Experimental results and EMC considerations on RFID location systems

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Experimental results and EMC considerations on RFID location systems

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1. Introduction

- RFID Active / Passive
- Readers – microprocessor based
- Tags – memories
- Multiple frequency bands
- Standardized
2. RFID Location Systems

- Inertial systems – good for outdoor applications

- Indoor locations: triangulation / scene analysis / proximity

1. Specialized infrastructure
2. Using wireless networks signals and information
3. Mixed

- Many implementations

Active Badge, Cricket, MotionStar, MSR Radar, RFID Radar, SmartFloor, SpotON
3. The RFID Radar positioning system

Catalog data:

Operating frequency: 870 MHz / 10kHz band

Max. range: 40 / 100 m

Passive / Active tags

5uW / 200uW tags

Passive TTF – Tag Talk First protocol

RS232 interface

Control software
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4. Performance evaluation based on experimental results

Indoor test setup 1
Same setup for 1,000 measurements
3 different days
4. Performance evaluation based on experimental results

Results
65 % of total
Error < 10%

Tag 1 at 5m
Tag 2 at 10 m
4. Performance evaluation based on experimental results

Indoor test setup 2

Same setup for 1,000 measurements
3 different days
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4. Performance evaluation based on experimental results

Results
35 % of total
Error < 10%

Tag 1 at 5m
Tag 2 at 10 m
4. Performance evaluation based on experimental results

Outdoor test setup 3

Same setup for 1,000 measurements
3 different days
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4. Performance evaluation based on experimental results

Results
6 % of total
Error > 10%

Tag 1 at 10 m
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5. EMC Measurements

SRM-3000 NARDA

✓ Indoor / Outdoor measurements
✓ Noise floor 10 ... 20 mV/m
✓ Frequency band 100 kHz – 3 GHz
✓ Isotropic Three-axis antenna (75 MHz – 3 GHz)
5. EMC Measurements

Central frequency = 869.89 MHz

Peak E value = 39.03 V/m

Electric field magnitude at 3m distance in front of the antenna
5. EMC Measurements

Central frequency = 869.75 MHz
Peak E value = 1.288 V/m

Electric field magnitude at 20 m distance in front of the antenna
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CONCLUSIONS

Performances

1. Performances greatly affected by interferences
2. Only 40 to 60 percent of total measurements under 10 % accuracy
3. Not suitable for high-precision applications
4. Small errors in open-areas – 93 % accuracy

EMC aspects

1. NOT suitable for indoor applications – high E field
2. Very good for long-range outdoor positioning applications

A lot of work to do in the future!
Thank you!

Questions?