

# Internet Of Things Applications In Academic Libraries

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## Abstract

We have come to a new era of high-tech computer technology (IoT). IoT is developing as a trend in internet development. IoT has the likely to provide solution that improves service productivity and security of the academic library. This research paper deliberates the potential usage of the IoT. Accurately, we consider cloud computing, magic mirror and pressure pad sensor using wireless sensor network (WSN). Considering these, we proposed an approach to boost library facilities and providing patron friendly system. This technique is a step towards a smart library.

**Keywords:** Internet of things, cloud computing, magic mirror, pressure pad sensor, wireless sensor network.

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## 1. INTRODUCTION

Libraries are essential in our life to improve our knowledge (Srinivasan, 2013). A concept of “Internet of Thing” (IoT), which forms a network by sharing information of each sensing object, has recently been spotlighted over the world (Lee, 2014). IoT refers to the use of intelligently connected devices and system to obtain data gathered by embedded sensors, actuators in machines and other physical objects. IoT uses connecting media such as wireless sensor network and physical objects to connect devices to each other and the internet, with minimal direct human intervention to deliver service that meet the needs of wide range of academic libraries (GSM Association, 2014). As libraries explore and develop their next generation library catalogue, cloud computing has emerged as a critical component of these new system. Cloud computing improves the service efficiency and visibility of library’s collection and management services (Dulaney, 2011). Magic mirror is a application based technology could be added throughout library

that will be able to sense what title the patron is holding and recommend other like material, mention 2 related events, give a sneak peak into the books(Amit Gupta, 2020). Using Pressure pad sensors in the aisle under the floor is yet another innovative technology gives the library a count of people browsing aisles in the library, helping with collection development and possible area where improved signage might be required and automatic turn ON/OFF light bulbs which indeed save energy and making a smart library(Amit Gupta, 2020). Wireless sensor network enabled with Wi-Fi provides communication node to transfer and gather information and data by the sensing nodes(What the internet of things(IoT) needs to become a reality. , 2014). Above mentioned technologies inter linked to improve service efficiency and making academic library a smart library.

## **2. HISTORY OF INTERNET OF THINGS**

Dewey (1983) posited that, “libraries are schools and the librarian in the highest sense a teacher.” Oyedeji (1980) describes a library as having “a machinery” for the use of the collection. In the modern world, a wide range of information is disseminated through the printed word, yet it is impossible to have access to all forms of information and knowledge through wide reading alone. Other facilities and agencies thus exist that emphasize audio-visual learning. They include electronic media such as radio, television, cable satellite, the Internet. These media give wide publicity to events, objects, discoveries, scientific findings, new products, and new services(Chiemeké, 2007). In the 1990s, Internet connectivity began to proliferate in enterprise and consumer markets, but was still limited in its use because of the low performance of the network interconnect. In the 2000s Internet connectivity became the norm for many applications and today is expected as part of many enterprise, industrial and consumer products to provide access to information. However, these devices are still primarily things on the Internet that require more human interaction and monitoring through apps and interfaces. The true promise of the IoT is just starting to be realized – when invisible technology operates behind the scenes dynamically responding to how we want “things” to act. (Jim, 2013). As early as 1995, Louis Rosenfeld, founder of the clearinghouse for subject-oriented internet resource guide at the University of Michigan, edited a monographic series covering the area of health and science, humanities, social science, business, and law. (Rosenfeld, 1995) There are also numerous web sites devoted to the “best of the web” in given subject area The term “Internet of Things” was popularized by the work of the Auto-ID Center at the Massachusetts Institute of Technology (MIT), which in 1999 started to design and propagate a cross-company RFID infrastructure. (Ashton, That Internet of Things Thing, 2009). In 2002, its co-founder and former head Kevin Ashton was quoted in Forbes Magazine as saying, “We need an internet for things, a standardized way for computers to

understand the real world”(Schoenberger, 2002)To date, the world has deployed about 5 billion “smart” connected things. Predictions say there will be 50 billion connected devices by 2020 and in our lifetime we will experience life with a trillion-node network which provides strong connection nodes(Gubbi, 2013).

### **3. CLOUD COMPUTING**

Cloud Computing is simply a form of registration and management that can be accessed online instead of staying in the workplace or an internal employee. Cloud Computing is independent of local network availability. The term Cloud Computing refers to the product applications or various assets that exist on the web and that are accessible to various clients online, rather than being delivered to a specific client's PC. Cloud learning takes place based on the development of the cloud as it supports the use of cloud applications to learn by providing information, stockpiling and online programming that can be found in the online environment ".

