January 22, 2006

RFID: Radio Frequency IDentification: 4400:391-002

Texts: No text
Time: W, 3:15-5:30 PM
Room: CH-323
Dr. N. Ida (ASEC N252), e-mail: ida@uakron.edu, TEL: 972-6525

RFID: Outline

1. Introduction

2. What is RFID
History, where did it start, why? when?, what is it?, what can it do? Etc., Review of RF basics, what is RFID, RFID base system architecture, frequency bands used by RFID, comparison with barcodes.

3. Standards and regulations
Global regulatory requirements, regional regulatory requirements, ISO, ETSI, FCC, EPC, safety regulations/issues.

4. RFID applications
Supply chain, asset tracking, theft reduction, retail, access control, tolls, military applications, others

5. Tags
Tag features, types of tag, passive and active, chips, read only, read write, affixing tags, selecting location to affix a tag, tag orientation and location, tag stacking, impact of rate of movement, tag data formats. Approaches to RFID tags, the players in the industry (microchip, TI, Phillips, and other smaller companies), active, passive and semi-active tags, antennas, implementation, protocols, etc.

6. RFID readers
Reading zones, RFID types, relation to various standards, antennas, read distance tests, multiple readers, synchronization, reading environment effects, collision and anti collision protocols, RFID peripherals.

7. Testing and troubleshooting
Read rate problems, improperly tagged items, tag failure.

8. RFID system design
Antenna types, interference, antenna location and spacing, multiple antennas, multiple readers, tag types, grounding and ccnsiderations, cabling, site diagrams.

9. Security, safety and privacy

Security of RFID tags, safety, issues of privacy and access to tag information, impact on society at large, misuse, fraud.

Grading: Each student will be assigned topics (3-4 during the semester). The student then writes a report and presents it to the class, including a question and answer session. These reports will be graded. The average grade of these reports is the class grade.

Notes:

1. This is a new class. It is likely that the order as well as some of the topics will be changed to better fit in the overall scheme.
2. There are many new books on the topic, most of them non-technical. A list of those that are available in the library as well as others that are useful for overall understanding of the issues involved is provided below.
3. I am trying to put together some experiments to at least demonstrate the use of RFID. I will update you on progress in this endeavor.

Bibliography:

RFID books. The first three in the list are available in the Science library.

1. Simson Garfinkel, Beth Rosenberg, RFID : Applications, Security, and Privacy (Hardcover), Addison-Wesley Professional 2005.
2. Dominique Paret, Roderick Riesco, RFID and Contactless Smart Card Applications, John Wiley & Sons
3. Claus Heinrich, RFID and Beyond: Growing Your Business Through Real World Awareness, John Wiley & Sons
4. Steven Shepard, RFID, McGraw-Hill Professional, 2004
5. Klaus Finkenzeller, RFID Handbook : Fundamentals and Applications in Contactless Smart Cards and Identification, John Wiley & Sons 2nd edition
6. Robert Kleist, RFID Labeling: Smart Labeling Concepts & Applications for the Consumer Packaged Goods Supply Chain, Banta Book Group
7. Nahid Jilovec, EDI, UCCnet & RFID: Synchronizing the Supply Chain, 29th Street Press
8. Manish Bhuptani, Shahram Moradpour, RFID Field Guide : Deploying Radio Frequency Identification Systems, Prentice Hall PTR
9. Sandip Lahiri, RFID Sourcebook, IBM Press
10. Amal Graafstra, RFID Toys : X Cool Projects for Home, Office and Entertainment, Wiley
11. Bill Glover, Himanshu Bhatt, RFID Essentials, O'Reilly Media, Inc.
12. Anthony Furness; Ian G. Smith, RFID Compendium: The Technology and Where to Use It, Auto ID Service Providers, LTD.
13. Pete Lindstrom, Frank Thornton, RFID Security, Syngress