# Chapter 17
# Smart Education Using Internet of Things Technology

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## ABSTRACT

*Smart education is now a typical feature in education emerging from information communications technologies (ICT) and the constant introduction of new technologies into institutional learning. The smart classroom aims users to develop skills, adapt, and use technologies in a learning context that produces elevated learning outcomes which leads to big data. The internet of things (IoT) is a new technology in which objects equipped with sensors, actuators, and processors communicate with each other to serve a meaningful purpose. The technologies are rapidly changing, and designing for these situations can be complex. Designing the IoT applications is a challenging issue. The existing standardization activities are often redundant IoT development. The reference architecture provides a solution to smart education for redundant design activities. The purpose of this chapter is to look at the requirements and architectures required for smart education. It is proposed to design a scalable and flexible IoT architecture tor smart education (IoTASE).*

## INTRODUCTION

Technology has recently changed the educational landscape. The increase in human knowledge and steady technology advances higher educational institutions (HEI) make the best use of the resources available and keep learning up-to-date. In an age determined to generate new paths to quality education, Information and Communications Technology (ICT) brings forward countless benefits. ICT makes many ordinary tasks uncomplicated and facilitates communications from virtually any part of the globe. ICT in education has been linked with an upward shift in the quality of people's lives by improving teaching and learning.

The use of ICT techniques in learning/teaching has a very positive influence on a student's learning capabilities as well. It is established that students reflect in a very positive manner towards work and education when they are using computers to complete tasks given to them, encouraging and motivating them to soak in the knowledge. Students who used technology to learn in educational institutions have increased self-esteem and self-confidence. This is why a number of educational institutions are increasingly integrating ICT in their education system. With the advent of technologies, HEIs can now keep track of resources, create smarter lesson plans, design safer campuses and improve access to information. From the use of mobiles and tablets in the classroom, education looks very different today.

## IoT and Education

Electronic learning or e-Learning is the use of ICT to enable learners to learn from anywhere and anytime. The delivery involves the use of electronic devices such as a smartphone and tablets in some way to make available learning contents. It makes the learning process more efficient for learners as well as teachers. By now, an e-Learning has been limited to virtual classrooms, video lectures and animations, online tutorials and study materials. In the age of information technology, developing with modern technology means to grow and achieve the benefits of the birth of new technology. Cloud computing, big data computing, Internet of Technology (IoT), etc. are some of the recent technologies, which have been introduced recently for the infrastructure level(s) of e-learning systems in the world of information technology.

The IoT and big data technology change everything including e-Learning platforms. It is important to identify a sophisticated strategy to combine different types of data in a way that they provide the best result to the learner, the user of the e-learning platform. In this context, big data learning integrates the mix of structured and unstructured data in one data repository to facilitate access in addition to an optimal relevance of search with adequate and consistent results according to the expectations of the learner. The big data learning system performs the capture of all types of data (text, image, video, audio, etc.) related to the subject of the theme and groups them in its raw data repository. It then includes data of any type, such as posts, pictures, videos, audio tracks, etc. IoT is a technology that capture data from the IoT enabled devices installed in the learning environment.

The introduction of the IoT in e-Learning can really help to transform education. The huge data created by the IoT is measured for high commercial value, and data mining algorithms can be applied to IoT to extract hidden information from data. It enables the collection, exchange, and analysis of generating information. The IoT has the potential to impact every aspect of learning processes. IoT continues to revolutionize e-Learning and is expected to bring in more 'connectedness' and smart classrooms in the future. They take the advantages of new capabilities by developing pedagogical approaches that leverage the technologies emerging in the environments around us (Watson, *et al.*, 2013).

Most e-Learning platform delivers video tutorials using smart devices. Video content is easily integrated into small IoT-enabled devices and can be more effective than the text content. This includes learning applications, which require managing huge and mixed volumes of information coming from IoT devices. HEIs have to adapt their technologies to be able to handle the large amounts of learning content generated by IoT devices. Once data has been received then it is to find big data technology platform for storing IoT data. The devices that will make up the IoT, as well as the kinds of data they generate, will vary by nature.

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