# IoT for enhanced decision-making in medical information systems: A Systematic Review

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**Abstract:** Combination of emerging technologies such as Internet of Things (IoT) enhance telemedicine quality as make it more personalized, reduce costs, reduce medical errors and enhance patient safety, and save time for critical situations. IoT-based technologies transform medical decision-making by offering various services such as transmitting medial data/ biomedical signals, patient tracking and remote monitoring, reliable access to medical data, and quick emergency services. Although, there are many benefits in merging new IoT technologies with telemedicine, the role of IoT in medical and technical decision-making is not clear enough for medical professionals. Therefore, this chapter aims to perform a systematic review of the relevant literature to elucidate various IoT applications for enhanced medical and technical decision-making. Electronic database search is performed to obtain the studies from 2017 to 2021 using search strategies. IEEE Xplore and PubMed are included for database search. Around 272 papers were selected from searching strategies. While reviewing the title of those papers, filtration was applied, and some papers were removed. Among all papers, only 73 journal articles which only focus on the role of IoT for medical decision-making were included in this study. ATLAS.ti was used for coding, qualitative analysis and visualization of the included papers to extract the relevant information to this study. IoT-based techniques were highlighted and their role in the enhancement of medical and technical decision were discussed. This chapter can be useful for healthcare providers for using relevant IoT-based solutions for providing better decision-making for medical information systems.

**Keywords:** Internet of Things; Medical Information Systems; Medical Decision-making; Systematic Review; Qualitative Analysis

## 1 Introduction

Internet of Things (IoT) is the network of physical devices which communicate, interact, detect and transfer data without human involvement. Emerging of IoT-based technologies offered various services to healthcare such as patient remote monitoring, tracking patient's location, accessing to electronic health records and medical data, the transmission of medical data/ biomedical signals, and quick emergency services for enhancing decision-making and medical treatment. The use of IoT in healthcare was inspired by emergence of wearable technologies. These technologies assist users to send their medical data to the respected doctor/nurse, to self-track, self-monitor, and self-manage their health, and to prevent abnormal health situation [1, 2]. Apart from wearable technologies, that can detect patient's biomedical data, emergence of IoT innovations in medical systems can offer cares in emergency, provide remote monitoring services to patients, diagnose potential health issues, and keep the patients out of hospitals.

Patient-centric care requires a serious solution due to the lack of nursing and medical personnel. Advancement of new information technologies, emerging IoT in healthcare, and wearable technologies transformed methods of providing patient-centered care. Thus, IoT-based medical information system, which delivers ubiquitous medical services to the patients anytime at anywhere, was transformed. Patients and their families, healthcare providers and professionals, and physician are involved in a patient-centric healthcare information systems to support patient's needs [3-8]. Various services are offered to medical information systems by the emergence of IoT-based technologies. It can connect patients to the relevant medical professionals using wireless communication technologies; therefore, hospital visits and physicians' burden can be reduced [2, 9].

An example of IoT-based medical information system architecture is illustrated in Figure 1 in which computing devices are communicating and interacting with each other over the internet. This king of IoT-based medical information systems can provide quick and efficient decision-making in the hospitals as all parties are interconnected. However, patient's privacy, security, data loss prevention, quality of care, medical myths, and misinformation prevention needs to be considered for this kind of medical information systems.

