**6CS003 Emerging Technologies Assessment 2**

Student Name: James Braznell

Student Number: 1007022

Module Leader: Dr. Rupert Simpson

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**Review:**

The first lecture covered Radio Frequency Identification (RFID) and Near Field Communication (NFC), RFID can be embedded in objects or 'tagged', transmitting a unique serial number to a reader via radio waves. NFC an extension to RFID, is described as a wireless communication interface.

The lecture described the current uses of RFID, advantages and disadvantages, two different types of RFID, LF and HF which is low range/bandwidth and UHF which is high bandwidth and long range. Next the lecture dismisses several myths about the technology, such as how RFID is expensive and then the lecture shows the structure of an RFID system.

The lecture lists NFC's features such as not requiring line of sight, it shows the technology is in use in Japan and the member companies/sponsors of NFC, its gives reasons why such a technology would be used, it shows the market for NFC, where trials of the technology have taken place as well as its use in mobile phones. The lecture lists the competing/complimentary technologies, how the technology works, its uses and the issues with said technology.

The second lecture covered Human-Computer Interaction (HCI), this is shown as how users interact with computers, the lecture shows the history of HCI such as the first computers and their users for example Alan Turing’s Colossus, the lecture presents the mouse a popular HCI device as an example of HCI technology. The lecture shows the computer landscape before the personal computer (PC), such as time sharing where many users interacted with one computer although it seemed as though they each had one computer, giving rise to the need for HCI.

The lecture shows several applications that were introduced because of the development of the GUI, as well as the research being carried out in the field of HCI, such as connecting ourselves to computers for output much like mouse and keyboard or as input directly to the brain. Lastly the lecture makes its prediction of the future of HCI, such as mobile phones and speech recognition as the technologies to be further developed with HCI considerations as well as a host of other technologies to help interact with computers.

The first lecture was brief and to the point but still gave much information about both technologies, including their features, uses, and issues with the Technology. It is clear that the lecture was designed to compare and contrast the two technologies by showing their differences and similarities, advantages and disadvantages of both in order to give a clearer picture of both technologies. The practical part of the lecture gave insight into the technologies and allowed for greater understanding of said technologies.

The second lecture although not as practical in nature as the first was very informative, it gave a description of HCI, the history, examples of HCI technologies, past, present and gives a prediction on the future of HCI. The use of video examples of HCI helped to reinforce the points it had made providing greater understanding of the concept.

**Radio Frequency Identification**

James Braznell

University of Wolverhampton

Wolverhampton, United Kingdom

[J.Braznell@wlv.ac.uk](mailto:J.Braznell@wlv.ac.uk)

In this paper I give an introduction to Radio Frequency Identification (RFID), I show the uses and repercussions, limitations and similar technologies.

1. **Introduction**

RFID is a cheap transponder or 'tag' that is designed to embedded into objects to transmit a unique serial number via radio waves for identification purposes. RFID is an alternative or potential replacement of universal product code (UPC) barcodes, it improves on barcodes by enabling detection of an object from distance without the need for line of sight. RFID transponders also allow for more complex data to be stored that allow the tags to have potential use in several fields such as retail, forensics, health and many others, this is supported by the work of Kumar, P *et al* (2009).

RFID is not a new technology, it has been used since World War II for plane identification, this is supported by the work of Nuzzolese, E et al (2010). However recently the technology has become more used as it is cheaper has improved accuracy and is more robust. The use of RFID can help avoid mistakes in terms of data entry, based on the type of RFID that is employed. One such type is low frequency and high frequency (LF & HF), this is a coil antenna, it is cheap, the tag size determines the range, has better penetration of materials, it also has low range and bandwidth. Another type is ultra high frequency (UHF) Technology, this is a linear antenna, it uses wideband tags that work worldwide, these however need different readers than traditional RFID, it has high bandwidth and long range (5 metres), the tag size is determined by wavelength.

RFID is commonly used and it does not violate people's privacy more so than a person's car registration, it can be used wherever automatic data acquirement is required. Therefore the RFID technology is very useful and has the potential to be of great benefit to several industries more so than the standard barcode which cannot provide the extra possibilities RFID tags bring.

