Roadmap to Smart Campus based on IoT

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Abstract—**Information technologies are playing a vital role and are heading tremendously towards all prospects of education and management such as education ideas, methods, models, pedagogies and technological concepts.**

This paper introduces the usefulness and work functions of smart campus system. By considering the difficulties and problems faced by education institutions and management. This paper introduces the new method of smart campus focused on Internet of Things. This paper will explain the idea of smart campus through the use of internet of technology(IoT), via smart campus. College-wide infrastructure is obviously connected via the external or third-party service provider online. Hence the approach to teaching may have been carried out in real time. This work has been carried out in smart schooling, smart classrooms and smart car park. Which will eventually develop teaching and learning practices in a more relaxed, effective and efficient way for staff and students.

Keywords—Smart Cities, IoT, Smart Parking, Infrastructure

I. INTRODUCTION

Technology in the current era has amazingly advanced and has given birth to the Internet of Things (IoT). Information and communication technology has been used as the inevitable part in all developed countries to improve educational quality at all levels, primarily in higher education. Which is really helping to improve the education level and fix the major issues. There is tremendous improvement can be seen them in the field of library management, research work, and college administration and its resource management. One of the best implementations of IoT through information and communication technology month the devices that can be integrated which are being use in daily life. The automation of different constrained devices has opened the possibilities of having smart homes, job environments and other work related locations. It is a complex global network architecture with self-configuring capabilities based on standard and interoperable communication protocols in which physical and virtual "things" are defined, physical attributes and virtual identities are identified, intelligent interfaces are used and incorporated in the information network seamlessly[10].

Without a doubt, the impact of IOT in the field of Information Technology has been vast and wide. Its impact ranges from private users to big universities and colleges. It has played a major role on developing smart homes for private users and has greatly impact the automation and manufacturing, logistics, commercial aspects and other business/educational perspective of small and big educational institutions.

Internet of things (IoT) is all about connectivity according to a famous report published recently, throughout the word by 2020 approximately 20 billion connected devices will be in use around the globe. Which includes computers, smartphones, connected with smart homes, smart cities, industries, factories and offices too. A huge amount of data that is also known as big data available make these devices intelligent. A reliable connectivity 24/7 required to access these data all over the globe. Apart from the wired and wireless network, global satellite connectivity (Extranet) can play a vital role in connecting the devices all over the world and can provide access to big data 24/7 without any interruption.

Digital/Smart campus is a network based on the advance information technology means and tools to achieve from the environment which includes equipment, classrooms, departments, materials such books, course materials to activities such as teaching, science, management, service office etc[11]. All efforts to make everything digital and bring all aspects of teaching and learning in digital space instead of tradition method of teaching and learning.

At present Oman is heading towards the pace of information technology in education. Oman education minister putting all efforts to make all technical college campus smart by providing the high speed internet service [16], and all latest technologies equipment for class rooms like smart board, projector, centralized storage space for students and centralized printing, photocopying, and scanning inside the campus or to the cloud for both students and staff. In addition, on cloud email and project tools for students and staff.

This all effort is in order to create new base for teaching and learning environment throughout all over the technical colleges in Oman.

II. LITERATURE REVIEW

In this work we suggest the design structure of the Radio Frequency Identification (RFID) solution that is implemented through the use of modern cloud computing technology. Which are enabled by technologies of good quality and which should be cost effective. Interestingly the technology supports items like college asset track records, valuable things, unauthorized individual access to college campus, student records, protection of exam papers, and essential certificate details to improve campus security. The future lecture rooms or labs ought to build up the technique for showing practice, specifically as a scholastic subject or hypothetical guideline. Within which the understudies can connect increasingly through commitment and participation in inclining forms. To make a domain that supports the study halls of things to come, it requires a

coordinated arrangement of any fundamental things. Right now, it is utilized to make things in which the gadget is rendered as a machine unit by utilizing a remote sensor organize. It is accepted that everyday grounds activity principally meaning of the board occupations should be possible by running the program. In the side look at of learning it was conveyed and stood out from conventional technique. This methodology improves the productivity of grounds offices the executives stopping guide for instance by utilizing QR code.