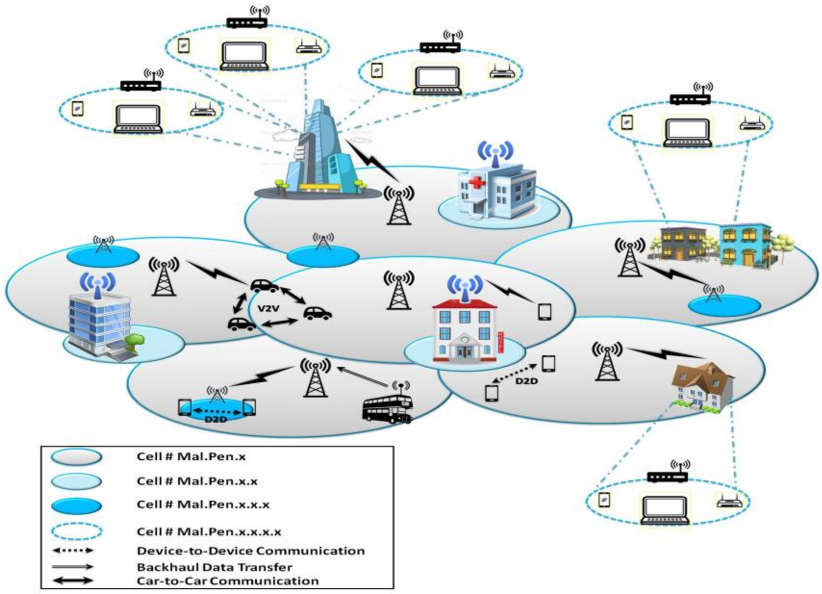


**Fig. 1.** Example of IoT-based Technologies in Hospital.

Nowadays, IoT-based and big data technologies have revolutionized the way for healthcare is delivered. As shown in Figure 2, data is generated from patient's IoT devices which needs to be analyzed by medical big data analytics methods to make the correct diagnosis, medication, treatment, prediction decision. Patient data from IoT devices can be fitness results, heart rate, blood glucose levels, blood pressure, Electrocardiogram (ECG), blood oxygen saturation, dyskinesia, Parkinson's symptoms, and so forth. Using the internet, these medical data can be processed and transferred to medical professionals. A decision tree can be created based on the processed data, which can assist medical professionals in making quick and efficient decisions. Use of IoT in medical information systems attracts many attentions for decision-making of aging populations and chronic diseases. In order to reduce strain on medical resources, patients with chronic diseases be monitored remotely instead of being hospitalized. Furthermore, access to healthcare can be improved for rural areas; and the elderly can be lived independently. IoT technologies provide activity monitoring by tracking drugs, healthcare professionals, patients, inventories, medical assets in hospitals. Thus, the time that medical staff need to search for the drugs and devices would be reduced and they can spend more time for patients. Moreover, on-time alert can be activated to rescue patients in emergency. However, some drawbacks such as security and privacy are mentioned for IoT-based medical information systems. In addition, some other risks such as risk of disconnection from medical information systems, accuracy of medical wearable sensors and devices, battery life issues, and security risk of storing big medical data in a database. Although there are various available solutions to address these issues and risks, some issues related to secure communication and storage of medial data, secure clouds, big medical data processing, and impact of motion on medical sensors/ devices still need to be addressed for enhancement of IoT medical information system in the future.

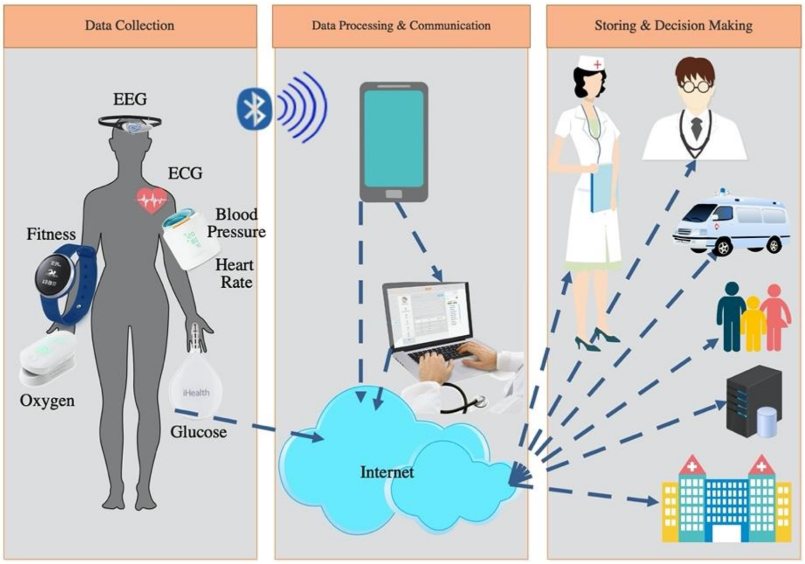


**Fig. 2.** Example of Using IoT for medical information systems inside hospitals.

In order to design an IoT-based medical information system which can provide a platform for quick and efficient decision-making, a comprehensive study is required to be familiar with IoT-based technologies and how they can assist medical professionals and healthcare providers to make the best medical and technical decisions. Therefore, this study aims to conduct a systematic literature review to review different studies which used IoT technologies in medical information systems. In addition, this study intends to find how IoT technologies can assist medical professionals and healthcare providers for decision-making. Furthermore, this chapter provides an overview and background of IoT in healthcare and IoT for decision-making. Then, the proposed systematic review methodology is reported followed by results, analysis and discussion of the systematic review. Finally, the study is warped up by concluding remarks.

The total number of 73 journal articles, which are retrieved from IEEE Xplore and PubMed database, are reviewed in this chapter. Various methods, techniques, and type of IoT sensors/ devices are extracted from these articles. Based on the contributions of the reviewed articles, decision-making are divided into (1) technical decisions, and (2) medical decision. Using ATLAS.ti software, the total number of 76 codes were defined for IoT sensor/ devices, 51 codes for technical decision, and 37 codes for medical decision.

This chapter is organized as follow: Section 1 includes introduction, background, problem statement and the goal of this study. Section 2 covers the method for conducting the systematic literature review. Section 3 describes results and discussion followed by Section 4 which concludes this chapter.

## 2 Methodology

A systematic review is conducted in this study which includes five steps as shown in Figure 3. In the first step, literature screening was performed using two keywords of “IoT for medical decision” and “Internet of Things for medical decision” in IEEE Xplore and PubMed. As IEEE Xplore is a famous database for IoT and PubMed is for medical studies, these two were chosen as electronic databases for this study. The total number of 230 papers have appeared from the screening results in IEEE and 42 in PubMed; however, duplicate publications were removed from the screening results. After applying filtration from journal articles published from 2017 to 2021, 46 journal articles remained from IEEE database and 37 from PubMed. Some irrelevant papers were excluded from the screening results and only 38 journal articles from IEEE Xplore followed by 35 journal articles from PubMed were included in this study. Finally, the papers were added in ATLAS.ti software. Coding was performed, qualitative analysis and visualization was done to find the IoT sensors/ devices used in each study and how they helped to improve medical and technical decision-making. In addition, word cloud was created to retrieve the objectives, techniques, the systems used in each paper.

