Example of essay on rfid technology

Business, Company

Radio Frequency Identification (RFID) is regarded as a subset of technologies group, which is used for automatic identification. This technological equipment is mainly used with other machines to identify objects (Bolic, Ryl and Stojmenovic, 2010). Technologically RFID technologies include things such as smart cards and bar codes. Technologically, RFID is a term used to identify a subset of automatic identification, which uses radio waves to identify bulky and individual items automatically (Bolic, Ryl & Stojmenovic, 2010). The technology used in RFID has been available for a long time. However, with advancement in technology, this technology has been improved and its uses have grown to include a variety of uses.

One of the original uses of RFID is in aircraft during World War II. However, with recent technologies requiring the use of RFID technology, experts in the field have come to identify its technology as an expensive one while its functionalities for several commercial application has been found to be limited (Shepard, 2004). However, there have been several advancements in technology, which have helped to lessen RFID technology design and implementation, thereby reducing the costs of provided increased capabilities and individual system components (Shepard, 2004).

With reduction in costs of development, many organizations are currently using RFID technology while a number of other organizations are considering the inclusion of this technology in their systems. In fact, many organizations, for instance the US defense and Wal-Mart have been given the permission to use RFID technology for different purposes by their business partners (Bolic, Ryl & Stojmenovic, 2010). However, while RFID technology is offering many benefits, it is hampered by a number of challenges, privacy concerns being

one of these challenges.

Considering this, it is essential to identify the various aspects of RFID technology, starting with a proper definition of the technology as well as its history. The most essential aspects to consider about RFID technology is their benefits, which seems to be the reason why they are widely used and the technology disadvantages, which can be used to point out areas where designers and developers of this technology ought to concentrate on. All these aspects of RFID are included in this report.

RFID Technology Definition

The RFID system has been designed with three components namely: a tag or in some cases multiple tags, a reader, which is also known as an interrogator and a supporting architecture, which includes both the software and hardware of the system (Glover & Bhatt, 2006). An interrogator as one of the components of RFID system is used to communicate with the RFID tag. An interrogator broadcasts a radio signal to the tag, which then transmits the information to the reader (Glover & Bhatt, 2006). Readers can be employed in the form of portable handheld terminals or they can be used as fixed devices, which are mostly positioned in strategic placed like loading bays or the doors of transport tracks (Igoe, 2012).

A transponder, which is another term used to identify an RFID tag, is a small piece of material with three components, which are: a microchip, an antenna and an encapsulating material (Hunt, Puglia & Puglia, 2007). The microchip part of a transponder consists a memory storage, which is used to store information of anything an RFID system is used. Also, it is essential to note that tags came in the form of read only and read and write form. A read only

tag is used as an identification code, and is mostly used as electronic product code, which is recorded at the time the product is being manufactured or when the product is being provided with a certain code (Igoe, 2012).

The information that has been programmed in a read only microchip cannot be modified, but it can be read a number of times. On the other hand, read and write tag provides the user with the option of changing the information, which has been stored in the chip. Because of this advantage of read and write tag, this chip has more functionalities than the read only tag. Furthermore, an RFID system also includes both hardware and software. However, the RFID specific software is regarded as the most essential component of the RFID system since it is capable of translating raw data, which is stored in tags into meaningful information about the products or orders that the tags were used to represent (Igoe, 2012).

The information obtained from the tag is then put into a computer and stored in a centralized database. This information is what many companies will use for various purposes like inventory management. When read and write tag is employed, the RFID software used is required to control the decision of whether information can be written on the tag, if the information should be changed and the tag that should contain certain information, as well as the process used to initiate data adding method (Igoe, 2012).

History

History places the first use of RFID technology in the World War II period. During this time, the Japanese, Germans, British and the Americans were all using radar system, which was discovered in 1935 by Sir Robert Alexander

Watt (Roberti, 2011). Watt's technology was used by World War II participants to warn of approaching airplanes while before the planes could reach their airspace (Roberti, 2011). However, this technology had issues considering that, even though all the countries could know a place was approaching them, they did not have the mechanism to identify the owner of the plane.

The Germans managed to come up with a mechanism which enabled them to identify the planes that were returning to their bases (Roberti, 2011). This mechanism was rooted to the fact that these planes changed their radio frequency, which reflected back to them. With this technique, the radar crew on the ground managed to identify their own planes from those of their enemies. This is essentially regarded as the root to initial RFID system. However, advancement in RF and radar communication systems have been used since the World War II, with much of this technology gaining its ground in 1950s and 1960s.

