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Study of Security in Privacy and Intelligent Library Service by IoT Based on Cloud Computing Smart Libraries.

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Abstract: The Internet of Things emerged with a wave of network development. IoT has the potential to provide solutions that improve the efficiency and security of library services. This article discusses the use of the Internet of Things. We specifically cover cloud computing, optical glasses, and pressure sensors using Wireless Sensor Networks (WSN). With these in mind, we propose a way to improve the library and make the system available to those interested. This system is a step towards smart libraries. The services provided in the smart library not only use simple forms such as network design and cloud computing, but also use user perspective, collaboration, time and space break, etc. It also has immersive services. At the same time, there are some problems in smart library service and research management. This article presents solutions for smart library services and IoT management, including suggestions from Atlas users. It is expected to provide new ideas and methods for research in this field. The results of the experiment show that our smart library system has better library management, increases the number of readers and reduces the daily maintenance costs of the library.

Keywords: Intelligent Library Service, Internet of things, cloud computing, magic mirror, wireless sensor network.

1. Introduction

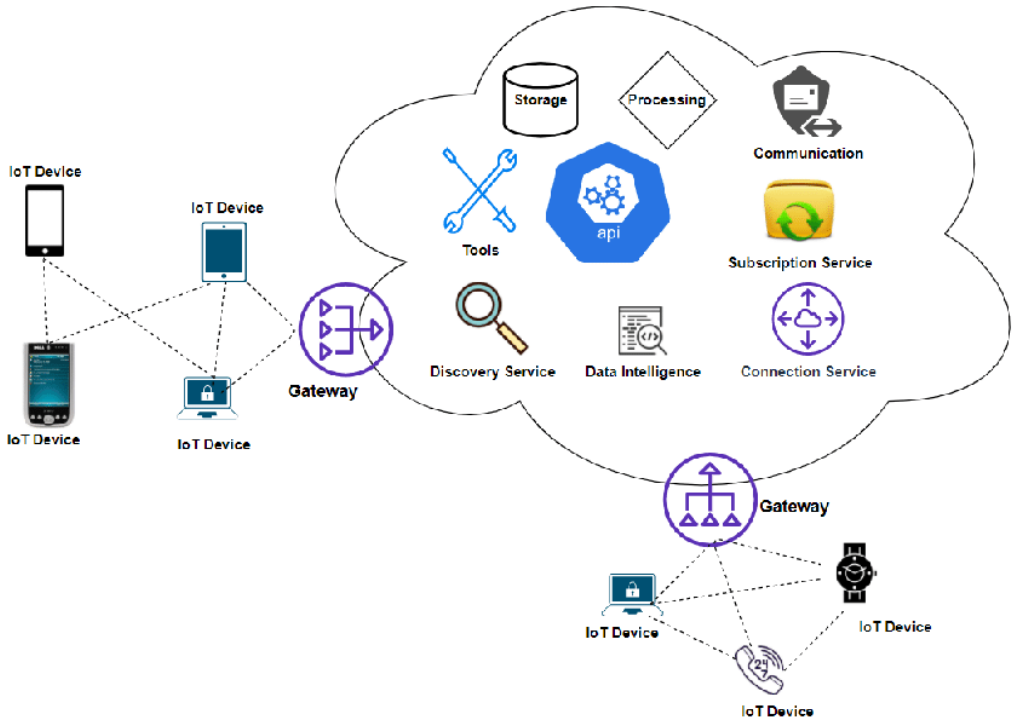
Libraries are important in our lives and can improve our knowledge. The concept of "Internet of Things" (IoT), which creates a network by sharing information about all devices, has recently begun to attract worldwide attention [1]. The Internet of Things refers to the use of smart connected devices and systems to receive data collected from sensors and actuators on machines and other physical devices. The Internet of Things uses communication networks, such as wireless sensor networks and physical devices, to connect devices and enable the Internet to provide services that meet the needs of many academic libraries that directly impact people [2]. As libraries discover and create next-generation libraries, cloud computing has become an important part of these new technologies. Cloud computing increases the service efficiency and visibility of library storage services. Magic Mirror is an app-based technology that can be added throughout the library, finding titles owned by users and recommending other similar products based on the nature-related layer, providing books to readers. The use of pressure sensors in floor corridors is another new technology that can provide libraries with information about the number of visitors to the library corridors, help collect growth and areas that may need advanced signage, and turn on lights. on/off really saves money. Power and build smart libraries. Wi-Fi-based wireless sensor networks provide a way to communicate and collect data and information from sensing nodes [3].
The above technologies interact to increase efficiency and make the school library a smart library. Cloud computing is a collection of software and services that can be accessed over the Internet rather than through a desktop or internal server. Cloud computing is independent of network connection. The term cloud computing describes software or other programs that can be used online and made available to multiple users over the Internet, rather than being installed on the user's local computer. [4] Cloud learning is based on cloud technology because it supports learning using software in the cloud by providing data, storage, and software that can be accessed online. "Regular computing is completely different from cloud computing. Cloud computing is the next stage in the evolution of Internet-based computing, allowing the use of information technology as a service. As smart devices emerge from the cloud, IoT can increase efficiency, effectiveness, and efficiency. Smart cities are communities living in communities that seek to explore new areas of recording and communication technology in achieving environmental sustainability, management respect in the city, improving health, information and success in the network [5].