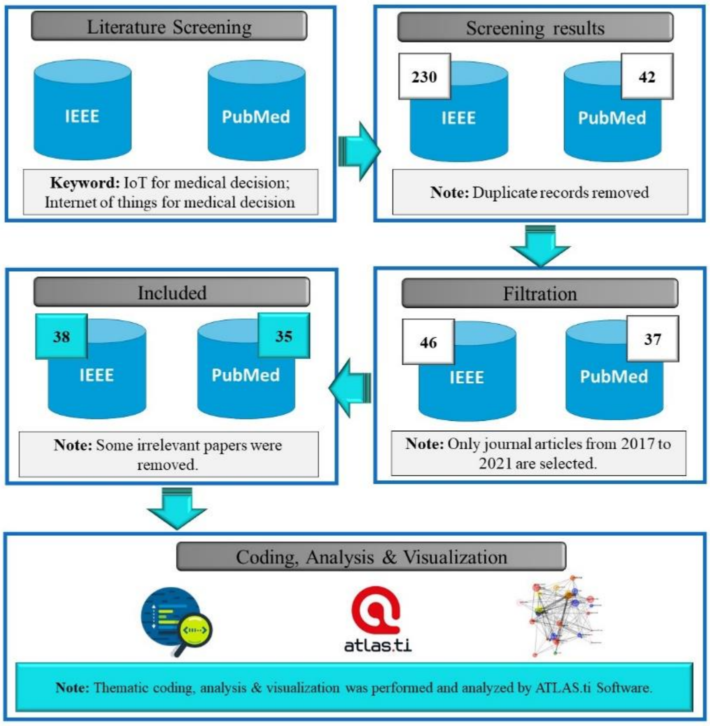


**Fig. 3.** Systematic Review Process

The total number of 76 codes were defined for IoT sensor/ devices, 51 codes for technical decision, and 37 codes for medical decision (Figure 4). Among all codes, 94 codes belong to the journal articles which were retrieved from PubMed and 67 from IEEE Xplore. Absolut frequencies refers to the number of coded quotations which is highest for the code "IoT sensor/ device" among PubMed articles and lowest for the code "medical decision" in both databases. Row, column and table-relative frequencies illustrate the distribution of quotations or words within a row, column and the table respectively.

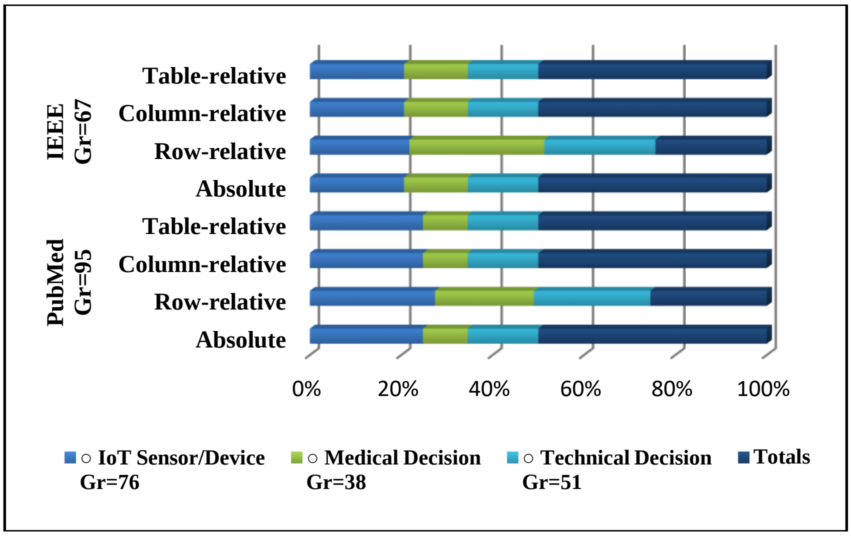


**Fig. 4.** Results of Code-Document Table from ATLAS.ti

## 3 Results and Discussion

As mentioned in the methodology, this chapter conducted a systematic review in which ALTLAS.ti is utilized to arrange the articles, create codes and quotations for each paper, analyses the codes, and make conclusion. The total number of 73 journal articles are included in this study among which 38 are from IEEE Xplore (Table 1) electronic database and 35 from PubMed (Table 2). These two databases are chosen for this study as they are related to IoT and medical information systems and decision-making, respectively.

**Table 1.** Summary of Included Studies (**IEEE Xplore**).

| Study | Aim/ Objective | System |
|---|---|---|
| [10] | cluster-based hierarchical approach for monitoring the patients in an energy-efficient manner | smart healthcare system |
| [11] | providing generic and reusable solutions for elaborating flexible smart IoT-based systems able to perceive the collected data and provide decisions | a flexible cognitive monitoring system |
| [12] | novel framework based on computer propped diagnosis and IoT to detect and observe type-2 diabetes patients | diagnosis with mysterious data |
| [13] | an enhanced system by introducing a Physical Unclonable Function (PUF)-based authentication scheme and a data driven fault-tolerant decision-making scheme | an IoT-based modern healthcare system |
| [14] | A survey existing and emerging technologies that can enable this vision for the future of healthcare | Health of Internet-of-Things (HIoT) system |

