Local Real-time Neural Networks-Based Learning for Tracking in an RFID Tag Field

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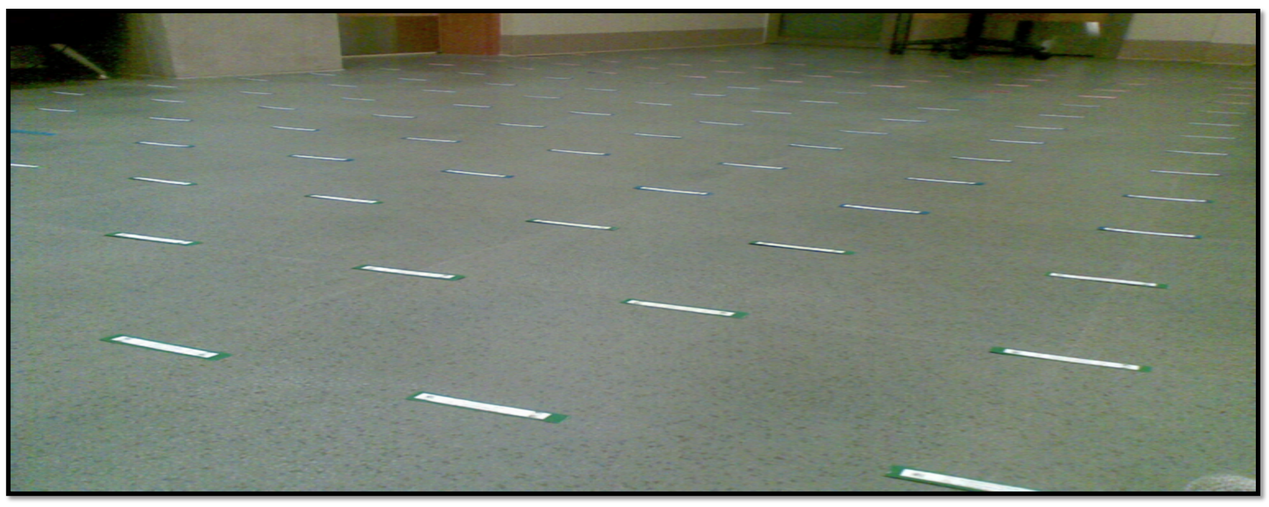
Passive RFID Tag Field

- Stationary passive RFID tags are distributed densely over a large physical space
- Tags have storage memory
- Tags can fail temporarily (or scans can be inaccurate)
- Tags can fail permanently due to environmental conditions such as weather
- Tags are cheap, and can be replaced
- System decays gracefully, according to deployment and maintenance of tags; it is robust
- Users move through the tag space with RFID interrogators
- Users read from and write to the tags by scanning them
- A user can leave a digital trail stored in tags
- A user can follow a digital trail
- Multiple trails leading to a common destination is similar to a vector field

Motorola MC9090-G RFID reader.



RFID tag field.

Siebel Center for Computer Science, University of Illinois.

Local Real-time Learning

- Small locality of *n* tags
- User enters locality at certain direction; exits at a difference direction
- Train for correct difference exit direction, relative to entrance direction
- Training based on relative scan times of tags in the locality
- Many localities pointing in the correct respective directions form a digital trail
- Training and testing can occur together, depending on implementation

Neural Network

- Three-layer neural network
- Input is relative scan times of tags
- Output is difference angle
- Weights stored inline in tags
- Use backpropagation algorithm
- A tag can belong to multiple neural networks (localities)

References

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