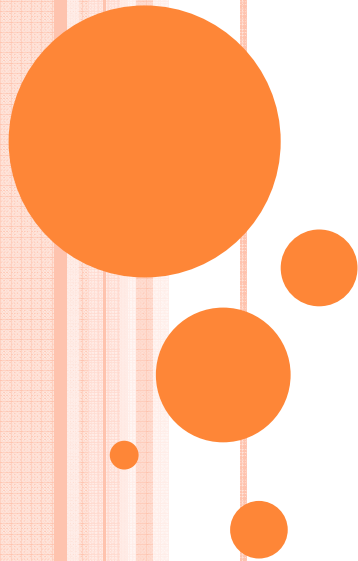


# ADAPT OR DIE!

An exercise in the role of adaptation in pervasive wireless  
sensornets

Riaz Ul Amin  
Shahriar Bijani  
Aris Valtzanos  
Marios Karagiannis  
Angelo Di Crescenzo



# OVERVIEW

- Problem Statement
- System Design
- Implementations
- Reflections on the environment
- Looking Forward



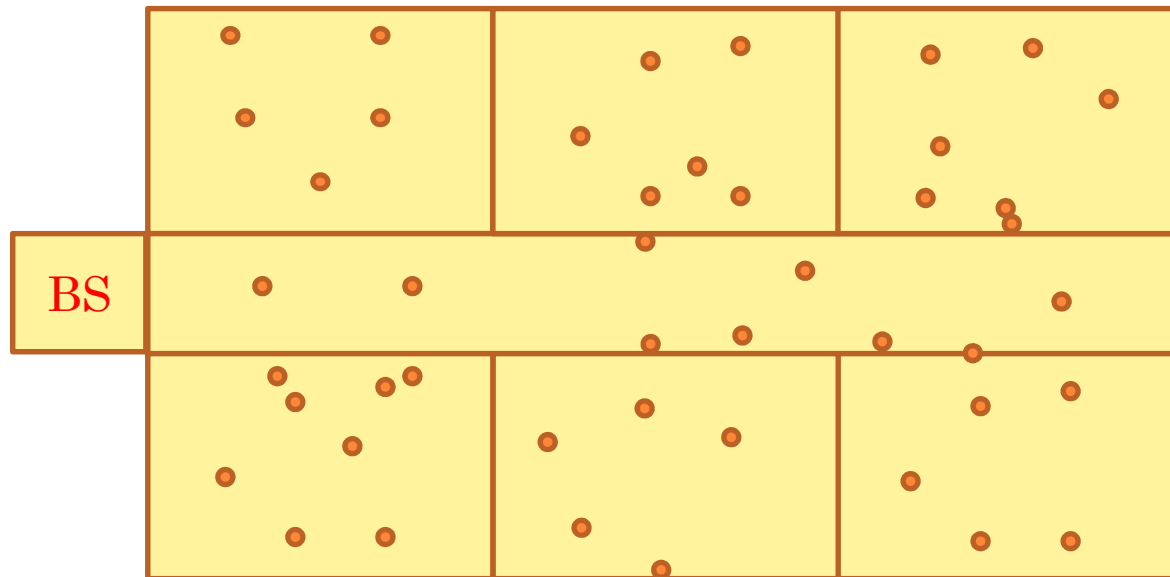
## PROBLEM STATEMENT

- Creation of fire emergency alarm system (FEAS)
- Early detection of fire
- Immediate propagation of information about fire location and severity
- 