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| [15] | an adaptive and flexible Brain Energized Full Body Exoskeleton (BFBE) for assisting the paralyzed people | Brain Energized Full Body Exoskeleton system |
| [16] | Experimentation results prove that ML algorithms with PCA produce better results when dimensionality of the datasets is high | - |
| [17] | a cognitive healthcare model that combines IoT–cloud technologies for pathology detection and classification | Healthcare model |
| [18] | Deep Learning-based SDN Model for Internet of Things | IoT-Train-Deep approach for intelligent software |
| [19] | The basic feats of NDN architecture for designing and verification of an NDN-based smart health IoT (NHealthIoT) system | NHealthIoT |
| [20] | A drowsiness detection system based on a brain-computer interface (BCI) headset having 3 electrodes is proposed | drowsiness detection system |
| [21] | finding significant features by applying machine learning techniques resulting in improving the accuracy in the prediction of cardiovascular disease | Hybrid random forest with linear model (HRFLM) |
| [22] | an emotion-aware connected healthcare system using a powerful emotion detection module | Emotion-aware healthcare system |
| [23] | Activity Recognition (AR) and Movement Recognition (MR) implementation for enabling IoT for in-home rehabilitation | eHealth and mHealth |
| [24] | Enabling Secure Cross-Modal Retrieval Over Encrypted Heterogeneous IoT Databases With Collective Matrix Factorization | Secure cross-model retrieval (SCMR) process |
| [25] | the remote patient health monitoring in smart homes by using the concept of fog computing at the smart gateway | Fog Assisted- IoT Enabled Patient Health Monitoring system |
| [26] | Human activity recognition based on improved Bayesian convolution network to analyze health care data using wearable IoT device | Improved Bayesian Convolution Network (IBCN) |
| [27] | Intrusion Detection System for healthcare systems using medical and network data | Enhanced Healthcare Monitoring System (EHMS) |
| [28] | a proposed Identified Security Attributes (ISA) framework is presented to evaluate the security features of Internet of Healthcare Things (IoHT) based device in healthcare environment | ISA framework that uses hybrid MCDM |
| [29] | proposed an RL-based privacy-aware offloading scheme for an EH powered healthcare IoT device to choose the offloading rate and the local computing rate without being aware of the privacy leakage, IoT energy consumption, and edge computation model | Reinforcement Learning (RL)-based privacy-aware offloading scheme |
| [30] | Acquiring vital data in real time by integrating with diverse devices connected to newborns in neonatal intensive care units (NICUs) | NEO system |
| [31] | Based on an architectural model based on recursive and modular structures called constructive blocks | Architectural model with edge-fog-cloud processing structure |
| [32] | first-order predictor coefficient of differenced sensor signal that is capable of significantly reducing false alarms and timely notifying sensor disconnection and saturation in unsupervised health monitoring | a new on-device photoplethysmography (PPG) signal quality assessment (SQA) system |

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|---|---|---|
| [33] | Ontology-Based Security Recommendation for the Internet of Medical Things | Ontology-Based System |
| [34] | An approach to enrich IoT-based medical records by linking them with the knowledge in linked open data | Hospital Information System (HIS) |
| [35] | Optimal policy derivation for transmission duty-cycle constrained LPWAN | Low-Power Wide-Area Network (LPWAN) |
| [36] | a proposed fog-based ANFIS+PSOGWO model provided for Parkinson's disease prediction | adaptive neuro-fuzzy inference system (ANFIS) |
| [37] | Deep learning algorithm for predicting asthma risk | indoor particulate matter system |
| [38] | Improving battery life and false alarms | real-time photoplethysmogram (PPG) signal quality assessment system |
| [39] | smart EMS system integrating contexts in emergency fields into connected care environments reflecting demands of paramedics who proposed to utilize technology to reduce burden of recording and transmitting information | Smart Emergency Medical Service (SEMS) system |
| [40] | machine learning model based on oblique decision trees to enable resource-efficient classification on a neural implant | ResOT model |
| [41] | Secure surveillance mechanism for a medical healthcare system with enabled IoT (sensors) by intelligently recorded video summary into the server and keyframes image encryption | Healthcare IoT system |
| [42] | an innovative and improvised denoising technique is implemented that applies a sparse aware with convolution neural network (SA_CNN) for investigating various medical modalities | sparse aware convolution neural network (SA_CNN) mode |
| [43] | early detection of cardiovascular diseases | IoT-based wearable 12- lead ECG Smart Vest system |
| [44] | Test event generation for a fall-detection IoT system | Fall-detection IoT system |
| [45] | a secure and efficient remote monitoring framework, called SRM, using the latest hardware-based trustworthy computing technology | Secure Remote Monitoring framework |
| [46] | trust-based decision-making protocol that uses trust-based information sharing among the health IoT devices | trust-based health IoT protocol |
| [47] | wearable multi-biosignal wireless interface for sleep analysis monitoring with direct sleep-stage classification capability | wearable multi-bio signal wireless interface |

**Table 2.** Summary of Included Studies (**PubMed**).

| Study | Aim/ Objective | System |
|---|---|---|
| [48] | To predict student stress index at a particular context | student stress monitoring system |
| [49] | Review those biosensor and chemosensor technologies and concepts used in an IoT setting or considered IoT-ready that were published in the period 2013−2018 | - |
| [50] | Supporting wise clinical decision-making in the medical and healthcare fields | Medical IoT-based healthcare system |
| [51] | Cancer patient's in-home quality of life monitoring framework with the help of occupational therapy | Quality of Life (QoL) monitoring framework |
| [52] | Multidisease monitoring,where a distinct service | Heart Health Monitoring Service |

