

A Study of Internet of Things (IoT) and IoT Based Smart College Campus

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Abstract:

The Internet is growing too quickly: An Internet of Things is the connectivity for anyone, at any time, anything, any place, any services, at any networks using technologies. This paper introduces the Internet of Things, background and literature review. The Internet of Things provides a platform for digital classrooms and interactive whiteboard for college, smart devices, and laboratories with wireless network design kit & sensor. The cloud storage is used to accesses a network infrastructure. Lastly, it focuses on IoT Challenges and finally, we describe the future research directions of the Internet of Things.

Keywords:

Internet of Things, Cameras, Sensors, Smartphones, Smart College Campus, Cloud.

I Introduction

"The Internet of Things (IoT) is a system of interrelated computing devices, automated and digital machines, objects, natures or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction."

In the fast developments of mobile Internet, Smart Education System, Artificial Intelligence, Machine Learning data mining, Green & Cloud computing, device-centric traditional Internet of Things (IoT) is now moving into a new era which is termed as the Internet of Things Services (IoT). In this era, sensors and other types of sensing devices, wired and wireless networks, platforms and tools, data processing/visualization/analysis and integration engines, and other components of traditional IoT are interconnected through innovative services to realize the value of connected things, people, and virtual Internet spaces. The way of building new IoT applications is changing. We indeed need creative thinking, long-term visions, and innovative methodologies to respond to such a change.

The Internet of Things (IoT) provides connectivity for anyone at any time and place to anything at any time and place. With the advancement in technology, we are moving towards a

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society, where everything and everyone will be connected [1]. Figure 1 shows the Internet of Things

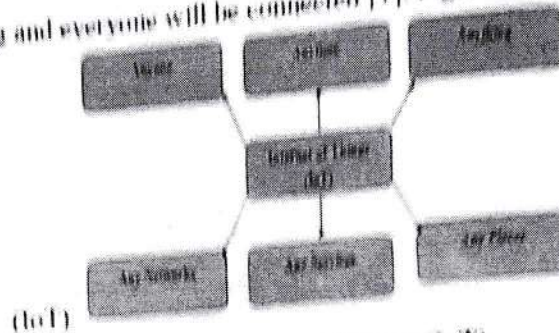


Figure 1 Internet of Things (IoT)

The IoT is considered as the future evolution of the Internet that realizes machine-to-machine (M2M) learning is discussed [2]. It focuses on the basic idea of IoT is to allow autonomous and secure connection and exchange of data between real-world devices and applications is discusses [3]. The IoT links real life and physical activities with the virtual world is discussing [4].

II Internet of Things (IoT) Background and Literature Review

Today, in the 2018s, we are heading into a new era of ubiquity, where the "users" of the internet will be counted in trillions and where humans may become the minority as generators and receivers of traffic. Instead, most of the traffic will flow between devices and all kinds of "things", thereby creating a much wider and more complex "Internet of Things".

The root at distance mode of communication goes for a back to the beginnings of the electromagnetic telegraph in 1832 by Baron Schilling in Russia. Samuel Morse also sent his first telegraphic message in 1844 which knows as 'Morse code'. Alan Turing in his article 'Computing Machinery and Intelligence' sees the possibility at the machine with sensory organs to purchase, buy, teach or understand a speech for a child. Karl Steinbuch predicts the wider use of the computer in every industrial sector.

The concept of ARPANET introduced in 1969. The TCP/IP in 1974, Domain Name System in 1984 and World Wide Web in 1984. The first IoT device comes into existence in 1990. It was created by John Romkey. It was connected with TCP/IP networking. The first web page created by Tim Berners-Lee in 1991. Mark Weiser's wrote an article on the universal computing called, the computers for the 21st Century. Its mentioned about the role of the computer in everyday life affairs. Steve Mann created Wear Cam in 1994. The commercialization of Internet with Amazon and Echobay(ebay). Google is formed into a legal corporation in 1998. This year also saw the development of in Touch project of MIT; it was developed by Scott Brave, Andrew Dahley, and Professor Hiroshi Ishii. In 1999 it was a big year for the Internet of Things and MIT.