Cloud computing is the next stage in the development of Internet-based computing and allows the transfer of information and communications technology (ICT) resources over the Internet. IoT on cloud infrastructure can benefit from optimization, efficiency, and payment. The emergence of cloud computing is supporting the evolution of communications and e-commerce packaging. Therefore, IoT and cloud are now very close to future internet technologies compatible with IoT systems. The Internet of Things focuses on the challenges that arise in a dynamic and shared environment. The Internet of Things is a broad category that includes many flexible and extraordinary devices with limited storage, power and performance capabilities. These limitations create hurdles and hurdles in the development of IoT systems, including complex issues such as compatibility, performance, overall functionality, and usability. Cloud computing is one of the best ways that can be combined with IoT to overcome these limitations. The cloud provides integration (network, storage, computers, and software) and is universal, low-cost, and beautiful.[6]

This article describes the current communication, operation, and storage of cloud-based IoT platforms for smart cities. The platform may use cloud resources and services to collect, transmit, analyze, process and store data. It can also use cloud resources and services to collect, export, search, analyze and store data generated by complex situations. Figure 1 shows a cloud-based IoT platform for application development. [7] Libraries are subject to various costs. On the other hand, “there is little to no financial need for cloud computing.” “Pay as you go” and “subscription” are two payment methods for cloud computing. “91% of European and American organizations believe cost reduction is the main reason they are moving to cloud computing” [8]. Therefore, it is time for libraries to think carefully before providing library services with cloud-based technologies and providing reliable and fast service to users.

Magic Mirror

With the advancement of technology, mirrors are used more and more. The magic mirror consists of a camera and sensors, supports Wi-Fi and enables interaction between people and computers. These systems can be used in many languages such as site analysis, content analysis and similar data [9]. Information about user comments is also stored in the database. The system will be integrated into daily use very quickly and advanced methods that will give users a good understanding will be important. There are always ways, even in the digital world. User time for library [10] The pressure sensor pad has a separate sensor pad using Wi-Fi technology, connected to the system and control system of the system. Recording the user's movements from a certain place in order to provide sufficient information by keeping the notebooks in a closed area. Pressure pad sensors can also be connected to a power supply to reduce power loss in academic libraries.



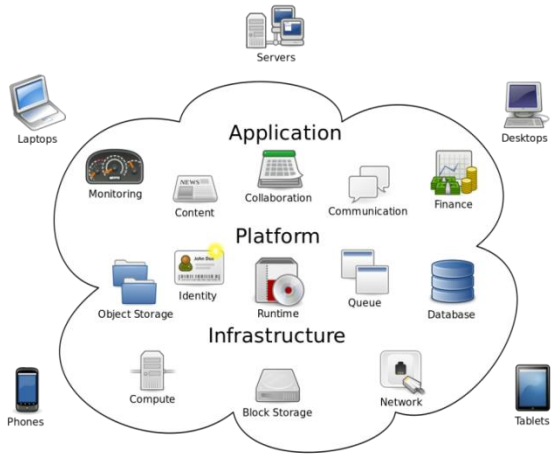


Figure 1

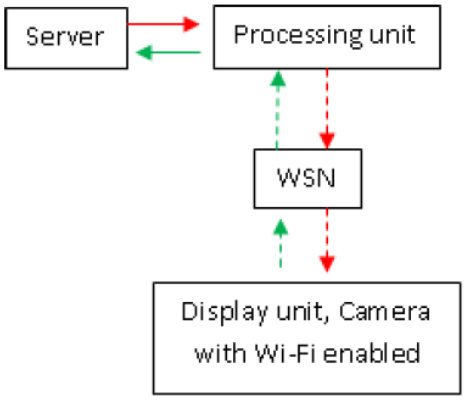


Figure 2

Recent technological advances in low power 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 [11]. In figure 1 we can see, Cloud computing system that are divided it into two parts: the user part and the cloud part. They connect to each other through a network, usually the Internet through Wireless sensor network (WSN). The user part is the side the computer user. The cloud part is the "cloud" part of the system. In the cloud, there are many computers, servers and data storage areas that form the "cloud" of computing services. The main features of cloud computing are:

