Mobile Agents Assignment

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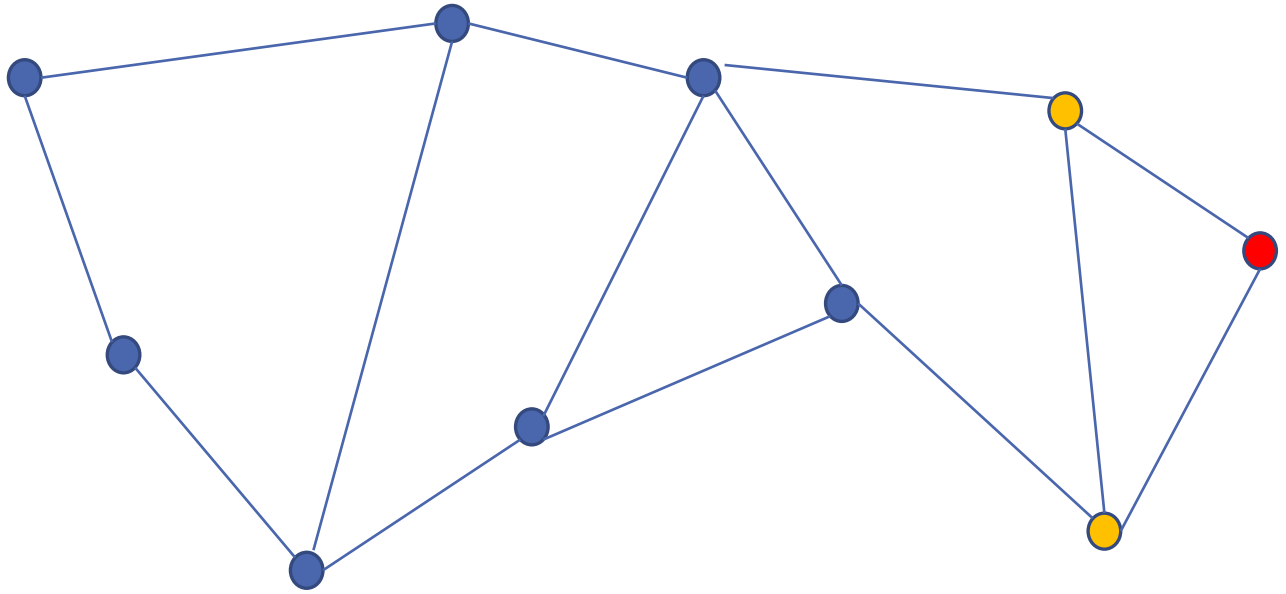
Problem Statement

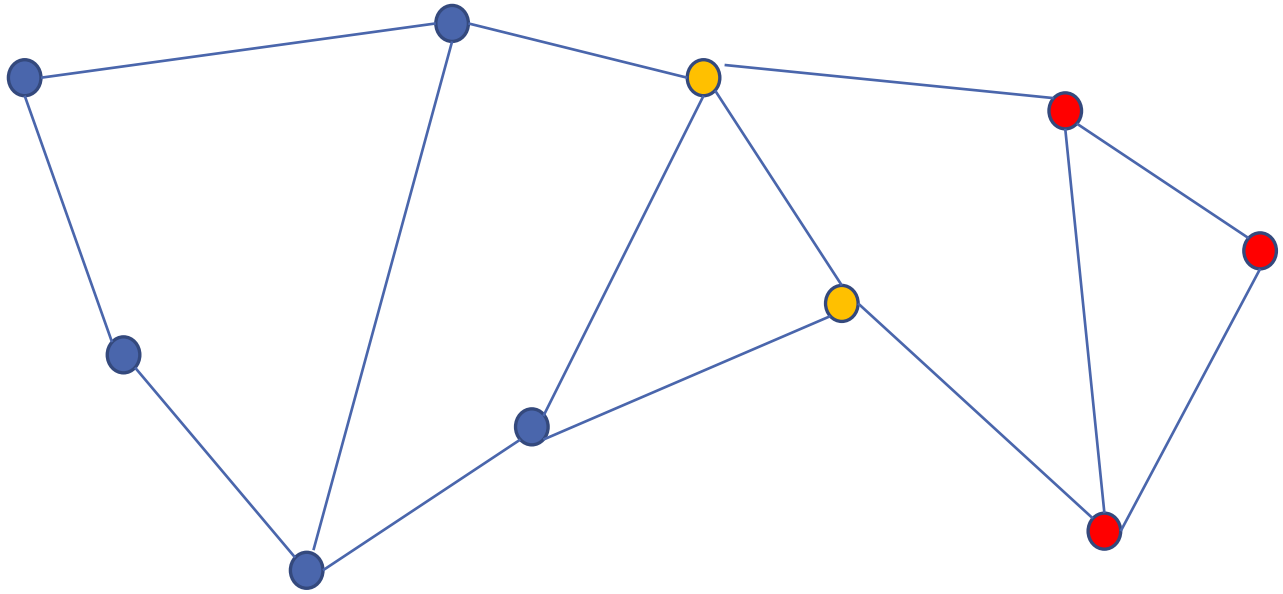
- Design, implement, and test a simulation system for a wireless sensor network application in which mobile agents discover and monitor a forest fire
- The wireless sensor network is modeled as a planar graph
  - each vertex represents a sensor, modeled as an independent concurrent thread
  - each edge in the graph denotes communication link among two sensors, modeled as object references held by the respective sensors
- Mobile agents are modeled as independent concurrent threads that can traverse the sensor network from one sensor to one of its neighbors
- Mobile agents have the ability to clone themselves
- Fire conditions are modeled as states of the sensor nodes