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| | meets the needs of patients having a specific disease. | Platform (HHMSP) |
| [53] | Recent emerging technologies in the personalized healthcare systems | Personalized healthcare systems |
| [54] | Enhancing the Effectiveness of Prototype Medical Instruments Applied to Neurodegenerative Disease Diagnosis | IoT-based architecture |
| [55] | A comprehensive mechanism for managing as well as assessing the quality of various heteroge-neous data sources in combination with their derived data quality. | an innovative mechanism |
| [56] | Precise diagnosis of the malignant nodules | Lung nodule detection and classification system |
| [57] | To determine if composite digital monitoring biomarkers come of age | systems-based architecture |
| [58] | To compare usefulness of different AMH kits (IOT, BC II RUO, BC II IVD, Ansh and Roche) for the purpose of clinical outcome prediction | involves Anti-Mu¨ llerian hormone (AMH) levels with different kits |
| [59] | Secure data transmission between incubator monitoring systems and doctors or administrators | infant incubator monitoring system |
| [60] | Detection and classification of lung cancer nodules; CT images | Computer-Assisted Decision Support System in Pulmonary Cancer |
| [61] | IoT technology in biological and medical applications should be based on a new data assimilation process to provide diagnoses | Multiscale modeling of systems biology at |
| [62] | Designing Transmission Strategies for Enhancing Communications in Medical IoT | an energy-efficient transmission strategy |
| [63] | To advance in the control of the disease and raise global awareness on the increasing prevalence of diabetes. | IoT Based Continuous Glucose Monitoring (CGM) System for Diabetes Mellitus Research and Care |
| [64] | A new class of Posit operators called L1 operators, which consists of fast and approximated versions of existing arithmetic operations or functions only using integer arithmetic. | - |
| [65] | To identify the oral cancer region structure in IoT based smart healthcare system | Computer Aided Cancer Classification System in IoT based smart healthcare system |
| [66] | To examine and evaluate the key influential factors of consumer adoption behavior for improving and promoting intelligent medical terminals | systematic evaluation in index system |
| [67] | To address challenges in data collection and sharing that are faced by different authorities, including healthcare, within Disaster Management Cycle (DMC) | Framework based on the integration of three technologies |
| [68] | Annotated descriptions of medications and patient's case history are stored in NFC transponders and used to help caregivers providing the right therapy. | innovative Decision Support System (DSS); clinical decision support framework |
| [69] | An automated platform for collecting, monitoring, and performing diagnosis on physiologic data collected in the ICU | research-focused clinical decision support systems (CDSS) for the management of patients in the intensive care unit |
| [70] | To provide agile, reliable and integrative air | low-cost and agile urban air |

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| | quality data collection. | pollution monitoring system |
| [71] | Predicting the lung cancer disease through continuous monitoring and also to improve the healthcare by providing medical instructions | Internet of Things (IoT) based predictive modelling |
| [72] | Home- based early detection and prediction of urine-based di-abetes (UbD) | Healthcare System for Urine-based Diabetes Prediction |
| [73] | Diagnosing new symptoms without exposing patients' data to different network attacks. | privacy-preserving clinical decision-support system |
| [74] | Integration and operation of an emotion analysis service in a homecare/mHealth application. | mHealth application; assisted living application for elders and patients with chronic diseases |
| [75] | To enable resource-efficient classification on a neural implant | ResOT model, a hardwareand memory-efficient approach for neural signal classification. |
| [76] | piFogBedII to support the testing of mobile fog applications by modifying some components in the piFogBed | piFogBedII |
| [77] | An overview of the current state of Internet of Things (IoT) and key implementation considerations | - |
| [78] | Physician free to choose among different tests with similar sensitivity or specificity, on the basis of medical, logistical and economic considerations | - |
| [79] | Recent research regarding the AI application in ophthalmology and telemedicine. | - |
| [80] | Data security with a powerful security architecture that performs one-time key, single block enciphering | security algorithm for data security |
| [81] | To efficiently match the biomedical ontologies | compact CoEvolutionary Algorithm |
| [82] | To explore how new streams of data will contribute to further the transformation of the healthcare system across different jurisdictions | Importance of data |

The articles used various computerized methods to either improve the performance of IoT-based technology or medical decision. A word cloud of methods and techniques used in different papers are illustrated in Figure 5 in which various methods such as Fog assisted-IoT methods [25], edge- fog cloud processing [31], cloud computing [31, 67], hierarchical approach [10], neural networks [40, 64], deep learning [64], decision trees [40] [47, 73, 75] and decision-making approaches, data mining [25, 73], blockchain [51, 63], cryptography [83], EEG-based drowsiness detection [20], cognitive radio [26], machine learning [36, 40, 69, 70, 75], Bayesian network [26, 48], near field communication [68], analytical methods for remote sensing [49], fuzzy cluster [36, 71], 5G [22], mobile communication [34, 53] are used. Some of the papers aims to contribute towards improving technical parts of IoT and some towards medical decisions. Therefore, this study divides decision-making into (1) technical decisions, and (2) medical decision.

