicity computation method, accurately separated the true heart-rate-related component from the head motion signal and demonstrated improved accuracy that is sufficient for daily heart-rate monitoring.

On the other hand, Namje Park, et al suggested “A Mechanism of Masking Identification Information Regarding Moving Objects Recorded on Visual Surveillance Systems by Differentially Implementing Access Permission” [12].

Shuyu Li, et al suggested “Melody Extraction and Encoding Method for Generating Healthcare Music Automatically” [13] and demonstrated possibility of generating music through deep learning neural networks. George Baldoumas, et al suggested “A Prototype Photoplethysmography Electronic Device that Distinguishes Congestive Heart Failure from Healthy Individuals by Applying Natural Time Analysis” [14].

Yonghun Jang, et al suggested “Fake News Analysis Modeling Using Quote Retweet” [15] based on the neural network classifier that significantly increases the accuracy of fake news analysis. Ziyuan Yang, et al suggested “StoolNet for Color Classification of Stool Medical Images” [16]. The research employed advanced digital image processing technologies and deep learning methods that lowers the price and increases the performance. Laith Alzubaidi, et al suggested “Deep Learning Models for Classification of Red Blood Cells in Microscopy Images to Aid in Sick Cell Anemia Diagnosis” [17]. The suggested model's simulation and analysis results obtained state-of-the-art performance and achieved high level of accuracy.

Meanwhile, Sung-Wook Park, et al suggested “Avoiding Mode Collapse in GANs Using Variational Inference” [18]. The suggested paper is related to the optimization of GAN, and it can be integrated into various systems by reducing cost and time. Sea Young Park, et al suggested “An Energy-Efficient Enhanced Dual-Fuzzy Logic Routing Protocol for Monitoring Activities of the Elderly Using Body Sensor Networks” [19]. The simulation and analysis results of this protocol revealed the reduction of the energy consumption effectively extending the lifespan of the entire network. Dong-Gun Lee, et al suggested “Intelligent Image Synthesis for Accurate Retinal Diagnosis” [20]. The suggested method resulted accurate diagnoses after retinal examinations that reconstructs the vessel image based on past retinal image data with artificial neural networks.

Samaneh Davarzani, et al suggested “Closing the Wearable Gap for Human Gait Recognition Using Deep Learning Methodologies” [21]. The suggested methods were predicted by foot-ankle kinematics captured by the 3D motion capture system based on SRS, and revealed the high performance and the high potential of SRS.

For hospitals to check the safety of customers before a surgery, Jun-Ho Huh suggested the “Surgery Agreement Signature Authentication System for Mobile Health Care” [22]. The suggested system is developed with Java Android and for hospitals to install and monitor the system at low cost.

Meanwhile, Jiyeon Kim, et al suggested “CNN-Based Network Intrusion Detection against Denial-of-Service Attack” [23]. The suggested content featured a CNN-Based Network Intrusion Detection System to ensure security related to DDoS attacks for a safer society.

Wen-Yaw Chung, et al suggested the “Development of a Portable Multi-Sensor Urine Test and Data Collection Platform for Risk Assessment of Kidney Stone Formation” [24]. The suggested platform is based on the Internet of things (IoT) data collection system. The suggested platform’s preliminary result indicated exhibiting high correlation with standard instruments.

Mudasir Ahmad Wani, et al suggested the “Impact of Unreliable Content on Social Media Users During COVID-19 and Stance Detection System” [25]. The suggested contents featured the Online social network (OSN) users during the COVID-19 pandemic had been more vulnerable in perceiving the religion-based misinformation as fact. In addition, Stance Detection System based on deep learning model has been suggested as one of the automated mechanisms for tracking the news on Twitter as being potentially false.

Yonghoon Kim, et al suggested a “Traffic Inference System Using Correlation Analysis with Various Predicted Big Data [26]”. The traffic amount of the suggested system will be inferred by using an algorithm suggested by Big Data technologies to be able to save time and cost safely.

These research papers attempted various electronic solution based on artificial intelligence and big data that provide useful functions and insights for a valuable human life.

#### 4. Conclusion and Future Special Issue

In the era of artificial intelligence and big data, what do we consider to be important, and what system should we develop and study?

This Special Issue does not aim to simply increase users or make money, but features the following: an artificial intelligence system with a focus on human respect and love for life, a system that is essential to health care and human life, and a security system for safety. In other words, this Special Issue consists of a system that is essential to human life.

There are a total of 25 papers, including review papers and research papers. Papers will also be continuously collected for a future Special Issue, “Electronic Solutions for Artificial Intelligence Healthcare Volume 2” [27]. This Special Issue attempted to deal with ethical issues as well, but related studies will be dealt with in volume 2.

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