Sensor Network and Fire Behavior



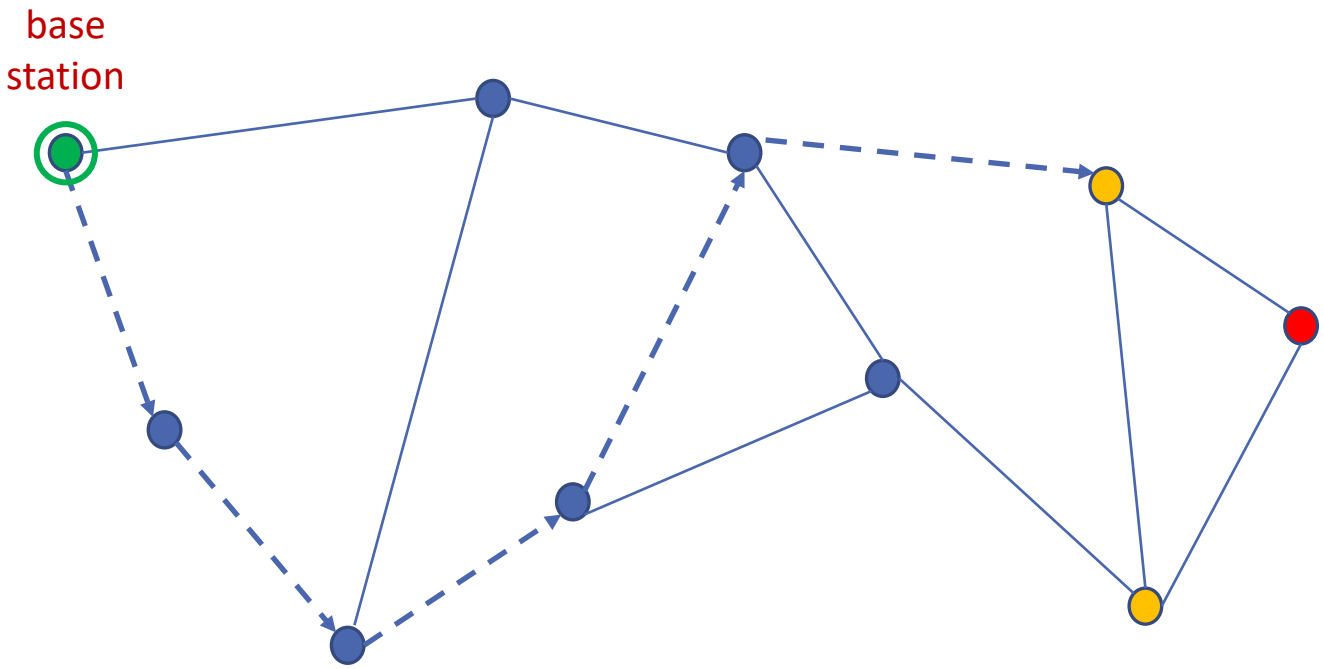
- A sensor/node can communicate only with its neighbors
- Red nodes are on fire and can no longer support agents or communication
- Orange nodes surround the destroyed red nodes and indicate proximity to the fire