Libraries were loaded with various expenses. On the other hand, “with cloud computing there is little or nothing to finance”. “Pay-as-you-go” & “Subscription” methods are two modes of payment in cloud computing. “91% of the organizations in US & Europe agree that the reduction of cost is a major reason for them to migrate to cloud environment”(Yuvaraj, 2013). Therefore it is time for libraries think seriously before clubbing libraries services with cloud based technologies and provide reliable and rapid services to their users(Kaushik).

### **4. MAGIC MIRROR**

Mirrors have an ever increasing number of uses as innovation propels. Enchantment reflect comprising of camera, sensor with Wi-Fi empowered gives cooperation among individuals and PCs. This technology can be applied to diverse information, such as location recognition, review of the contents, similar like material(Kim, 2015). Also the information of the users review stored in the database(Gupta, 2015). This system will find their way into daily use very fast and advanced methods to provide intuitive user interfaces will be of high importance(Blum, 2012).

### **5. PRESSURE PAD SENSOR**

Even though in the digital world, the traditional way of approach is still alive. The users come to the library by default(Murugan, 2013). A pressure cushion sensor that includes a small sheet sensor cushion approved for Wi-Fi establishment is associated with a control unit that records and controls the frame. Consequential improvements of the client especially the route of travel should be logged so that the diversity oflogged area literature will be expanded to provide adequate data. The stress cushion sensor can also be connected to a power outlet to limit the potential misfortune in the acedamy library.

## **6. WIRELESS SENSOR NETWORK (WSN)**

Modern technology developments in low current integrated circuits and wireless communications have made available efficient, low cost, low power miniature devices for use in remote sensing applications. The combination of these factors has improved the viability of utilizing a sensor network consisting of a large number of intelligent sensors, enabling the collection, processing, analysis and dissemination of valuable information, gathered in a variety of environments (Jayavardhana Gubbia, 2013).

## **7. DESIGN AND IMPLEMENTATION**

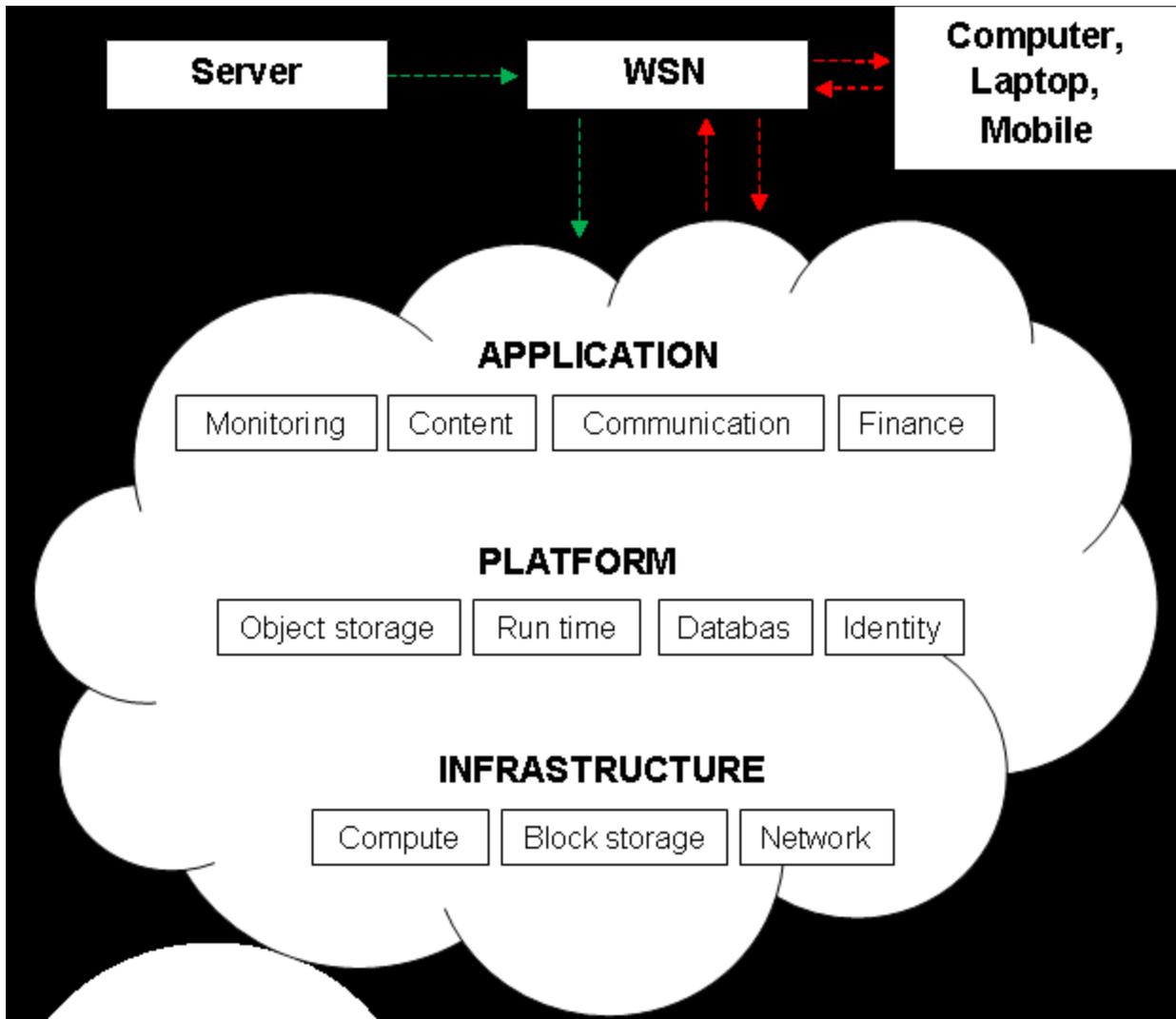
In our work we are design to give users a difficulty free, user friendly atmosphere in academic library.