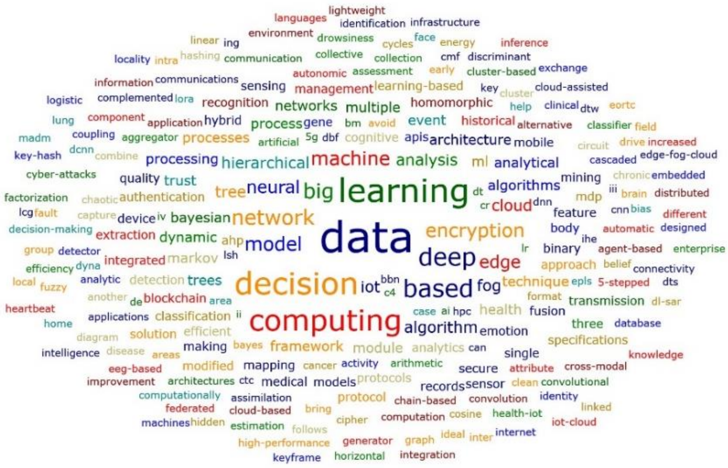


**Fig. 5.** Word Cloud for Various Methods and Techniques used in The Included Articles

After reviewing all 73 papers and coding the IoT sensors and devices, data is visualized, and a network is created by ATLAS.ti as shown in Figure 6. The total number of 76 IoT sensors/ devices are retrieved from the included papers in this study; however, the duplicates sensors/ devices were removed. For instance, medical sensors, camera and wireless sensor network, visual sensors, were used in [48] for predicting student stress index at a particular context. This study improved technical decision-making by having alert generation mechanism with the deliverance of time-sensitive information. Another example is use of biosensor and chemosensor by [49] to make technical decision towards unique ability to be remotely stationed that easily function in networks and to make the greatest progress toward IoT integration. Heterogeneous wearable devices were utilized by [11] to offer generic and reusable solutions for elaborating flexible smart IoT-based systems and to perceive the collected data and provide the best technical decisions related to system performance in terms of response time and scalability management. A study was conducted by [17] to develop a cognitive healthcare model that combines IoT–cloud technologies for pathology detection and classification. EGG and other medical sensors were used in this study [17] and deep learning model was utilized to achieve better accuracy than the state-of-the-art systems. Optical sensor, smart IoT sensor, Bilirubin-Optical Sensor, Fibre-Grating Sensor were used by [72] to improve the effectiveness and efficiency in urine-based diabetes (UbD) monitoring and prediction. This work tried to contribute towards both technical and medical decision-making.

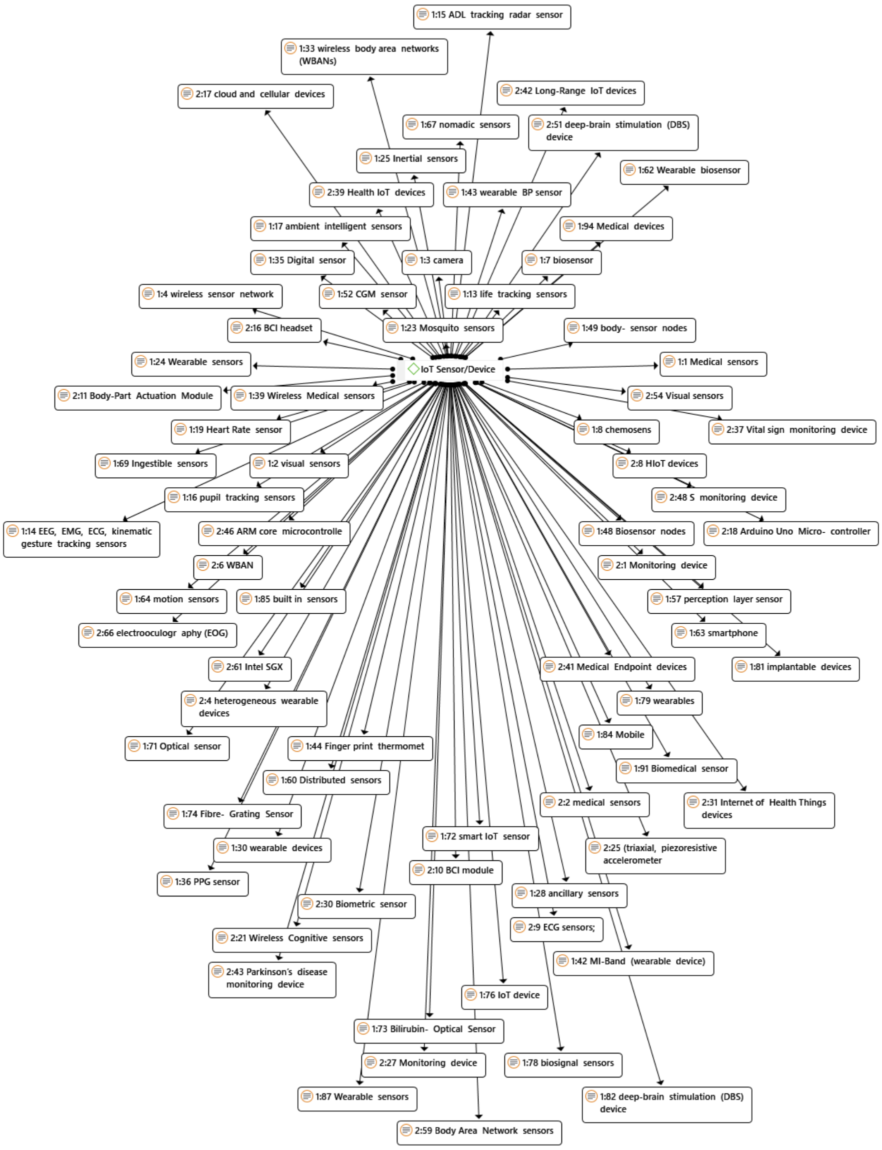


**Fig. 6.** A tree of IoT Sensors/ Devices from Included Articles

There are numerous examples of activities that contribute towards improving medical decisions which are extracted from the included journal articles in this study (Figure 7). In all of these studies, IoT was used to improve medical decisions by having real time decision-making to improve quality of care [54, 74, 75], capturing activities of daily life [51] to improve healthcare services, classification of oral cancer [65], Parkinson's disease prediction [36], Predicting asthma attacks [37], detection of cardiovascular diseases CVDs [43], incorporation in clinical feedback [57]. All of these studies utilized the benefits of IoT to improve medical decision-making towards monitoring patients and the stages of their disease, digenesis and treatment of disease, prediction, classification, and clustering the diseases, preventing further development of disease, and so forth.

