

Learning Course on RFID

Introduction : Radio Frequency Identification Technology (RFID in short) is the hottest new technology today, with applications ranging from car parking systems to hospitals and supply chain management. Mandates by some large retailers like Wal-Mart and other big and influential organizations like the US DoD have driven the rapid adoption of this technology, by a variety of suppliers. It is estimated that, there are today now about 3 billion RFID tags already produced this year. The number is going to go up exponentially and it is expected that 31 billion tags will be in operation by the beginning of the year 2010. This is one of the few technology areas which will have rapid adoption and usage in almost all businesses, one way or the other.

However, rapid adoption of the technology does not mean that it is widely understood.

The number of professionals who would be required to know something about this technology, vis a vis the number who actually do, is very small. This is in no small measure due to the multiplicity of vendors who tout their own technology as THE real technology. The lack of standards is another problem. There are standards of course, but their development lags behind the technology, as well as the implementation, causing lots of confusion amongst RFID implementers, as well as users of the technology.

The Course : A cursory search on the internet will reveal that most courses on RFID technology are either by vendors (or by their agents, which is the same) , are classroom based or web based. The courses are by themselves divided into several different types, with no course big enough to give an overall picture, without being too complicated.

To bridge this gap, Abhisam has come out with a comprehensive RFID course, that aims to cover the entire gamut of the technology, right from Basic concepts to Security and Privacy issues related to RFID.

The course covers six areas

- a) Basic Concepts
- b) RFID Physics
- c) Practical RFID systems
- d) Middleware and standards
- e) RFID applications
- f) Security & Privacy issues

The entire course is designed in an easy to understand manner with text, graphics and animations and without any complicated stuff.

It is said that "A picture is worth a thousand words" . This is true but we would like to take this concept further and state that " a Flash animation that shows how things work is worth a thousand pictures".

The course makes extensive use of Flash based animations, to explain how RFID and the technology which drives RFID, works.

Additionally, since Abhisam is not an RFID vendor, we give you a very generic picture of the technology, without any bias towards any one vendor or standard.

The course has the following modules.

TABLE OF CONTENTS

BASIC CONCEPTS

1. Introduction to RFID
2. A modern history of RFID
3. An Attractive technology
4. Automatic Identification
5. Bar Codes-1
6. Bar Codes-2
7. Bar Codes-3
8. Matrix Bar Code
9. Use of Automatic Identification
10. What does a bar code reveal?
11. Do bar codes follow any standards?
12. How is a UPC bar Code made up?
13. What is a tag?
14. Active, Passive & Semi-Passive Tags
15. More RFID tags
16. What does an RFID reader read?
17. How is an RFID tag different from a bar code?-1
18. How is an RFID tag different from a bar code?-2
19. How is an RFID tag different from a bar code?-3
20. RFID systems
21. Some Advantages of RFID over bar codes
22. Bar Code reader for a moving conveyor
23. RFID reader for a moving conveyor
24. Anti Counterfeiting-1
25. Anti Counterfeiting-2
26. Further advantages
27. Disadvantages of RFID
28. Summary of Basic Concepts

RFID PHYSICS

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3. Development of a wave-1
4. Development of a wave-2
5. Parts of a wave
6. Electricity & Magnetism
7. A practical experiment
8. Amperes law & Biot Savart's Law
9. Maxwell's findings
10. Electromagnetic Waves
11. The Electromagnetic Spectrum
12. An electromagnetic wave
13. A transformer
14. Basic Radio Communication
15. A radio communication system-1
16. A radio communication system-2
17. Antennas

18. Half wave dipole
19. Magnetic & Electric fields around antennas
20. Near field & Far field
21. What is Resonance?
22. A basic radio tuner
23. How does a Radio receiver work?
24. Modulation
25. Frequency Modulation
26. Digital Modulation
27. An example of Digital modulation
28. Amplitude Shift Keying
29. Frequency Shift Keying
30. Data transmission by radio

RFID SYSTEMS

1. Practical RFID systems
2. RFID Tags
3. A practical RFID system
4. RFID Tags
5. Physical Construction
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9. Classification of RFID systems
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11. Countries & Tag frequencies
12. Countries & Tag frequencies
13. Selection of frequencies
14. RFID Readers
15. RFID Antennas
16. RFID Antennas
17. Near Field & Far field readers
18. Near Field reader
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22. Electronic Article Surveillance (EAS)
23. Working of an EAS reader
24. Contactless Smart Cards
25. How do Near Field systems work?
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27. Data transfer using Load modulation
28. What is backscatter?-1
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32. Space, Frequency & Time domain anti collision
33. Singulation
34. Tree Walking protocol
35. ALOHA
36. Slotted ALOHA
37. Summary

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2. Need for Middleware-1
3. Need for Middleware-2
4. Need for Middleware-3
5. Functions of Middleware
6. What is a Savant?
7. Middleware Architecture-1
8. Middleware Architecture-2
9. EPCglobal
10. Electronic Product Code
11. What is EPCIS?
12. Object Naming Service
13. What is an EPC tag?
14. How will the system work?
15. Summary
16. Standards in RFID
17. The Air Interface Protocol
18. Standards in RFID
19. Standards laid by ISO
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RFID APPLICATIONS

1. RFID applications
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3. Pharma Supply Chain-2
4. Container tracking in a yard-1
5. Container tracking in a yard-2
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7. Hospital patient identification & tracking-2
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9. Airline baggage handling-2
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11. Summary of Applications

RFID SECURITY & PRIVACY

1. Security Issues in RFID-1
2. Security Issues in RFID-2
3. Security Issues in RFID-3
4. Security Issues in RFID-4
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6. Summary of RFID Security
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9. Privacy protection
10. Use of a blocker tag
11. Blocker tag disadvantages
12. Killing Tags
13. Faraday Cage
14. Tracking with RFID

- 15. Summary of Privacy Issues
- 16. Conclusion

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