III. SMART CAMPUS INFRASTRUCTURE.

The infrastructure is the foundation of the smart campus program. When college campus network is very well integrated through all digital means (Including LAN Wireless, Radio frequencies CCTV etc.)[8] Hence information related to teaching and learning can be managed and easily accessible through all mobile devices and other gadgets. Some information from smart city has been utilized in college campus example smart learning, personalize learning virtual class rooms and online learning online exams/quizzes.

A. Proposed work.

Existing condition: In existing condition has not with execution of brilliant grounds. In the present situation there is no strategy to reimburse the vacant study halls/consumed homerooms data, and the arrangement of parking areas.

1) Proposed technique

The correspondence in shrewd grounds depends on the gadgets well outfitted with radio frequencies that impart and get the sign and can speak with one another without wire by utilizing radio signs. Close to remote Bluetooth can likewise be use as the method of correspondence. The part of IoT comprise of Hardware, programming, and cloud administrations.[9] The plan of equipment depends on the prerequisite. The equipment depends on microcontroller deices, PCBs and numerous other required sensors, modules, remote and other association. Sensor module being utilized is RFID, PIR sensor, IR sensor, camera, Ultrasonic. Data being sent from the sensor creatures handled and spared in cloud that transmit to android/IOS applications.[6] This application gives the clients about the feed and customized data about the study halls accessibility and parking garages conditions/accessibility.

2) Framework Design

The framework plan of the brilliant grounds which is portrayed in underneath fig1 is constrained on shrewd training that is comprise of E-learning, Virtual study halls, Virtual labs, and a keen stopping. A stopping framework that gives data identified with the stopping accessible spaces and consumed spaces.

3) Smart Education

In the brilliant schools/Campus the learning procedure directed through E-learning framework, that makes it conceivable to understudies and employees to join inclining from anyplace whenever by utilizing web association. E-learning is likewise furnished with video conferencing, so it encourages the understudies to confront the educators from

better places. Adjacent to virtual class, Teachers can help reproduction for understudies to take care of issue while learning. Virtual class additionally can be utilized for doing rehearses in online reasonable labs.
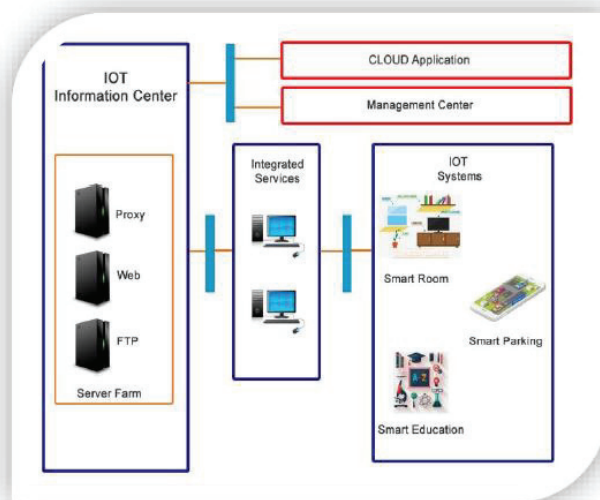

Fig. 1. Scheme of System Design.

4) Smart Parking

A stopping framework that gives the data about the accessible parking area and data about the involved stopping. Sensor is placed in the parking garage to filter the vehicle that enters the parking area. What's more, the all-out number of vehicles can without much of a stretch be determined and can be show on the showcase board about the unfilled parking garage and involved parking area.

5) Smart rooms

This framework gives data about the homerooms that are full and about the study halls/Labs that are occupied with during the working time. This framework utilizes the sensor of PIR, RFID and camera. Which gives the data of empty room and the all out number of understudies are available in to it. Information caught about the all out number of understudies and their name present in to the study halls are spared in database. By utilizing the PIR sensor in homerooms, light will be naturally off if no human is being distinguished inside the study hall. [4] Then again, light will be consequently turned on if there is or there are individuals inside study hall.

Smart campus building will be a long-term goal and must be unified proceeding in multiple steps. First, we need to make a long term and overall project planning is the implementation of any necessary steps and engineering rules.