1. **Applications and Implications**

There are several uses for RFID in many different industries, for example they can be used as a successor to the commonplace barcodes that are used in most stores. Electronic article surveillance (EAS, 1 bit RFID tags) is an alternative to barcodes and in many ways improves on them, EAS functions to stop shoplifting in stores much like barcodes but crucially these tags can be embedded into the packaging or the item itself making it harder to tamper with.

Another application of RFID is that it can be used for forensic human identification, tags can be placed in dentures to help identify a body during post mortem, this can be accomplished by storing data in the tag that would help to identify the deceased individual, this information could be transmitted to a reader and a computer would display the results speeding up the forensic investigation. Due to the limited range of the tag, a reader must be very close to an individual in order to successfully scan the tag and therefore there an individual with this tag installed is very unlikely to have their privacy jeopardized, this is supported by the work of Nuzzolese, E et al (2010). Therefore an RFID tag can be placed in dentures for forensic human identification and will greatly help with this process, the technology has very little impact on the individuals with the transmitter installed nor society itself is affected.

RFID can be used in supply chain as a successor to barcodes, the technology would improve brand authentication, traceability and tracking, by implementing a recently developed global standard for automatic and unique identification of items and their representation on the computer back-end of the system, the EPC(Electronic Product Code)Global Architecture Framework which allows for the storing of much greater amount of information than a barcode using its coding scheme, it will store information about the manufacturer of the product, product type and a unique serial number of that particular product. By implementing a production management system and then extending this to traders, the technology will allow for the acquirement of real-time data on objects and therefore will improve material handling efficiency, it will increase product availability, and item management. This is supported by the work of Tudora E (2011). Therefore RFID is clearly an improvement on the barcode technology that is commonly used in supply chain and if adopted the technology would grant several benefits in this field. The social impacts of this would be customers would be able to purchase the items they wish and not have to wait until it came into stock anywhere near as much as today because the technology would allow management to more effectively handle this issue.

The health industry can implement RFID in order to automate the identification process, reduce medication errors and increase patient safety, this can be achieved by introducing for example a hybrid system of RFID for tracking equipment, ventilators, IV pumps etc while barcodes could handle medication, patient and staff identification (ID). Therefore RFID would be able to help improve productivity and efficiency, eliminate paper-based documentation, reduces or even prevent medical errors, patient safety and in doing so this will save the industry money and will reduces patient waiting times, this is supported by the work of Lahtela, A. and Hassinen, M. (2009). The social impacts of this would be a more efficient health service with increased patient safety and cut down waiting times for example.

# One application of RFID would be its use in the food industry, by implementing the transmitters in supply chain management for example by tracking food goods during their transfer to the retail store and storage therein it will allow for automated stocktaking, cutting down on costs and increases efficiency in this process, RFID could help monitor the temperature of foods as the RFID tags are more sophisticated than barcodes they allow for more complex data to be transmitted, the temperature readings could be stored in a data logger and then transmitted which a reader would pick up and show an employee the status of a product. Therefore RFID can help improve the food industry in supply chain management as well as temperature monitoring, in doing so RFID would improve efficiency and productivity, cut down on food spoilage and waste, this is supported by Kumar, P *et al* (2009). The social impacts of this would be products in stock more often, less spoiled food making it onto shelves and therein less waste.

1. **Limitations**

RFID although it has many benefits it is not without its faults, such as with EAS anti-shoplifting tags, the system is prone to false alarms, these can occur most often if tags are not properly deactivated, however there it is possible that simple key rings, nearby alarm systems, or even a coil of wires can possibly set of the systems alarm. There are more expensive versions of the technology available which handle this issue better, however in order for the technology to be used on the same scale as barcodes, the cost must be brought down. Therefore the technology must be continued to be developed in order to reach its full potential.

