

# Technologies in Health Care Domain: A Systematic Review

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## ABSTRACT

Blockchain and Internet of Thing (IoT) has been widely used to impart constructive and smart healthcare services to the community. Blockchain technology has also invaded complete facet of information communications technology (ICT) and it has been growing and growing in today's fast paced world. Use of Blockchain Technology will increase the certainty and efficiency of electronic healthcare records (EHRs). The data mining approaches and machine learning algorithms assist in predicting the chronic disorders in patient thereby helping in the identification of the patient's treatment. This article provides a survey of the state of art in this domain. The key features, as well as the challenges of the various approaches, have been analyzed. A novel methodology to overcome the existing limitations has been proposed for future work and research. This proposed framework will make the data aggregations much easier to save and for decision-making. The function of alerting to caretakers and to inform hospital in critical condition will make this system new and unique.

## KEYWORDS

Blockchain, Cloud Computing, Health Care, IoT, Machine Learning

## 1. INTRODUCTION

Blockchain is a digital technology that is implemented without any central authority and it is distributed in manner. A distributed ledger is a database that is shared across multiple sites. Blockchain allows the users to record the transactions in this distributed ledger. Once a normal operation is done and published, it cannot be changed. Instead of central authority, the electronic cash is protected through a crypto currency called as Bitcoin.

Blockchain can also help in the field of healthcare by providing non-manual medical record mining which would help in making more precise predictions and reduce medical errors by ensuring more accurate treatment, while simultaneously reducing the cost. Similarly, IoT is also a growing system which is very useful in Healthcare system these days. Internet of Things commonly termed as IoT is the recent hype in the field of technology and a continuously growing ecosystem which comprises of digital devices, hardware, objects, applications, and humans over internet enabling them to communicate, collect and interchange data. There is a significant increase in number of services, users and applications in the field of IoT in different segments of life. Internet of things has been developed from radio frequency identification (RFID) and wireless sensor network (WSN) technologies and now also with an advanced integration with cloud computing.

IoT system consists of sensors, actuators, communication interfaces, algorithms, and cloud interface. Sensors are used to collect data from different devices. Advanced algorithms are used to process data and deduce meaningful details through applications. There are different major types of IoT services as follows:

First, smart devices which can be worn are used for patients who need to collect data about their health conditions such as heartbeat rate, blood pressure and glucose level through sensors on the smart device technologies, which are then sent to respective patient's mobile phones. The health status of patients can be monitored at the same time by the doctors and the families of the patient.

Secondly, smart homes can be created using IoT. Where sensors can be used to detect the difference in temperature, hence air-conditioners can be monitored. Surveillance over home for security purpose can be carried out using cameras, it can capture any robbers and send a cautionary advice to the owners using mobile applications and alarm them for it.

Thirdly, road traffic and transport systems can be observed by IoT to attain smart cities. Information can be assembled and analyzed to realize the updates in traffic networks and commuting systems creating more methodical towns and try to finish the problems of high traffic on roads.

Cloud computing is becoming apparent as a new computing model created to perform different computing services through networks such as the Internet. This approach offers many advantages to users such as extensibility, online delivery of software etc. The flexibility of cloud computing services is offering many possibilities for organizations that never were expected, among those are healthcare centers too.

Benefits of adopting IoT e-Health can be summarized as follows:

- **Comprehensive:** Whether it is used for safety, health, exercise, or beauty reasons, it has a solution for each and everyone's needs;
- **Easy interaction and intermingling with different technologies:** It enables different kinds of technologies to perform together efficiently;
- **Big Data analytics and processing:** IoT eHealth can efficiently analyze, process and manipulate the large flow of multi-modal, distributed, multi-scale, and heterogeneous data sets produced by inter-connected sensors in less amount of time. This allows us to extract useful information from health data and then use it further to predict diseases and alarm the concerned people in advance;
- **Personalization of services:** IoT can significantly expand the arena to fulfill the urgent need of personalized healthcare and treatments. For example, machine learning algorithms and big data analytics can be used to depict health conditions in advance. As a result, patients and their doctors can take quick needful precautionary actions.

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