The Internet of Things, this concept introduced by Kevin Ashton director of the Auto-ID Center. The Internet of Things (IoT) was born in 2008-2009. In 2008 group of companies launched the IPSO Alliance to promote the Internet of Things. In 2010 Chinese Premier Wen Jiabao calls the IoT a key industry for China and has plans to mark major investment in it.

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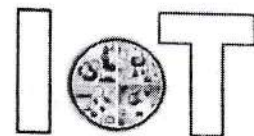
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Internet of Things (IoT) communities mature on social networks like LinkedIn and the UK's Technology Strategy Board networking platform connect.

It addresses the IoT is getting increasing popularity for academia, the industry as well as a government that has the potential to bring significant personal, professional and economic benefits [5]. It focuses on the Internet of Things, architectures, and vital technologies and their usages in our daily life [6]. The concept of the Internet of Things (IoT), its characteristics, explain security challenges, technology adoption trends & suggests a reference architecture for E-commerce enterprise[7]. It proposed an integrated framework of the IoT and cloud computing for people with disabilities such as sensory, motor and cognitive impairments in the context of business-to-consumer e-commerce context [8]. It focuses on current research work on IoT in terms of architecture, a technology used and applications and also highlights all the issues related to technologies used for IoT [9]. It addresses the existing development trends, the generic architecture of IoT, its distinguishing features and possible future applications [10]. It presented a cloud -centric vision for worldwide implementation of the Internet of Things. The key enabling technologies and application domains that are likely to drive IoT research in the near future are discussed. A cloud implementation using Aneka, which is based on an interaction of private and public clouds, is presented [11]. It addresses everything will connect to the Internet will have a positive impact on individual & society lives across the world due to facilitating & maturing them about health care programs & camps regarding foods, exercise, disease etc. as well on the business world [12]. It focuses new concept called Smart University by providing a comprehensive overview of the IoT scenario and reviews its enabling technologies and the sensor networks [14]. It presented a suitable architecture for a smart campus despite heterogeneous protocols and systems [15].

III The Internet of Things Based Smart College Campus

Internet of Things and Smart College Campus are driven by the combination of Sensors, Smart Ultra High Definition Security camera, Wireless network design, smart devices, digital classroom, and interactive whiteboard and cloud storage see the figure 2.

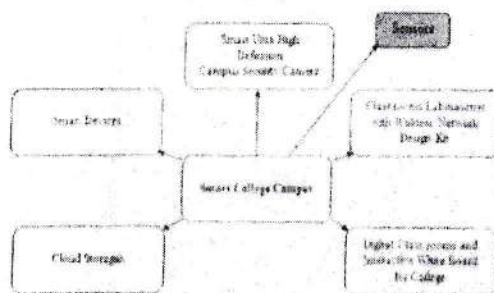


Figure 2 Internet of Things based Smart College Campus

1. Digital Classroom and Interactive whiteboard for College

Now a day chalkboard, charts, overhead projectors are outdated. Colleges are implementing e-boards for a more interactive learning experience. One of the most innovative is the electronic board. These devices are not only for the classroom in a larger, physical form; such electronic boards can also be



used online, facilitating remote learning between teacher and student and allowing for students to upload essays for electronic marking, fostering a virtual learning environment. This is an online learning platform. The board allows for additional features to the displaying of lesson content in a digital format. The Internet is available to students. They can search any information. The cloud storage is available, it allows students at home to post their assignments so that, by the required submission date, the tutor can mark the assignments, annotate comments, compare the submissions of different students, and provide a mark. In turn, the student can review the mark and see the areas on the assignments where improvements are required. By hosting the assignment electronically, artificial intelligence can be used to scan the submission for plagiarism.