1. Self-healing, multi-tenant, and service-oriented.
2. SLA driver: The SLA driver is adjusted to meet the agreed service level when the system encounters load peaks.
3. Virtualization: Cloud computing environment is a completely virtualized environment. 4. Flexible: They can be used to perform a wide range of tasks, from light loads for small consumer applications to very heavy loads for commercial applications. The system actually has the tools displayed, the camera connects to the servers, and the equipment's wireless sensor network is shown in Figure 2. Magic Mirror made up by a digital screen like a computer monitor, a sensory device like a webcam.[12] The system will work in the following way: When a person holding a book enters the field of view of the camera, the camera will start capturing the image and the algorithm of the system will start tracking the information regarding the title of the books along with additional information like related books, reviews etc. And the result will be shown in the monitor. Figure 3 represent the implementation of magic mirrors in the academic library.[13] Figure 4 shows the block representation of pressure sensor pad system. A thin sheet of sensor pads is 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.[14] 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. Many solutions based on the Internet of Things need to be integrated; This means not only a lot of thoughts, but more importantly, a lot of tasks. The role of cloud computing in IoT and Cloud Computing are two platforms that have proven to be beneficial in many ways. Most people think of smart city, smart home, etc. Familiar with IoT policies regarding. IoT is the key to integrating smart city responses into business tools and is used in healthcare, transportation, logistics, energy, etc. It paves the way for better answers in areas. Other areas. Yun wasn't far behind. [15] Cloud computing has many benefits in the Internet of Things. In other words, IoT and cloud computing are compatible and both work to improve daily operations. When the Internet of Things combines with smart cities, a lot of information will be generated. On the other hand, cloud computing paves the way for many experiences. From service selection to remote data, IoT and cloud computing work together to improve integration. They offer simple and useful products, but we can detect the differences between IoT and cloud computing in many areas [16].

1. Cloud computing has had a huge impact on business services and personal solutions. Additionally, the power and use of cloud statistics allow retrieving data from remote locations. Therefore, it has proven to be a solution for sending information directly through network channels and bridges according to business interests;

2. The cloud is an excellent IoT tool that can solve problems caused by business data. Cloud-based technology provides a functional platform for the development of critical applications for better use of online information;
3. Speed and scale: The two main cloud technologies are seamless integration and the Internet of Things enables communication and mobility. Therefore, the capabilities of IoT and cloud computing are enhanced through combination. Other features prove that the cloud is important for IoT access;
4. Depending on the building infrastructure, with the widespread use of IoT devices a significant amount of time is required to maintain a large number of devices and to control over-speed. In this context, the cloud brings the benefit of a good service environment;
5. The cloud improves the security and privacy of IoT data. IoT devices are easy to use and can include important security measures, updates, and discoveries with cloud collaboration. The cloud supports customers by providing complete security with strong authentication and encryption protocols;
6. Connectivity and delivery of cloud services for IoT devices. Using plug-and-play cloud hosting services often requires extensive infrastructure, which can be expensive for organizations or individuals. Thanks to the combined power of the Internet of Things and cloud computing, there is no need to invest in infrastructure and access restrictions for the Internet of Things and cloud services are removed;
7. Advanced device connectivity: the cloud plays the role of a communication facilitator with its powerful IoT APIs. These APIs aid the pure connectivity of smart devices and also help in the conversation between intermediate tools;
8. Cloud technology prevents companies from the necessity of infrastructure development and, at the same time, provides adequate resources;
9. Cloud computing ensures business continuity, protecting against unexpected challenges that may arise throughout the process. Since the data is stored on separate servers, there is no risk of data loss, especially in particularly well-supported infrastructure;
10. Cloud computing on IoT allows for seamless communication between IoT devices, enabling numerous strong API connections between connected devices and smart devices. In this way, cloud computing opens the way for the IoT explosion of connected technologies.

