RFID TECHNOLOGY

Introduction

Radio frequency Identification also known as RFID uses electromagnetic fields for the wireless transfer of data to automatically identify and track objects that have tags, containing electronic stored information, attached to them. In using RFID, the tag does not have to use a line of sight action as seen in some other such identification systems and can either be a passive or active transponder. An active transponder has its own power supply source while a passive transponder depends on the radio waves it receives for energy source.

Some common frequencies of operation and the read distance of RFID are shown in table 1.

Frequency range	Frequencies	Passive Read distance
Low Frequency (LF)	120 – 140 KHz	10 – 20 cm
High Frequency (HF)	13.56 MHz	10 – 20 cm
Ultra-high Frequency (UHF)	868 – 928 MHz	3 meters
Microwave	2.45 GHz and 5.8 GHz	3 meters
Ultra-Wide Band (UWB)	3.1 – 10.6 GHz	10 meters

Table 1: RFID operating frequencies (Weis, n.d., p 9)

RFID could be said to be invented in the mid 19th century with the development of a tool for espionage that was used to covertly listen and retransmit radio waves incident on it with audio information. However, it was not until the 1973 patent of a passive radio transponder that had memory by Mario Cardullo that we could really say the modern RFID was born. This first

device with a 16 bit memory was a passive transponder that took energy from the interrogating radio waves to power it and was used as a toll device.

The first commercial applications of RFID to prevent theft of goods at the point of sale was the Electronic Article Surveillance (EAS) equipment developed by Sensormatic and Checkpoints were witnessed in the 1960s and 1970s (OECD, 2008, p. 95).

The three main components of an RFID system are the RFID tags, RFID readers and databases. The tags are composed mainly of an integrated circuit and an antenna for the transmission and reception of signals. The tags with transponders are attached to the objects that need to be identified. The tags may be read-only where it has its serial number written to it from the factory or read-write (RFID Basics, n.d., p. 3) where the user can program specific data pertaining to the object to be identified on it. The RFID readers transmit radio signals to interrogate an RFID tag for information and read the response. The readers are more sophisticated than the tags as they can have their own processing capability, internal storage and network connectivity (Weis, n.d., p 9). Databases map the data that identifies a tag to records on objects being identified by the tag. The records often contain all necessary information on a product for tracking and assessment. For readers without its own internal storage, is often a conduit to the database that stores the information read by it.

RFID like other information systems is susceptible to security attacks. These risks when exploited could lead to serious harm to businesses and individuals. Some of these risks include privacy risks, business process and business intelligence risks. A number of measures could however be put in place to further enhance the security of RFID systems. Only low cost tags are

more susceptible to security risks as higher cost RFID products have sophisticated security features (OECD, 2008, p38).

RFID technology has been deployed in many areas for monitoring and tracking of objects as well as in payment systems. One of the deployment areas of RFID technology that is in use today is in checkout counters in stores and supermarkets.

Testable Hypothesis

Over the years, barcode technology has been deployed at the checkout counters in retail stores and super marts to monitor goods. The barcode papers placed on items for scanning cost next to nothing to produce. The RFID chip, costs more per unit to deploy on goods to be tracked in stores. The main research question then is "can the RFID tags effectively replace the barcode technology as a means to tracking goods in stores?" Answering this question will entail looking critically at the features of the barcode technology and juxtaposing it with RFID. At first examination, I think the advanced features and complexity of RFID will make it preferred over barcode despite the higher cost per unit owing to the autonomy in the management of the goods carrying the tags and the greater overall efficiency of its use. The flaws as have been experienced in the past in the use of barcode technology will be used to reinforce the argument vis-à-vis the merits of the use of RFID.

Faculty Mentor

As of right now, I've only contacted two faculty members to be my mentor but unfortunately, none of them have replied. I'm hoping I can go to Dr. Liu personally to ask her, but working full-time doesn't give me much time to be on campus other than at night for my late classes. I would like her to be my mentor however because her big niche is security. She is also my advisor. I will be emailing you by the middle next week to have a final response.

Project Timeline

The main tasks that will be involved in completing this project and the time frame and time duration for the completion of the tasks are presented in table 1 below. The duration for the completion of each task has been carefully determined to give some allowance for delays that may arise owing to unforeseen circumstances.

Activities	Week												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Topic Selection and approval	■												
Literature review on topic		■	■										
Project proposal writing		■	■	■									
Research on the topic					■	■							
Compiling information							■	■	■				
Report writing(Draft & Final)										■	■	■	
Project submission													■

Table 1: proposed time schedule for the project

Data Source

The source of information for this project will be from secondary data sources as published in research articles. Intensive literature search will be conducted in the library for papers relating to RFID technology with specific target on its deployment and the challenges encountered in its commercial deployment. The sources gathered will be screened for the most relevant papers that address the issues surrounding the thesis statement by doing a review of the papers and an annotated bibliography. The sources that will not contribute to the position on the thesis will be dropped at this point.

WORKS CITED

1.   Organization for Economic Co-operation and Development (OECD). "RFID Radio Frequency Identification, OECD Ministerial Meeting on the Future of the Internet Economy" (2008). PDF. Retrieved from http://www.oecd.org/sti/ieconomy/40892347.pdf

2.   RFID Basics. "RFID White Paper". (n.d.). PDF. Retrieved from https://www.wewear.org/assets/1/7/RFIDBasic_Paxar.pdf

3.   Weis, S.A. (n.d.) RFID (Radio Frequency Identification): Principles and Applications. MIT CSAIL. PDF. Retrieved from http://www.eecs.harvard.edu/cs199r/readings/rfid-article.pdf