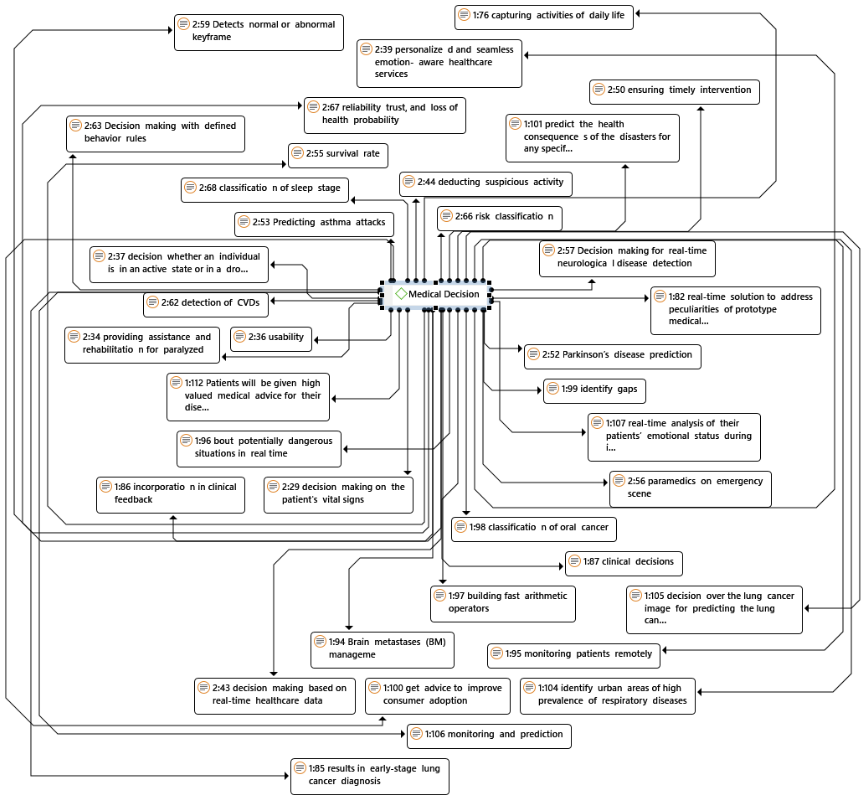


**Fig. 7.** Medical Decisions Extracted from Included Articles

The included journal articles in this study used various IoT-based sensors, devices, methods and techniques to enhance technical decision-making of medical information systems (Figure 8). For instance, [13] enhanced an IoT-based modern healthcare system by proposing Physical Unclonable Function (PUF)-based authentication scheme toward achieving better fault-tolerant decision-making. Another example is [18] which combined deep learning approach with IoT to improve delay, throughput, storage space and accuracy of the system. [24] enabled secure cross-modal retrieval over encrypted heterogeneous IoT databases with collective matrix factorization which enhanced security of IoT database.

