Documentation of Supermarket Data

1   Apparatus

- Nodes (SensorFly Boards)

    - Code: ARM + AVR
    - Function: Get Compass Reading. The main function in ARM has always been waiting for packets requring for Compass reading. Once the request packet arrives, the ARM will put current compass reading in result packet and send it out.

- Anchors (SensorFly Boards)

    - Code: AVR
    - Function: Ranging with Base, the ranging parts have been implemented already

- Base (SensorFly Boards)

    - Code: AVR
    - Function: Get Ranging Reading and Compass Reading. The AVR has always been receiving instruction packet from PC through serial port. When receiving packet for ranging, it will ranging with anchors directly; when receiving packet for compass reading, it will re-direct the packet to Node. The results of received packets (ranging and compass reading) will be printed by APLCallback() and in certain format so that the PC can recognize it later.

- Main Control (Laptop)

    - Code: Matlab
    - Function: Get Ranging Reading and Compass Reading

2   Supermarket Layout

- 3D model

- Anchor Location:

    - Node 3: 3', 40', 4'2"
    - Node 4: 30', 23', 4'6"
    - Node 5: 24', 42', 4"
    - Node 6: 3', 18', 3'8"
    - Node 7: 24', 42', 3'9"
    - Node 8: 13', 70', 5'5"
    - Node 9: 24', 42', 6'5"
    - Node 10: 13', 20', 2'11"
    - Node 11: 21', 56', 4'8"
    - Node 12: 21', 21', 4'
    - Node 13: 40', 13', 4'6"
    - Node 14: 9', -5', 3'2"
    - Node 15: 40', 56', 2'11"
    - Node 16: 32', 83', 2'10"

- Node 17: 30', 60', 2'11"
- Node 18: 51', 26', 4'10"
- Node 19: 61', 40', 6'8"
- Node 20: 66', 77', 6'9"
- Node 21: 66', 22', 4'2"
- Node 22: 51', 64', 3'8"
- Node 23: 50', 83', 2'10"
- Node 24: 61', -5', 4'
- Node 25: 81', 40', 6'11"
- Node 26: 81', 77', 6'11"
- Node 27: 75', 82', 3'9"
- Node 28: 83', 16'4", 5'
- Node 29: 81', -26', 6'4"
- Node 30: 105', 46', 6'8"
- Node 31: 105', 81', 6'8"
- Node 32: 105', 12', 6'4"

3 Purpose

- In order to test the algorithm of clustering and navigation, we collected readings of real location in a real supermarket, with people walking around, so that we can run the clustering and navigation code easily with modified algorithm easily.

4 Principle

- Signature: the reading of ranging is not accurate at all, due to

5 Data Analysis

- Clustering:
  - Generate new cluster center when the new reading cannot be clustered to any other existed cluster.
  - The pertantial problem is the location of the cluster center is generated based on the path picked randomly, and the center' location will effect the later clustering and the process of generating centers.
  - Optimization: doing re-clustering using other existed algorithm such as KMeans.
- Navigation:
  - Use Dijkstra to pick the best path

6 Result

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