Second, planning of Smart campus through digital gateway will be a long time plan. Implementing it should be systematically and gradually as an improvement from time to time.

Meanwhile implementations of smart campus will be difficult task, which requires great effort and cooperation from staff, students, and admin staffs at the same time. The structure

910

of Road Map to smart campus based on IOT for education and management includes the following aspects.

Hardware, camera, scanner, biometric system, card reader, light sensor, temperature and humidity sensor.
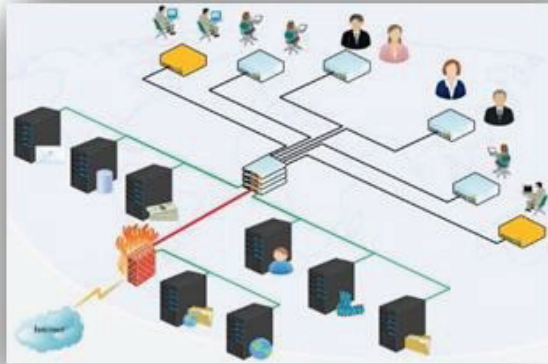

Fig. 2. Smart campus connectivity

As per the diagram, the infrastructure presents a high-speed connectivity, network application supports, information systems for local network and other IT related services. In this scenario, users can able to retrieve information through computer terminals.

Thus, there are limits within the access of information and its implementation.[5] These limitations enable campus services to be less beneficial to the users especially because of availability of access where time is of essence.

In this diagram, we will see the different approach where IOT will be beneficial. The installation of IOT devices to all the places within the vicinity of the campus will surely benefits all individuals inside and outside the campus.

Students data is already loaded in the local network system while enrollment. According to the movement of student's classrooms door etc. will grant access to permissible students in the class and so on. For printing. For online learning and online quiz and examination. All information, which should be available to students, can be access easily through the services provided by the Smart Campus.
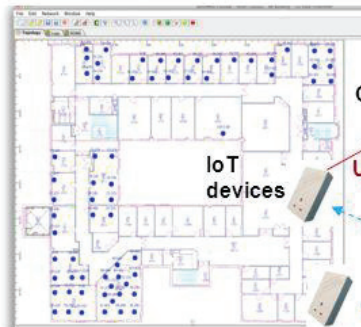
IOT Platforms are often referring to as middleware solution, which are joining part of the IOT.[7] In general, IOT solution is a mix of functions from multiple vendors and others, which includes as mentioned below.
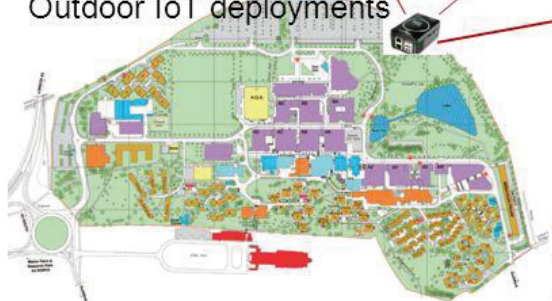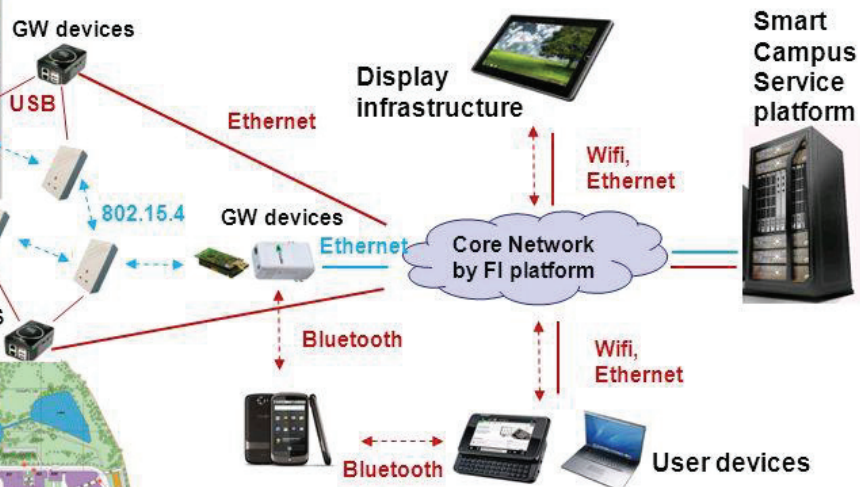