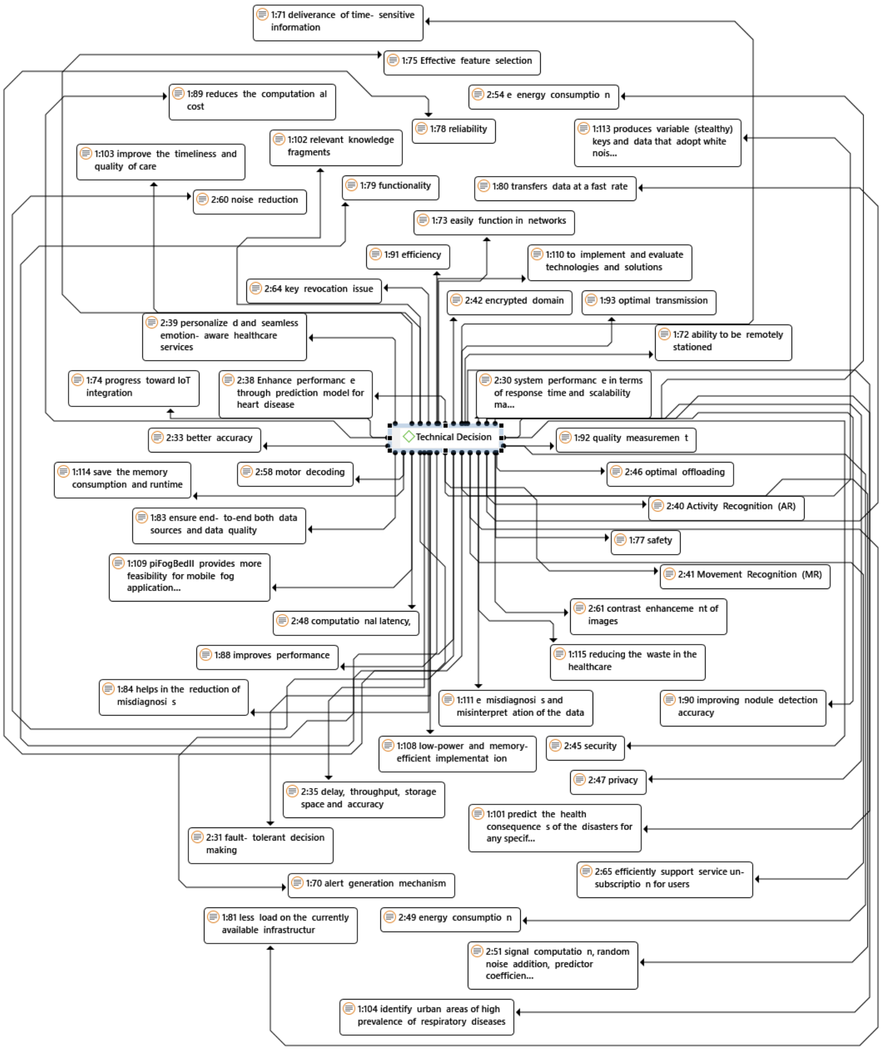


**Fig. 8.** Technical Decisions Extracted from Included Articles

Furthermore, [82] explored the role of new streams of data in extending the revolution of the healthcare system across different jurisdictions. Medical devices were used in this study to have more holistic approach in the decision-making process while reducing the waste in healthcare. [81] efficiently matched the biomedical ontologies and used compact Co-Evolutionary Algorithm with local search strategy that is capable of saving runtime and memory consumption. [80] aims to produce variable (stealthy) keys and data that adopt white noise statistical behavior to ensure high immunity to cryptanalysis. Biomedical sensors were used in this study. PiFogBedII was utilized by [76] to provide more feasibility for mobile fog application testing than piFogBed. [74] supports the medical experts to perform real-time analysis of their patients' emotional status during interactive video-conference sessions. This study contributes to improve both technical and medical decisions.

Various studies were reviewed in this chapter which utilized IoT-based techniques in medical information systems towards improving decision-making. Techniques, methods, IoT-sensors/ devices were identified and decision-making is divided into two categories of (1) medical decision, and (2) technical decision in this study. The results indicate that the advancement of IoT solutions enhanced decision-making by modernizing various processes in medical information systems and assist medical professionals to make the wise decision quickly [13, 46, 50]. Other than improving medical and technical decisions, IoT technologies can reduce the cost, decrease the number of visits to the hospitals, reduce the burden on healthcare professional's shoulder, lessen strain on hospital resources, and therefore, increase quality of care in the current medical information systems. Moreover, remote medical services can be provided easily at any time in any location by using IoT-based technologies and applications [25, 45, 49]. Patient's family can provide care to their patients at home even in the villages by accessing remote monitoring systems. However, IoT can enhance decision-making only if the users accept to use it and adopt it into the medical services [84, 85]. In order to adapt use of IoT in medical information systems, storing, managing and securing data are required. Finally, in order to use IoT-based technology in medical information system for better decision-making, training and infrastructure among healthcare providers and healthcare professionals is required [86].

# 4 Conclusion

Although IoT technologies are progressing rapidly and have very significant impact on medical decision-making, they have some drawbacks which needs to be addressed cautiously. Some of the shortcoming of IoT technologies are the accuracy of IoT sensors/ devices, privacy and security risk for storing, transferring and protecting medical data. This issues require more consideration and elaborations to use IoT for enhanced decision-making in medical information systems. Furthermore, although IoT technologies improve decision-making, technology never replace human decision-making power specially in case of medical systems. IoT technologies assist human to make smarter and more logical medical decisions.

This study explores recent IoT-related techniques, key advancements, various IoT sensors/ devices, and IoT-based decision by reviewing existing studies from IEEE Xplore and PubMed databases from 2017 to 2021. Moreover, this chapter classified the way IoT technologies are used for decision-making. Medical decisions and technical decisions are extracted from the articles to assist healthcare providers for better understanding of use of IoT for enhanced decision-making and helps healthcare professionals to be more efficient for their decision-making. This chapter provides new insight into the use of IoT trends for enhancing decision-making in medical information systems.

Future of IoT in healthcare will be more ubiquitous by involving next generation of IoT devices. Real time big medical data processing, smart homes and smart beds, reacting to triggers in emergency, decision-making, and intelligent services, patient prescription, and patient recognition will be more advanced. Finally, IoT can be specified for delivering pervasive services in healthcare and Internet of Healthcare Things (IoHT) or Internet of Medical Things (IoMT) can be stabilized in healthcare and medical arena [1, 2]. IoT-dependent solutions would simplify and enhance the way humans work with medical information systems by connection of devices, capturing, monitoring, and transferring data. In addition, IoT solutions for healthcare are evolved by considering big data applications in healthcare. Advanced integration of Artificial Intelligence (AI), machine learning techniques and IoT in the future would provide a platform for transforming decision-making in medical information systems. Employing these advanced techniques offer intelligent medical services such as detection and classification of Electronic Health Records (EHR), diagnosis and prediction of disease, tracking and monitoring of patients remotely, assisting and treating patients in emergency, and enhancing decision-making among medical professionals. Consequently, more studies are required to explore the role AI, machine learning, deep learning, and big medical data analytics on enhancing decision-making in medical information systems.

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