One issue with RFID in terms of security, is that the tags are inherently less secure than other technologies of similar function, this may be due to the lack of processing capability the devices have, therefore RFID must comply with IT security regulations in order to safeguard the data that is held on the devices as well as the middleware that processes the data stored and the back-end systems. It has been suggested that the tags should only store the serial and manufacturer numbers which effectively solves the security issues concerning data protection, however this does limit the applications the RFID technology makes available as a counterpart/successor to barcodes. Therefore the RFID technology must be continued to be developed to the point where these security issues no longer exist if it is to be adopted in any large scale fashion, this is supported by the work of Rawal, A (2009).

1. **Similar Technologies**

A technology similar to RFID isNear field communication (NFC) which is an extension of RFID, it is technically a short range wireless technology for data transfer without a physical connection medium, wires for example. NFC allows for two-way communication such as data exchange in electronic devices. RFID in contrast to NFC is able of transmission and read over a few metres while NFC is only able to do this at ten centimetres or less. Similar to RFID, NFC can also read NFC tags, which are NFC devices tags with no power but still store data, by reading such a tag, an NFC enabled device unlike RFID which is commonly used for tracking products from storage to retail or simply scanning in bulk, can open a website or launch a program already on the device. Therefore as can be expected by an extension of RFID, NFC is quite similar but also performs differently, this is supported by the work of Pesonen, J and Horster, E (2012).

1. **Conclusion**

In this report I have given a brief introduction to RFID, stating its uses such as in the food industry and how this impacts on society for example products being in stock more often, its limitations such as security issues caused by lack of processing power in the transmitters and similar technologies such as NFC. This paper details a fair amount of information on RFID but does not become so technical so that those not well versed in the technology can still understand the points I have made in this report.

**Bibliography**

Kumar, P., Reinitz, H. W., Simunovic, J., Sandeep, K. P., Franzon, P. D. (2009). Overview of RFID technology and its applications in the food industry. *Journal of Food Science*, [online]. **74**(8), pp.101-106 [Accessed 3 March 2013] Available at:

<http://onlinelibrary.wiley.com/doi/10.1111/j.1750-3841.2009.01323.x/pdf>

Lahtela, A., Hassinen, M. (2009). Requirements for radio frequency identification in healthcare. *Studies In Health Technology And Informatics*, [online]. **150**(0), pp.720-724 [Accessed 26 February 2013] Available at:

<http://wk6kg9sd8m.search.serialssolutions.com/?url\_ver=Z39.88-2004&url\_ctx\_fm t=info%3Aofi%2Ffmt%3Akev%3Amtx%3Actx&ctx\_ver=Z39.88-2004&rfr\_id=info%3As id%2Fmendeley.com%2Fmendeley&rft\_val\_fmt=info%3Aofi%2Ffmt%3Akev%3Amtx %3Ajournal&rft.genre=article&rft.date=2009&rft.volume=150&rft.pages=720-724&r ft.atitle=Requirements%20for%20radio%20frequency%20identification%20in%20he althcare.&rft.jtitle=Studies%20In%20Health%20Technology%20And%20Informatics&rft.title=Studies%20In%20Health%20Technology%20And%20Informatics&rft.aulast=Lahtela&rft.aufirst=Antti&rft.au=Hassinen%2C%20Marko&rft\_id=info%3Apmid%2F19745405>

Nuzzolese, E., Marcario, V., Di Vella, G. (2010). Incorporation of Radio Frequency Identification Tag in Dentures to Facilitate Recognition and Forensic Human Identification. *The open dentistry journal*, [online]. **4**(0), pp.33-36 [Accessed 28 February 2013] Available at:

<http://benthamscience.com/open/todentj/articles/V004/33TODENTJ.pdf>

Pesonen, J. Horster, E. (2012). Near field communication technology in tourism. Tourism Management Perspectives, [online]. 4(0), pp.11-18 [Accessed 07 March 2013] Available at:

<http://ac.els-cdn.com.ezproxy.wlv.ac.uk/S2211973612000323/1-s2.0-S2211973612000323-main.pdf?\_tid=0c03ba54-880c-11e2-9031-00000aab0f26&acdnat=1362759789\_6cfa88b9e5660dae2f7cf3e7d7aabb0c>