### **7.1 CLOUD COMPUTING**

In Figure 1 we can see, the Cloud computing system divides into two parts: the user part and the cloud component. They join each other through a network, always online via a wireless sensor network (WSN). The user component is the computer user side. Part of the cloud is part of the "cloud" of the system. At the cloud level there are several computers, servers and data storage systems that create the "cloud" of computer services. The main features of cloud computing are:

1. Livelihood, Multiple Rentals and service-oriented.
2. Determined SLA: The SLA is operated in such a way that when the system determines the load level, it will automatically adjust to compliance with service level agreements.
3. Visual: The cloud computing space is a completely visual space.
4. Flexible: Can be used to provide a wide range of workloads — ranging from the small loads of a small consumer app to the heavier loads

Figure 1



## 7.2 MAGIC MIRIOR

The system consists of a display device, a camera connected to a server, a processing unit using a wireless sensor network as shown in Figure 2. Magic Mirror made digital screen as an enhanced screen like a PC screen, a touchable gadget like a webcam. . The frame will work in accordance with the title: When the person carrying the book enters the field of camera, the camera will start to take a picture and the calculation of the frame will start with the data about the title of the books. next to additional data like related books, surveys etc ... And the result will appear on the screen. Figure 3 talks about the making of magic mirrors in an educational library.

Figure 2

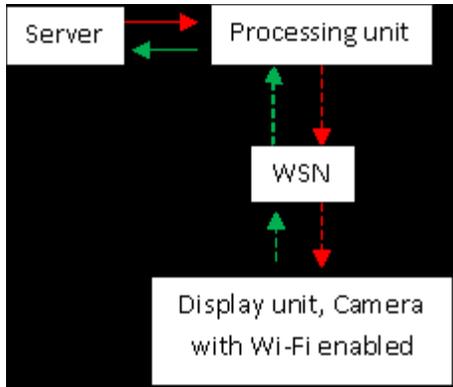
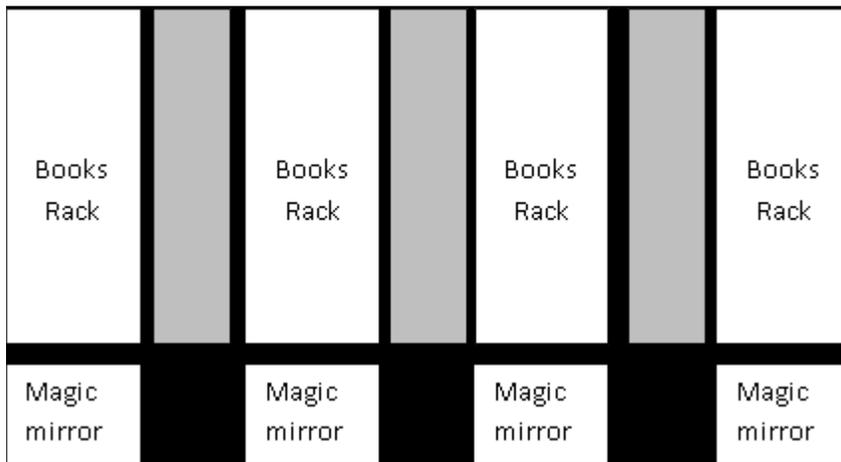


