Chapter 17
IoT-Based Cold Chain Logistics Monitoring

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ABSTRACT

This chapter aims to reduce the extent of human presence all along the cold chain by means of a powerful tool in the form of the IoT. It should also be ensured that any details regarding instances of equipment failure leading to product spoilage or an event of a successful delivery must be communicated to the manufacturer's end. It also seeks to fill gaps involving location tracking and environment control by means of a GPS module and an IoT-based sensor platform respectively used here.

INTRODUCTION

A new evolution in technological advancement is happening in the world these days. This increasing evolution permits the world of physical objects close in our surroundings to be connected to the internet. The design of the sensing body within the environment collects the information. Information then collected by sensing body connects itself to the cloud sensing element through a local area network. Later the network hosts information from its surroundings. This whole employment is the ideology behind giving life to IoT.

A cold chain is a temperature-controlled supply chain. It is unbroken and an uninterrupted series of refrigerated production, storage and distribution activities consisting of equipment and logistics, which maintain a desired temperature range. Cold chain logistics needs controlled surrounding environment for sensitive products. These products are suitable to use under the controlled environment. The sole assurance that tells if a certain method has been disbursed with success is the monitoring method. The use of IoT here is to observe cold chain supply leading to higher products handling and management.

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This book chapter describes a system which consists of a wireless microcontroller-based sensor network and a server which proves to be a perfect system to observe the temperature and humidity of cold chain logistics.

The meeting point between the real and the virtual world through some technologies is referred as "Internet of Things" (IoT). These technologies can be the sensor technology or mobile communication. With the ambition of giving all-pervading computing to automate the tasks or processes and to build a smart world this sort of computing system started a long time ago. The IoT is a trend with powerful technology in shaping the development of the information and communication technology (ICT). Today, the IoT consists of wide variety of items used in our daily lives, including radio frequency identification (RFID) tags, sensors, actuators, and even smart devices like mobile phones. A unique addressing scheme enables these objects to communicate and interact with other items to achieve the respective goals.

The development area like the wireless sensor networks aims at collecting contextual data. Here enhancement is being made in service-oriented architecture (SOA) which is a software approach to expanding web-based services using the capabilities of IoT (Web of Things, WoT) (Shih & Wang, 2016). Further the introduction of sensor technologies can be made doable conjointly together with technologies like artificial intelligence, nanotechnology etc. The sensor technologies create the IoT services as a knowledge domain field. Here most of the human senses are reproduced and replaced within the virtual world.

An electronic identification is given to these objects joining an IoT service. The sensors, for example, are the object/things which are the new electronic devices interacting with the real-world. A lot of chance is given to applications to contribute in building the IoT by combining sensors and mobile communications which seem to be very promising. From privacy, security, scalability and performance points of view these technologies can be improved, though they are already used (Islam, Mukhopadhyay, & Suryadevara, 2017).

The Internet within the IoT may additionally have completely different interpretations on the other hand. The present internet adapted to these new object's connectivity desires is the apparent interpretation which is more direct. With the IP addressing and routing capabilities the current internet is that of connected nodes employing a TCP/IP (internet protocol suite) protocol stack. The likelihood of planning corresponding gateways to specific nodes or networks is designed here in the internet model which runs a TCP/IP stack within the connected device (Islam, Mukhopadhyay, & Suryadevara, 2017). Adapting the TCP/IP stack to the resources of the objects involves the present internet connecting it. Within the long-standing time, the IoT seems among the leading methods to present this goal. IoT challenges the current internet model with new needs of connectivity of objects: like identifying, naming and addressing, measurability, non-uniformity, resource limitation, etc. (TCP Usage Guidance in the Internet of Things, 2018).

Regarding information visibility, IoT is currently running without any concern of autonomous decision-making. To avoid delays between data availability and choices and to alleviate from everyday decision tasks, new technologies and methods have to be compelled so it can be integrated. Autonomous cooperating logistical processes are being researched in logistics. Decentralized and hierarchal designing and management methods are used in the main set up of this idea. The combination of IoT and autonomous control (Autonomous system Internet) is an assortment of IP networks and routers below the control of one entity and additionally the IoT would provide a better level of strength in infrastructure, quantifiability and agility. To achieve subsequent level of user acceptance among the overall public they need to be easy to use and easy to assemble.