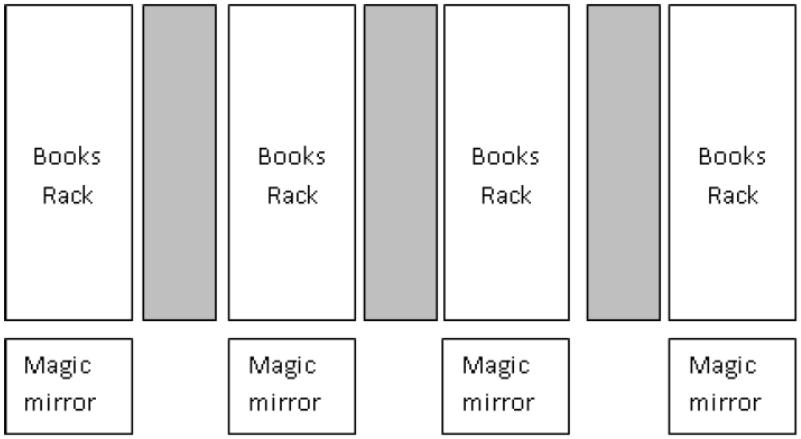
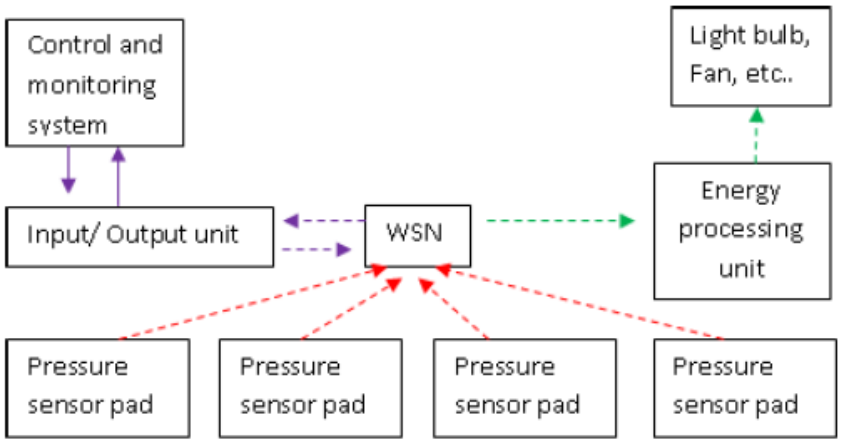


Figure 3



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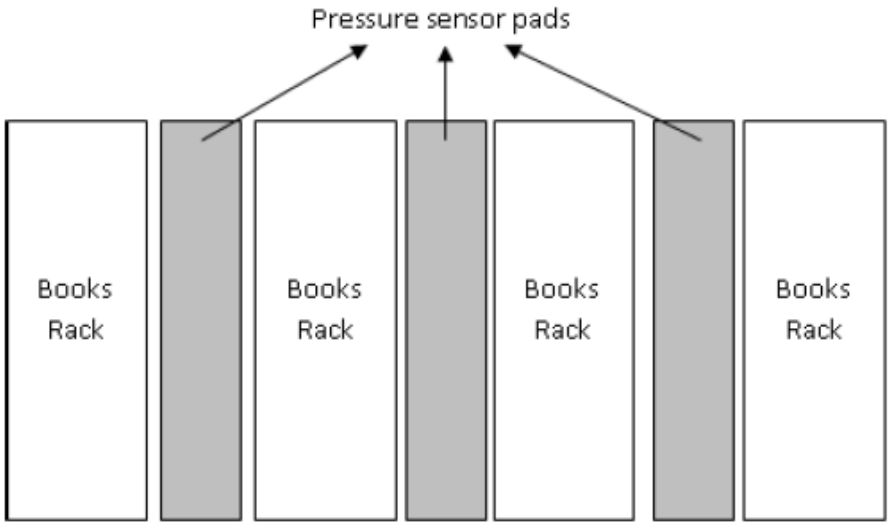

Figure 5

Experiments

The smart library in the Internet of Things Environment is a comprehensive library, educational resources and information service center; Its main features are complete, efficient and easy eight [17]. Smart libraries in the new environment mainly include the following three aspects:

(1) Intelligent communication: Using the Internet of Things to interact with information, link library materials, and create intelligent communication systems. In the intelligent library system, not only the ability to write information services will be better, but also the information services will be distributed on a large scale [18]

(2) Create intelligence: intelligently manage the facilities in the library building, create an intelligent library building system. Among these, the air conditioner can detect the current air quality in the museum, detect the content of the bad product, and turn on the air conditioner when necessary to protect people's health. Temperature-controlled lighting provides readers with a comfortable reading environment by instantly adjusting the temperature, humidity and brightness of the library according to the situation. At the same time, the operation and maintenance of various devices in the smart library appear to be automated. Smart buildings can reduce library operating costs, reduce emissions and improve resource allocation.[19]

