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Robomote: Sensor Actuator Platform

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www-robotics.usc.edu/~robomote

Introduction: Network friendly robot architecture

Sensor Networks with Static Deployment

- Limited Energy (Lifetime)
- Limited Capacity
- Limited Coverage and Connectivity
- Limited use of Geography of network

Mobility Assisted Sensor Networks

- Balance the energy distribution
- Increase the capacity of network
- Adaptive coverage and connectivity

Robomote

Test Bed

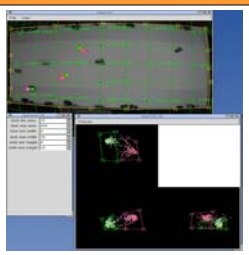
Infrastructure and Applications

Infrastructure

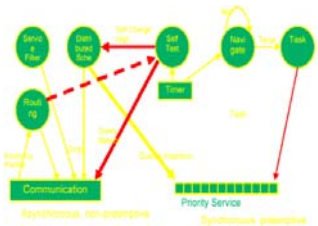
•RF Localization
•Vision based Localization
•Obstacle Avoidance
•Precise Odometry
•Compass based navigation
•Rechargeable battery

Applications

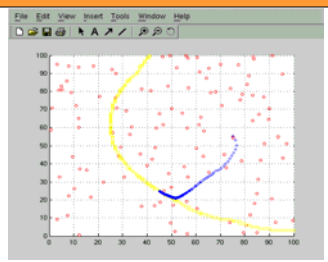
•Energy harvesting
•Actuated Boundary detection
•Network repair / Load Balancing



Vision based Ground Truth



Energy Harvesting State Machine

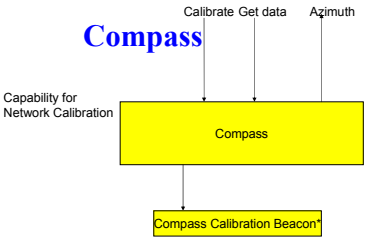


Boundary Detection

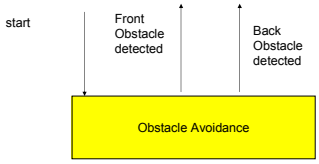
Component based software architecture

BASIC COMPONENTS

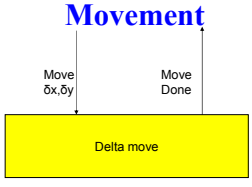
Compass



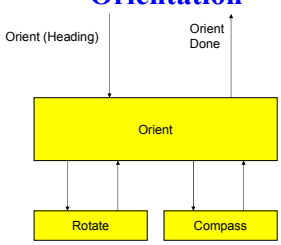
Obstacle Avoidance



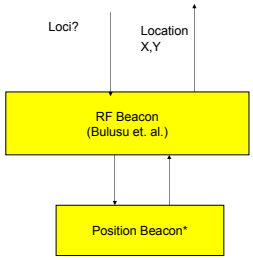
Movement



Orientation

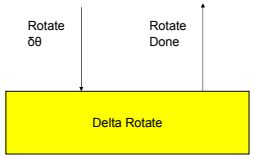


RF Localization

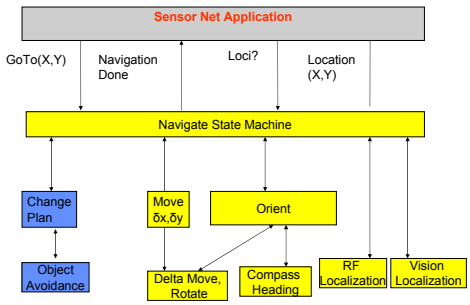


* Beacon range calibrated with auto calibration mechanism

Rotation



Sensor Network Application Interface



• Hardware Details

AVR 8 bit RISC microcontroller (Atmega 32L)

32 K Flash, 2 K Byte Ram , 1024 byte EEPROM

Max speed 15 -20 cm/Sec

Odometry 36 Pulses per cm

IR object avoidance system on front and back

Compass better than 5° precision

Max payload 300 grams

Power 345mAh

Charging Time 15-20mins wall