Various scientists in the US, Japan and Europe have come up with research papers, which provide the use of RF energy as far as identification of objects is concerned. According to research, the RFID technology was first invented in 1948 (Sweeney, 2010). However, this technology was not implemented as commercial use until the 80s. After the World War II, various companies in major cities around the world started commercializing anti-theft systems, which employed RF technology not only to identify, but also to determine whether a product had been paid for (Sweeney, 2010).

An electronic component known as an electronic article surveillance tag, which is still being used with many companies, has a 1 bit tag (Thornton et

al, 2006). When an item is paid for, then the bit will be turned off. However, if the item is not paid for, the bit will continue to be on, indicating that the item has not been paid for. This is identified when a person tried to walk out of the door of either a supermarket or a store with radar doors. Despite being developed in 1948, the first RFID patent was received by Mario W. Cardullo in 1973. At the same year, Charles Walton received the patent for passive transponder, which is used to open doors without the use of a key (Thornton et al, 2006).

The transponder operated in such a way that, when a card, which has been embed with a transponder communicates a certain signal to the reader near the door, then the door will open. However, a reader needed to detect a valid identification number, which is stored in the RFID tag. This technology was licensed by Walton to Schlage, who was a lock maker, while other companies also managed to acquire license for the technology (Thornton et al, 2006). Despite that, it is essential to know that the US government also worked on RFID technology in 1970s.

One of the government departments, Los Alamos National Laboratory, was requested by the US department of Energy to create a system, which could be used to track nuclear materials (Thornton et al, 2006). A scientist group devised a concept, which was used to implement a transponder in a truck and readers at secure facility gates. An antenna, which was installed on the gate, was used to wake up a transponder, which was installed in the truck. The transponder is required to respond with identification as well as other information like the ID of the Truck driver (Sweeney, 2010). This system became widely known in 1980s after the scientist that worked on it left to

develop payment systems, which are automated.

Despite that, it is until recently, which is due to technological advancement that many companies have found the RFID technology to be more feasible. Among the companies that have adopted the use of RFID technology is Wal-Mart, which is also regarded as the first retail store to implement RFID technology and has managed to improve its operations (Thornton et al, 2006). Other than Wal-Mart, there are a number of companies, which have adopted the use of RFID technology because of its advancements and lower production costs.

Uses

The first use of RFID technology was in World War II, whereby war participants needed to identify if there were any planes approaching their space. However, its use as an identification system was cemented by the Germans who managed to use radio signals to identify their planes and differentiate them from those of their enemies. However, with advanced technology, and their broader adoption, it is evident that RFID provides various uses other than just being used in airplane identification.

However, before moving the most complex uses of RFID systems, it is crucial to look at the most common uses. To begin with, it is essential to note that RFID tags are available in a variety of sizes and shapes and can be encased in a number of materials. For instance, RFID tags can be used as:

- Tracking tags for animals by inserting it under the skin.

- It can be used to identify trees or other wooden items.

- It is used in the form of anti-theft hard plastic tags, which are mainly attached to merchandise in retail stores.

- Are used in shipping containers in the form of rectangular transponders.

For many years, RFID systems have been used to identify animals like dogs. This technology provided permanent identification mechanism, whereby the owners of dogs branded their dogs with used tattoos and permanent ink markings, which were mostly branded on the ears of the dogs (Sweeney, 2010). However, the markings used to fade with time, not forgetting the fact that it was difficult for the dog owner to make the dog sit still while being branded.

Currently, with many organizations losing money because of thieves, most of them have been forced to implement RFID systems within their organizations. Since the RFID technology converts an inert object to one that is capable of communicating, the use of RFID technology has been intensified and its limits have been the object of human imagination. The potential uses of RFID technology within organizations include the following.

- In supply chain management, whereby it is used to monitor and control the flow of goods right from raw materials to finished goods and from the manufacturer to the consumer.

- Product integrity, whereby it is used to ensure that the products are authentic.

- Warranty services, it is used to mark durable goods with a specific tag, which incorporate a product registration code to facilitate its warrantee services.

- Ticketing, ID and travel, whereby it can be used to provide a means of verifying a traveler identity as well as to ensure the documents of a traveler are genuine.

- Baggage tracking, whereby is used to track movements of a bag for its check in to its loading on a plane.

- Care and management of a patient, whereby it is used to rapidly and accurately ascertain the information about a patient's illness like allergies as well as other information concerning the patient.