Fig. 3. Smart Campus Infrastructure

911

IV. CONCLUSION:

IOT innovation can be experimented in any field, one of which, that we had a go at actualizing in making a smart grounds. Extreme it a developing and moving idea for the Figure 3. Smart Campus Infrastructure innovation to carry it to the real world. The structure of savvy grounds is to make an approach to execute brilliant grounds restricted on keen educating and learning condition and shrewd stopping idea.
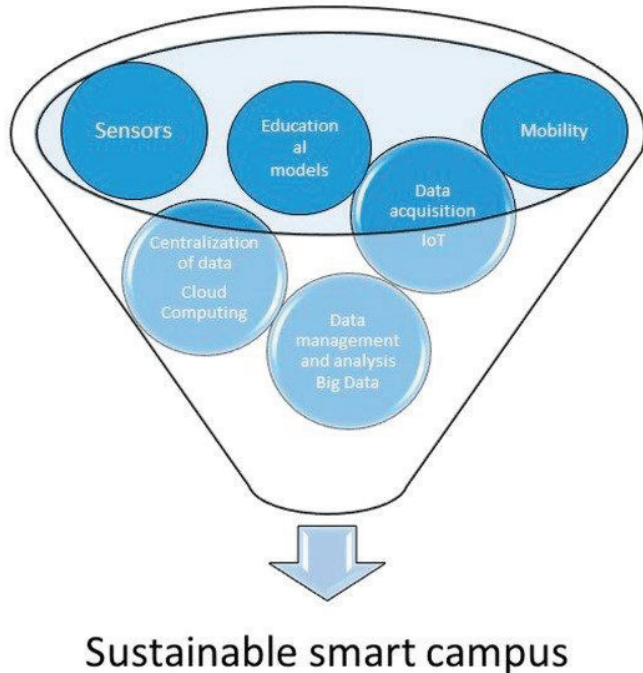

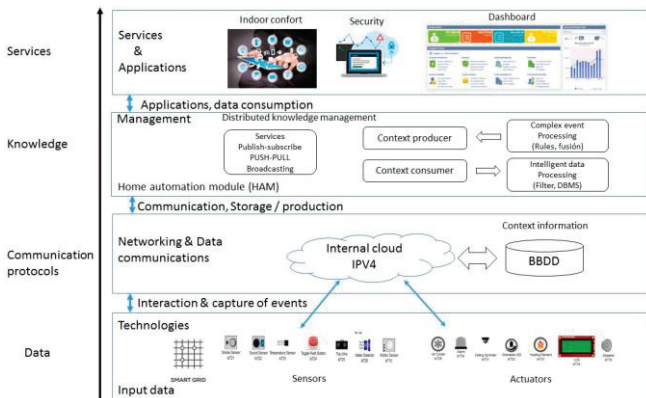Fig. 4. Components of Sustainable System

Fig. 5. Internet of Things (IoT) architecture within a sustainable smart campus.

In light of our investigations and our report of the Internet of Things (IOT), we can say that this division is simply in the principal period of improvement and have a great deal of potential to create in various fields. It would seem that a pattern to have one of these items and that is generally excellent for what's to come. As we can scrutinize it in my report, the desires for various people are commonly magnificent for this part. Utilizing this kind of items permit numerous increases. The Importance is extremely high for various schools to

transform themselves into the use of those items. As the research shows, individuals who are utilizing those kind of items cut the expenses and spare parcel of time and improve the general productivity. The facts (Fig. 5) demonstrate that those items are likely to be costlier yet they offer a decent support of the schools [15].

The execution of a Smart Campus arrangement will be helpful to all person in a since quite a while ago run. It will have improved all the fundamental administrations inside the grounds. All offices will likewise be appropriately checked in this manner it amplified their ease of use.

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