(3) Intelligence: The goal of smart libraries is to build smart buildings, connect devices, integrate and provide smart services to readers. Employees can use customer data obtained from smart devices, combine existing data and shared resources, research customer needs, and prepare the information and knowledge users need to make services more personal and Smart Library Service and Management Solution We are planning Figure 6 A new service for smart libraries, according to different user needs, users are divided into three groups: researchers, general readers, and government and user affairs. In response to users' needs, we provide presence information to

provide our users with personalized services such as experience, personal updates and rapid delivery of services.[20]

Test System performance

According to the intelligence difference of the relevant devices in the smart library, it is important for system users to know that the smart device operates simply and quickly, which not only requires time and efficient material management, but also the whole process. It is responsive and user friendly. Therefore, the standard of tests required for performance evaluation is also high.[21] The most important thing is to ensure the stable operation of the server and ensure that the server can provide timely service for access to the people used. These activities are related to completion of design and implementation and customer satisfaction. Therefore, in the last stage, the system was first tested on the server side. In the server-side testing phase, the system is tested by simulating user access events to test system services in more detail. Monitor and record the external activities of 200 visitors and run multiple tests in a short time (30 seconds), each lasting 24 hours.[22] generated the corresponding server-side throughput curve.

This article demonstrates the experiment by capturing the recorded event, as shown in Figure 7. From the analysis of the measurement volume and measurement curve in Figure 8 and Figure 9, it can be seen that as the number of simulated user logins in the server-side system increases, the system parameters on the server side also change. Server End responsiveness also changes at the same time. [23] As the number of cases increases, some small changes will occur each time, especially in the later stages. After the server-side response time statistics, it can be concluded that the average response time of the server-side system is 0, 865s. Server response time is 0.315 seconds. Overall, server-side processing capacity and response time meet the design needs. As can be seen from the analysis in Figure 9, as the number of users increases, the resource usage of the system continues to increase. Therefore, when the smart library is opened, the load on the server-side services of the entire system will increase. Therefore, looking at the overall analysis, it can be seen that mobile phones that can achieve better performance results when using the smart library can cover and establish the current list of phones in the current commercial test. Not only is work and usage faster, but the user also gets better results when using the terminal.[24]

Recommendation analysis. In order to analyze the effectiveness of recognition based on user portraits, a total of 197 undergraduate and graduate students in the field of education were selected as visual targets. Agree on all four suggestions once a week. Two weeks after the push, a survey was created and sent to users to assess their satisfaction. [25] From 172 surveys, 48 people said they could not check the recommended list because they did not follow our WeChat group, did not see the newsletters, did not have time to read the news, or did not like to read. 35 out of 48 people expressed interest in further education. Readers can learn about this novel later through other means and are encouraged to find useful content and make recommendations.[26]

For the remaining 124 studies, they were asked to explain their feelings after seeing the approved results. Nearly all said the recommended resources were relevant to their education, professional skills, and personal interests (see Figure 1). Recommendations for students are shown in figure 8. 22.47% of the students think that most of the books suitable for them are more than 40%, and 64.31% think that 50%-80% of the recommended books are available. More than 87% of people said that at least half of the books listed were relevant to them, with sample accuracy at 66.7% and overall engagement as high as 83%. The survey also investigated content that affects user satisfaction. The complexity of the transaction and the frequency of push, are also worrying for users. [27] The most interesting aspect of this agreement for students is that the content is updated quickly, while new contents of the program and content are rare. It is important that the content recommended as a result of the static user portraits created by experts and the studies carried out are the most studied books. We are happy that they are all willing to continue accepting the offer.

