Position Estimation of Nodes Moving in a Wireless Sensor Network

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Motivation

Investigate a method with reasonable accuracy but lower cost for positioning objects in indoor environments.

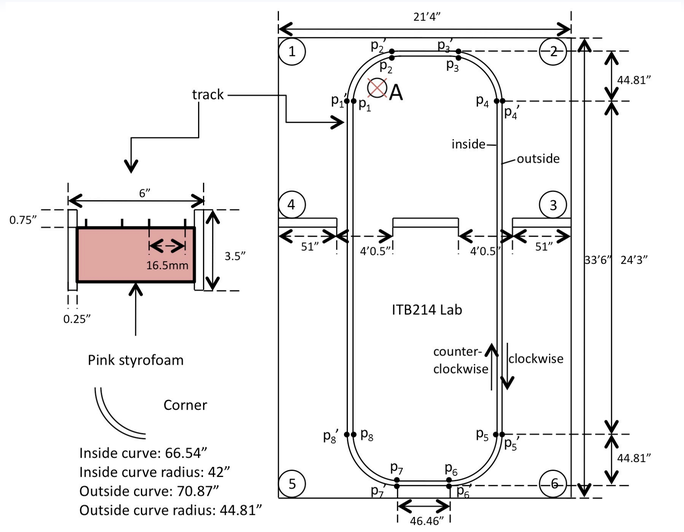
Received Signal Strength Indicator (RSSI), in dBm

- Less communication overhead – 8 bits
- Simpler and Lower cost
- Output by most single-chip transceivers
- Tradeoff with lower distance accuracy

Indoor Position Estimation

Method	Range of Use	Accuracy
Signal Strength Difference of Arrival	20m (simulated)	below 2.4m for the lower noise below 4.2m for the high noise
Angle of Arrival	30m x 30m square (simulated)	better than 2m
Received Signal Strength Indicator	30m	distance error of 10% of range
Time of Flight	30m	at worst 9m, 3m average
Time Difference of Arrival (e.g.: Cricket)	indoor area	1cm to 3cm
Ultra-Wideband (e.g.: Ubisense)	400m^2 for 4 stationary nodes	tens of centimeters
Mobile Phone Location (e.g.: My Location Indoor)	indoor area	several meters

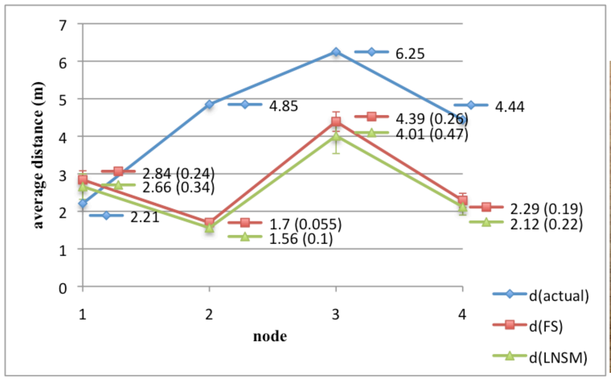
Test Platform



ITB214 Mobile Testbed

Preliminary Results

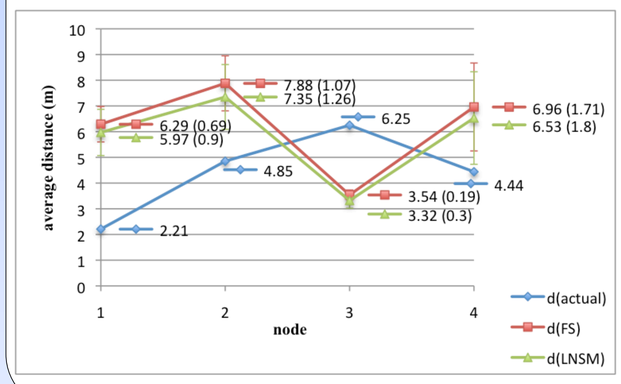
Distance to stationary node A, N = 50



TelosB, n = 2.7

FS: Free space model actual distance s = 0.05m

LNSM: Log normal shadowing model



MicaZ, n = 3.0

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Proposed Sequence Diagram