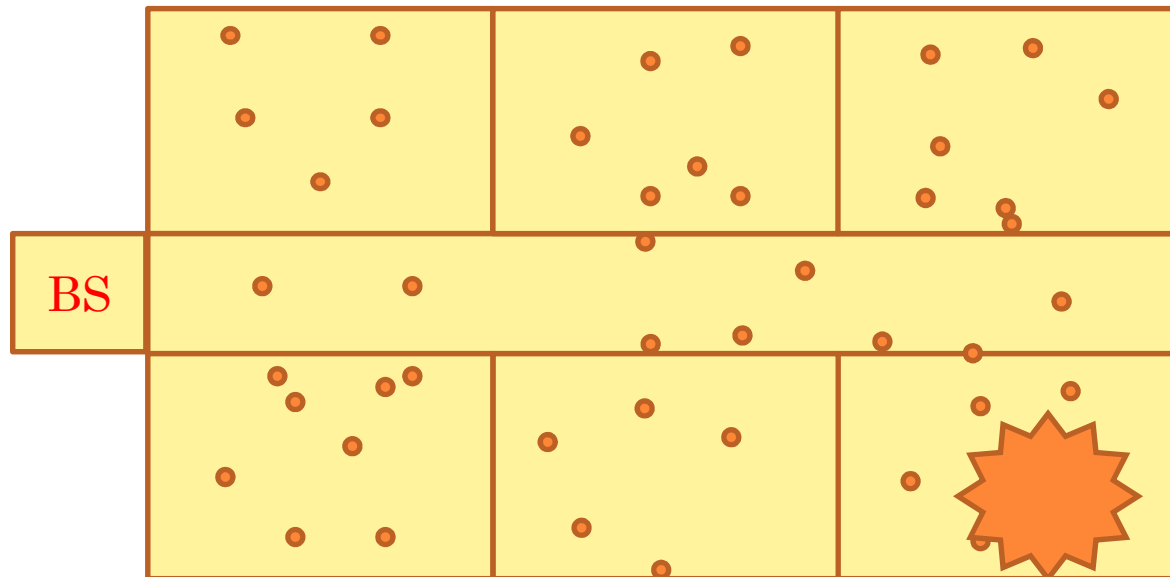
# SYSTEM DESIGN

- Deployment of the network in single floor
- Floor contains six rooms
- 



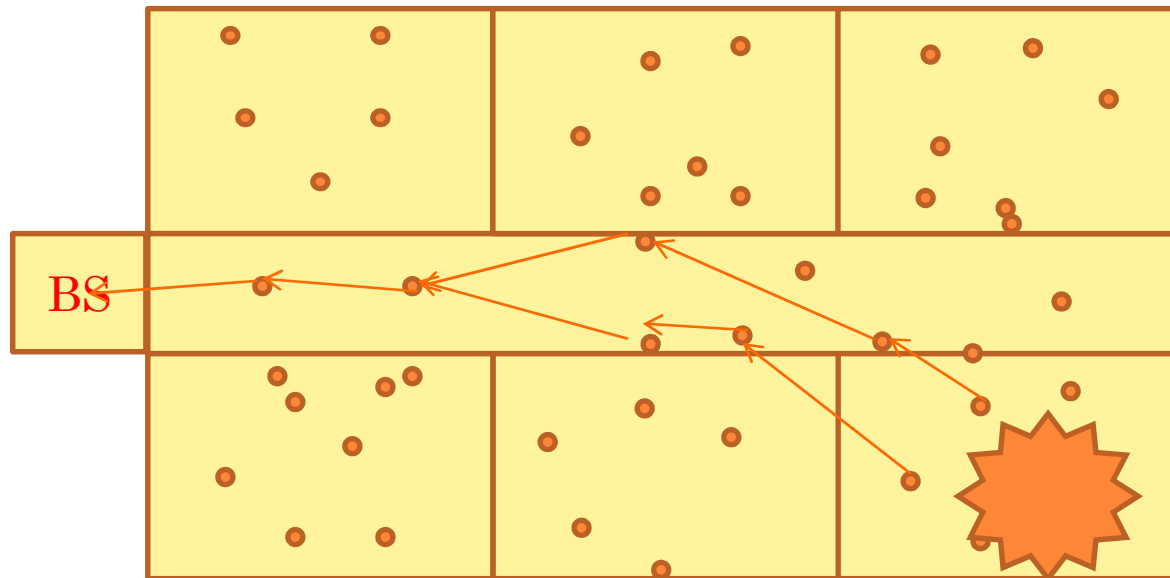
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## SYSTEM DESIGN

- During initialisation phase the base station floods the network
- Flooding is being used for static routing tree creation
- Sensors sense temperature every 1 second
- In case of fire, more intensive monitoring is provoked (higher frequency and spatial increment)
- Information about location of fire **MUST** reach the base station



# SYSTEM DESIGN

- The system must be adaptive
- Routes are being detected based on:
  - The best route according to the routing tree
  - Battery levels
- In case of node failures, the system also adapts by using a temporary random walk



# SYSTEM DESIGN

- The demo setup consists of:
  - A virtual network that lives in the SpeckSim simulator
  - An extension to this network that consists of real ENSs
  - A seamless bridge between the two networks using a SunSpot node
    - Data conversion was necessary between the simulated and real data packets



## IMPLEMENTATION ISSUES

- Due to time limitations, we were forced to limit the requirements about the capability of our system
- Because extensive coding was involved, time consuming debugging was necessary
- Becoming familiar with the API of SpeckSim as well as the ENP themselves also took time
- Compilation issues prevented the ENS from receiving packets during the first days of the project



# REFLECTION ON THE ENVIRONMENT

- SpeckSim left us very good impressions
  - Visualisation of the network is easy to customize
  - The dynamic configuration options also help a lot
  - Extending the simulation is straight forward for the most part
- The ENS uses a very similar API allowing us to port the code with relative ease
  - Timers, startup, shutdown, sensing methods use a very similar philosophy
  - The platform shows real promise!



# LOOKING FORWARD

- Integration between simulation and hardware platform can be improved
  - Same coding language
  - Code interoperability
  - Ready-to-use transparent communication
- Simulator specific
  - Bigger algorithms library
  - Adaptation specific algorithms
  - Propagation of new code
- Hardware specific
  - Over the air programming
  - Unique ID issues

