Chapter 8
Quantum Security for IoT to Secure Healthcare Applications and Their Data

Binod Kumar
https://orcid.org/0000-0002-6172-7938
JSPM's Rajarshi Shahu College of Engineering, India

Sheetal B. Prasad
SRM Institute of Science and Technology, India

Parashu Ram Pal
ABES Engineering College, India

Pankaj Pathak
https://orcid.org/0000-0002-5875-0387
Symbiosis Institute of Digital and Telecom Management, Symbiosis International University, India

ABSTRACT

Quantum computation has the ability to revolutionize the treatment of patients. Quantum computing can help to detect diseases by identifying and forecasting malfunctions. But there's a threat associated here (i.e., healthcare data among the most popular cybercriminal targets, IoT devices notoriously lacking in effective safeguards, and quantum computers on the brink of an encryption/decryption breakthrough). Health agencies need a security prognosis and treatment plan as soon as possible. Healthcare companies recently worry more about the quantum security threats. The biggest threat of healthcare data breaches has come in the form of identity theft. There should be a strong mechanism to combat the security gaps in existing healthcare industry. If the healthcare data are available on the network, an attacker may try to modify, intercept, or even view this data stream. With the use of quantum security, the quantum state of these photons changes alert the security pros that someone is trying to breach the link.

DOI: 10.4018/978-1-7998-6677-0.ch008

INTRODUCTION

The Internet of Things (IoT) is a communication system that defines a future in the day-to-day relation of physical objects to the Internet and the capacity to locate and interact locally or remotely (Coetzee, 2011). IoT grows rapidly and changes any technological area through the delivery of smart services, including healthcare. Such smart technologies to boost the standard of living and effectively drive healthcare sector development at the moment. These smart systems monitor numerous computer-based data and state-of-the-art IoT tools such as wearables, networks, etc. To answer the vast volume of knowledge gathered over the last two decades properly.

The concept of the Internet of Things (IoT) is clear: it requires the artifacts to create their own social networks and holds the two layers apart; it makes it possible for individuals to implement rules to preserve their privacy and to view only certain contact outcomes that take place on a social network (Atzori, Nitti, & Marche., 2016).The IoT has been a subject of global concern for a couple of decades. Nevertheless, the healthcare industry has just begun to understand the enormous potential and benefits offered by the implementation of new and more advanced healthcare equipment and services as well as links between several sectors of the industry. The Internet of Things has re-evaluated the healthsector with its numerous applications in the framework. IoT introduced health care to help doctors and nurses take improved medical decisions and reduce human contact by retrieving information from bedside devices to help them reduce error rates (Rao, 2019). The contribution of this chapter is as follows:

- For the healthcare environment, we offer a holistic perspective on IoT fundamentals. Various IoT views for the medical domain are outlined based on various types of relationships in an IoT to the healthcare system, and IoT's for the healthcare domain are discussed in detail.
- We addressed IoT healthcare architecture and technologies. We addressed in this article the 3-layer IoT structure consisting of the perception tier, network layer and application layer. We explained the idea and then demonstrated the way it operated.
- We also studied various research papers that provide approaches to various IoT healthcare problem areas. We evaluated the advantages and disadvantages of each research paper.
- This chapter sums up the importance of IoT in healthcare and offers a solution in Healthcare to design and implement IoT.

This is the rest of the book. Section 2 analyses similar IoT research in the healthcare sector, which increases healthcare productivity through healthcare alignment with other IoT fields. Remaining Sections discusses about Quantum Cryptography Fundamentals,, The Security of QKD, Secure Communications Using Quantum Key Distribution, Quantum Security, Post Quantum Cryptography, Asymmetric Versus Symmetric Encryption, Functions Quantum Cryptography, The Quantum Security for Remote Healthcare Data, IoT Application in Healthcare, Cost and Features of IoT Solutions for Healthcare. Finally conclusions are presented in section 8.

QUANTUM SECURITY FOR IOT

Security requirements of IoT devices can be very complex and it cannot be achieved by a single technology. There are many aspects of security in IoT devices has to be considered. For example secured software