While these seem to be the common uses of RFID technology, research shows that there are more uses of this technology. According to Buxton (2010) RFID technology is regarded as the missing link between the real world and online information. While this use is yet to be made official in commercial world, it provides an interesting future of the use of RFID technology. While many people are trying to provide answers as to whether RFID market will be layered similarly to the era of computers and the ongoing development of the internet, they have refuted the fact that RFID technology is currently becoming an essential technology in the market. RFID is currently becoming reliable in network infrastructures and other essential process changes. With this technology being integrated in almost all objects, it is possible that the next generation will see most solutions coming from this technological innovation. Currently, what most experts are trying to accomplish is how RFID technology can be used to link information stored in its components to online channels. If this goal is accomplished, then there will be no stopping what RIFD accomplishes.

Advantages

Considering the fact that many companies are currently implementing RFID technology in their systems, it means that this technological system has many benefits compared to traditional technologies. Whether a store is

concerned with inventory tracking or a fleet company is concerned with the maintenance of fleet of vehicles, it means that the company needs a data capture and analysis system, which is automated, to help track its valuable equipments or assets. There are a lot of benefits of RFID but some of them carry more weight compared to others. The most essential benefits are:

- Inventory shrinkage reduction

RFID components help companies to track their items from the manufacturing point to selling point or from a store shelf to a customer's basket. With their real time security notification, RFID devices notify a store security about the items, which might be leaving the store without being paid for (Shepard, 2004). In addition to that, they also provide a competitive advantage to the company by saving money, which could have been lost through theft.

- They provide smart labeling

The technology used in RFID enables owners to know the inventory that is unattended as well as provide automatic product identification, which are mostly provided in a mixed pallet (Shepard, 2004). They also provide what has come to be termed as smart shelf system, which is designed with a means of providing real time tracking as well as locating of items that have been tagged on shelves (Shepard, 2004). In addition to that, they also help in shipping and reception of applications.

- Stocking of shelves in a store

Through their real time information notification system, it is possible to know which products are out of stock. This means that RFID provides a proper method in which companies can use to replenish their shelves (Buxton,

2010). This is beneficial since it helps to retain customers who are likely to move to other stores incase products in a certain store are finished. Besides that, RFID provides mechanisms, which are essential for charting and tracking of products for forecasting purposes.

Disadvantages

The main concern with RFID technology is associated with privacy issues. The ability to track and store information on various products posses threats to individual privacy. Some of the threats include the following:

- Secret collection of information

Considering the size of RFID components, it is possible to install them into objects without the knowledge of the owner of the object. Since radio waves, which is the communication method used with this technology penetrates without restrictions it can be read past cloths and other materials. This makes it difficult for a customer to know if he or she is being scanned (Buxton, 2010).

- Tracking of individual movement

RFID tags can be used to track the movement of a person if they are embedded in the cloths of a person. This is one of the disadvantages of this technology since people feel insecure when their movements are being tracked.

- Individual profiling

Because of their ID, it is possible that the RFID unique number, which is mostly placed on a product, can lead one to the manufacturer of a product. Additionally, if the unique identification number is linked to a certain

individual, it is possible that it be used to identify the purchasing habits of that person.

Conclusion

In this paper, we have gained an insight on RFID technology and its uses. The first use of RFID was during the World War II. However, commercialization of this technology came later as more people started realizing the importance of identifying various aspects of their companies. Besides that, it is possible that the use of RFID will intensify as more and more companies currently understand its use. The main area where researcher and developers will need to work on is in privacy since it is easier for people using this technology to get their hands on personal information without the consent of the owner.

References

Bolic, M., Simplot-Ryl, D., Stojmenovic, I. (2010). RFID Systems: Research Trends and Challenges . NY: Wiley.

Buxton, B. (2010, 12 9). Use Your Imagination. Just Add RFID. Retrieved from RFID : http://rfid. thingmagic. com/rfid-blog/bid/52243/100-of-100-Uses-of-RFID

Glover, B., Bhatt, H. (2006). RFID Essentials (Theory in Practice). NY: O'Reilly.

Hunt, D., Puglia, A., Puglia, M. (2007). RFID: A Guide to Radio Frequency Identification. NY: Wiley-Interscience.

Igoe, T. (2012). Getting Started with RFID: Identify Objects in the Physical World with Arduino. NY: O'Reilly Media.

Roberti, M. (2011). The history of RFID technology . Retrieved from RFID Journal : http://www. rfidjournal. com/article/view/1338

Shepard, S. (2004). RFID: Radio Frequency Identification. NY: McGraw Hill Professional.

Sweeney, P. (2010). RFID for dummies. New York: John Wiley and Sons.

Thornton, F., Haines, B., Das, A., Bhargava, H., Campbell, A., & Kleinschmidt, J. (2006). RFID security: Protect the supply chain. New York: Syngress.