Figure 3



### 7.3 Street sensor pad

Figure 4 shows the block representation of Street sensor pad system. A thin sheet of sensor pads are placed under the floor in the aisles. The sensors, in thin sheeted pads records the movement of the users through Wireless sensor network, recorded information is monitored. As, we not only approaching towards digital library but also a smart academic library so, If no movement occurs the light bulbs, fans and energy related devices remains OFF, ensuring the saving of energy efficiently. Figure 5 shows the implementation of pressure sensor pads in the academic libraries.

Figure 4

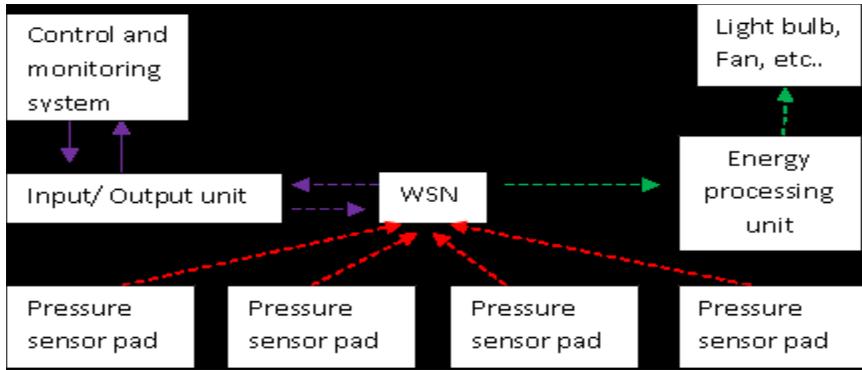


Figure 5

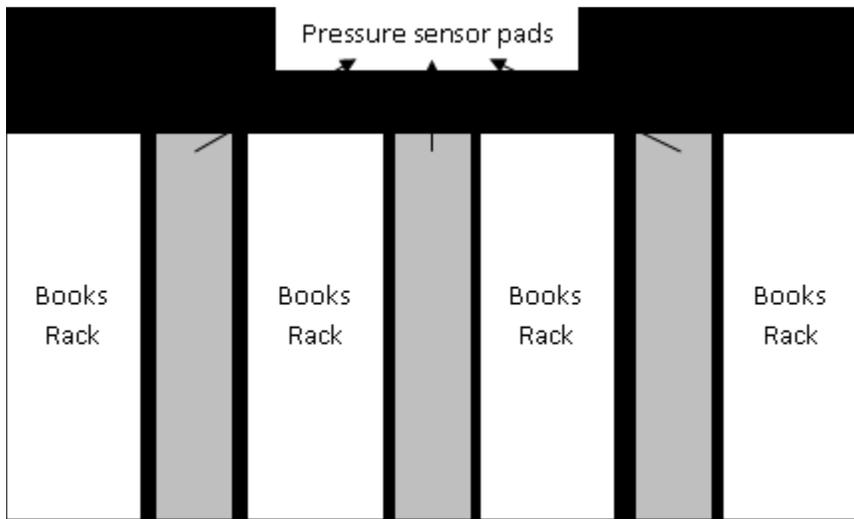


Figure 5

## 8. CONCLUSION

This research provides online ideas for items in the educational library to improve their resources in a more efficient way. The Internet of Things is an emerging technology that can impact clients by providing new and evolving and efficient services faster and better. Proposed technology, cloud computing, Magic Mirror, Compression sensor pads through wireless nerve networks can increase profits by improving resource utilization and the development of management services in educational libraries. The proposed system is expected to improve ease of use, and will be implemented successfully soon.

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