Sensor Network and Fire Behavior



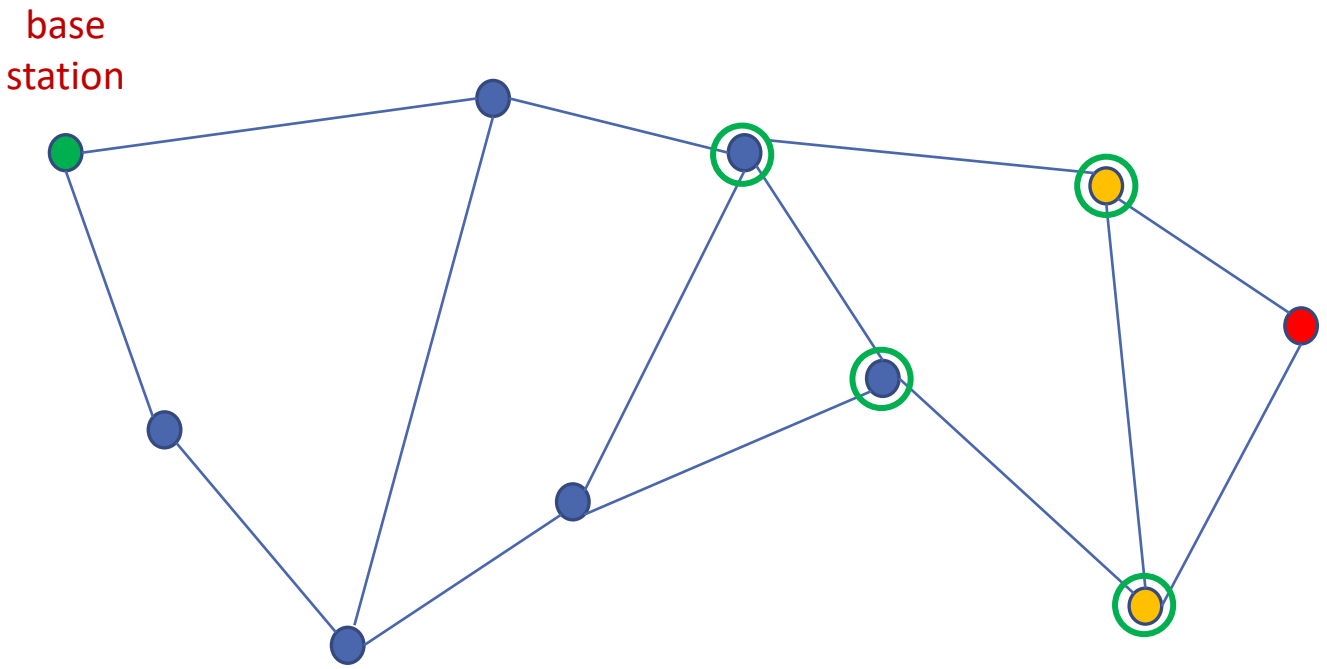
- The fire starts at one location and spreads slowly
- Orange nodes can turn red and their blue neighbors should turn yellow
- When a node turns red, it is allowed to communicate one last time with its live neighbors

Mobile Agent Behavior



- Initially, a single mobile agent is present in the system at some distance from the fire on a base station
- The mobile agent performs a random walk searching for yellow nodes

Mobile Agent Behavior



- Once a yellow node is discovered, the agent clones itself on all its yellow and blue neighbors trying to create a ring surrounding the fire
- No two agents can coexist on the same node, thus agents cannot be created on nodes that already have a local agent
- Agents communicate only with the sensor which they are visiting

Additional Requirements

- Keep a list of all the created agents at the base station
  - unique id of the agent
  - location where it was created
- It is allowed to develop a message routing structure before the first agent is created
- Do not use any global resources (e.g., static fields or methods)
- Form two-person teams
- Use an incremental development strategy