Rawal, A. (2009). Rfid: the Next Generation Auto-Id Technology. Microwave Journal, [online]. **52**(3), pp.58-76 [Accessed 27 February 2013] Available at:

<http://wk6kg9sd8m.search.serialssolutions.com/?url\_ver=Z39.88-2004&url\_ctx\_fmt =info%3Aofi%2Ffmt%3Akev%3Amtx%3Actx&ctx\_ver=Z39.88-2004&rfr\_id=info% 3Asid%2Fmendeley.com%2Fmendeley&rft\_val\_fmt=info%3Aofi%2Ffmt%3Akev%3Amtx%3Ajournal&rft.genre=article&rft.date=2009&rft.volume=52&rft.issue=3&rft.pages=58-76&rft.atitle=Rfid%3A+the+Next+Generation+Auto-Id+Technology&rft.j title=Microwave+Journal&rft.title=Microwave+Journal&rft.aulast=Rawal&rft.aufirst=Amit&rft.issn=01926225>

Tudora, E., Alexandru, A., Ianculescu, M. (2011). Using radio frequency identification technology in supply chain management. World Academy of Science Engineering and Technology, [online]. **81**(0), pp.317-322 [Accessed 4 March 2013] Available at:

<http://www.wseas.us/e-library/conferences/2011/Florence/AIASABEBI/AIASABEBI-50.pdf>

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| Student Name /Number: James Braznell 1007022 Grade:  Marker’s Name: Date: |

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| **PART A:**  **LO1**  KNOWLEDGE:  The background/Context of the technology’s emergence, ie from what other technology has it emerged or evolved?  A discussion of any existing similar technologies, if appropriate; and the salient features of the technology.  EVALUATION  A discussion of possible uses or markets; and the future impact of the technology  PRESENTATION  Structure: contents page; numbering; abstract; conclusion; references; etc  Style:  Written in an appropriate academic style, with references? | **A** | **B** | **C** | **D** | **E** | **F** |
| An excellent, well-rounded, discussion of the technology and its emergence. | You have discussed all aspects of the technology and its emergence in some depth. | You have given a mainly descriptive account of the technology and its emergence. | The facts are presented, system of citing sources limited but useable. | You have made cursory mention of the technology and its emergence.  Over-reliance on a few sources; and poor use of citations. | The technology’ or its emergence does not get a mention at all.  Citations have not been used to identify sources of any material used within the body of the report. |
| An excellent, well-rounded, evaluation of the possible uses , markets and future impact of the technology | You have evaluated in a limited way the technology’s possible uses, markets, and future impact in some depth | You have highlighted, the possible uses , markets, and the future impact of the technology | You have mainly described the technology’s possible uses, markets, and future impact. | You have made cursory mention of the technology’s possible uses, markets, or future impact. | The technology’s possible uses, markets, or future impact do not get a mention at all |
| An excellent structure, easy to navigate, easy to read (document standards compliant; consistency; summaries)  You have written in a clear, concise, academic style, which has been appropriately referenced. | Very good structure (easy to navigate, easy to read).  Your style is clear and concise, and is largely academic in style and suitably referenced | A good structure that is relatively easy to navigate and comprehend.  Harvard referencing is used accurately. There may be some spelling, grammar, and punctuation issues affecting clarity in places. | A satisfactory structure but not always logically presented; and lacking appropriate sizing of section s and sub-headings.  Harvard referencing is used, but some errors in places.  The essay is not written in the 3rd person. | Poorly structured essay;  and, your style of writing is poor. | A poor effort;  Difficulty in navigating and comprehending content;  written in a non-academic style;  Poorly cited (or referenced )  or not cross-referenced at all! |
| **LO2:**  Critique and summarise technological presentations | Excellent appreciation of the content and constructive review of both technology presentations. | Excellent appreciation of content and constructive review of most of the technology presented. | Some appreciation of subject and a good review given of the technologies presented. | A general description of technology given, lacking in some areas. | Poor review, showing general lack of awareness of content and the presentation. | Presentations not attended. Review unacceptable. |

Comments

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