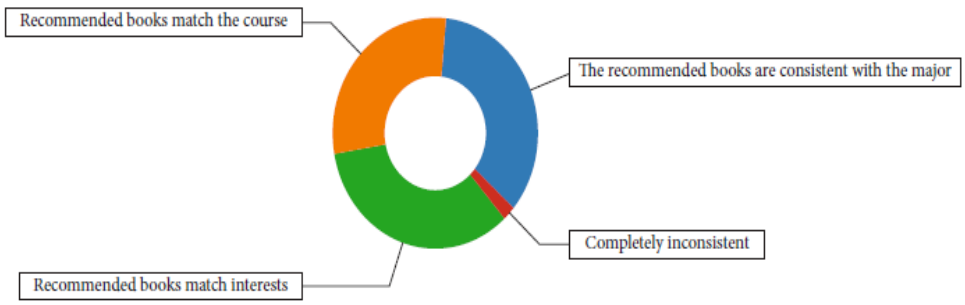

Figure 6

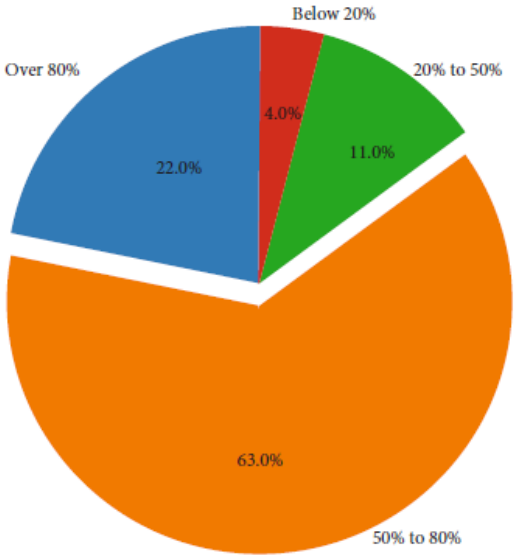

Figure 7

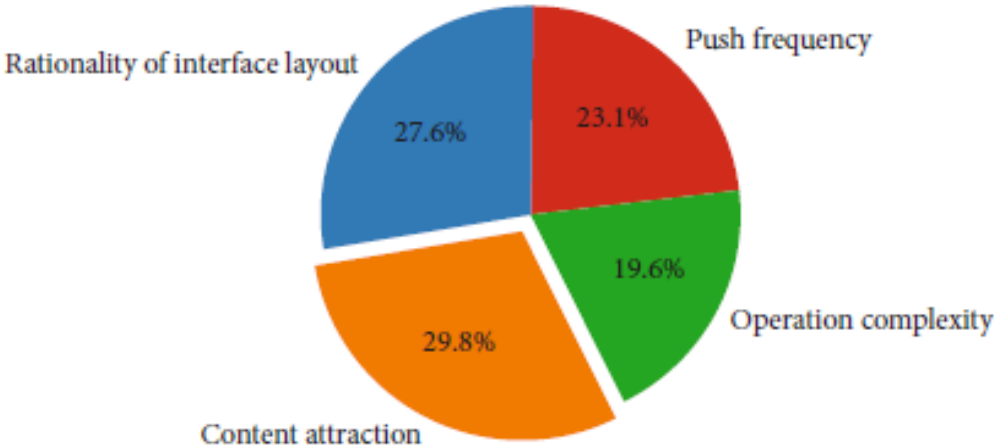

Figure 8

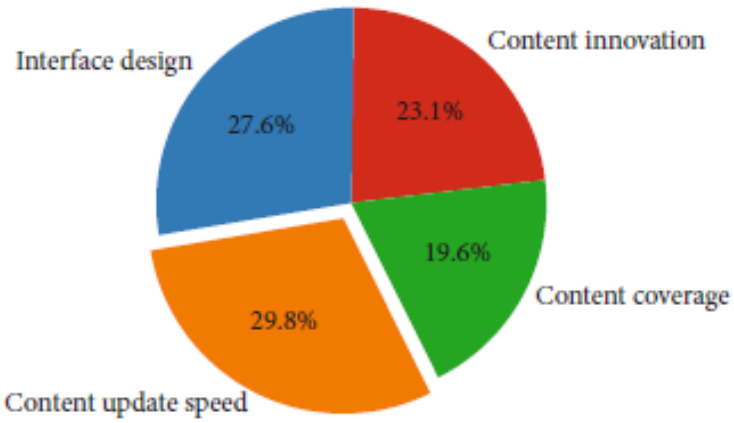

Figure 9

2. Conclusion

This study presents IoT concepts for library technology to learn to improve its services. The Internet of Things is one of the best emerging tools that can attract customers by offering new, evolving and profitable services faster and easier. Technology ideas, cloud computing, magic mirrors, and pressure sensor pads from wireless sensor networks can be used to increase the value of resources. The proposed system must be user-friendly and effective in the future. Smart library design is a new direction and hot spot in modern library design. Smart library self-service and management are standard for smart library. University libraries should take full advantage of the opportunities provided by colleges and universities and create personalized services to enable consumers to use more useful information through smart libraries and smart libraries. In addition, better library services should be provided to users to help the university develop.

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