2. Smart Classrooms and Laboratories with Wireless Network Design Kit

Internet of Things (IoT) plays a vital role in every aspect of our life. College campus is supported by round the clock by Wireless connectivity (Wi-Fi) of 100 Mbps and has a strong backbone of 40 access point links throughout the campus which covers each and every corner of the campus including Botanical Garden, canteen, parking, classroom, parking and hostels (boys/girls). With the help of Wi-Fi, the students can access online information anywhere in and around the campus using their Laptops/Tablets/Smartphone even after the normal college hours. Understanding the need and importance of Internet the College provides 24 x 7 Wi-Fi connectivity Network. The figure 3 shows the college campus sensors and college campus Wi-Fi is connected to each and every area.

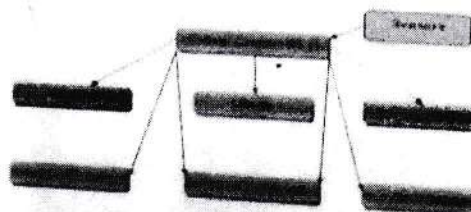


Figure 2 Internet of Things based Network diagram

3. Smart Ultra High Definition Security Camera Systems

College is susceptible to crimes and acts of violence of all forms and surveillance cameras play an important role in making college campus safer. When security cameras are placed in plain sight, studies show that it reduces criminal activity in that area. Criminals don't want to get caught. College is often subject to vandalism because they have predictable off hours and inside thieves can access expensive equipment. Well-placed security cameras can deter this activity and help identify anyone that tries. Entrance and exit points are vulnerable to having eyes on them are essential to safety. A visible camera can deter crime, or aid in a crime event.

4. Smart devices

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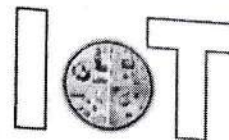

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The Smart Internet of Things College Campus, the Smart student devices Laptops, Notebooks, Tablets, and Smartphones easily access the internet for research and reference. It can easily access e-mail & Join online lectures. It can very easily solve online comparative exam. The student's easy access to the eBooks in your smart library. The smart library is available with an Android application that is created and is installed in all the student phone number & e-mail ID. The Android application will inform the entire student about the e-books/books/textbooks, e-question papers, magazine, journals, and other books information & his status of the e-books-question papers, journals, and other related library information that has been borrowed.

5. Cloud Storage

The Smart Internet of Things for the college campus, The college database, Information regarding students, teaching & non-teaching staff, education programs, applications, video files lectures, and recorded labs experiments are stored in local storage and cloud storage. The benefits of cloud storage is a service where the database, information regarding students, educational programs, applications, video files lectures, and recorded labs experiment is remotely maintained, managed, and backed up and faculties can access this information through an android application. The service allows the users to store database online so that they can access them from any location via the Internet.

6. Sensors

The Sensor is a device, module, or subsystem whose purpose is to detect events or changes in its environment and send the information to other electronics, frequently a computer processor. The current location of smart devices data using Global Positioning System (GPS) sensors. The human eyes and ears using smart camera and headphones. It is necessary to connect sensors of wireless networks to detect a large and small object of the college campus.

IV Internet of Things (IoT) Challenges

Internet Connectivity It is big challenges before the society. Lack of the speed at the internet or sudden dis connectivity may laps data or post pond fixed scheduled. It creates trouble in work. If it worked properly, it will create work efficiencies or accountability.

Wireless Communication It is useful to connect the different smart devices without any cable. But, it creates some major issues in wireless communication; those areas limited location, problems of security.

Electricity Supply Inconsistent electric supply raises the problem. To maintain the consistency in a network it requires solar technology or any other alternative.

Software Complexity Differences in software creates the problems to utility network resources. In order to get network resources, it requires simplicity and similarity in software at the maximum level.

Scalability This type of networks must be increased as its resources added in large amount.

Absence of governance: Legal control of essential for sharing the Internet of Things (IoT).

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