Software for Context-Aware Multi-User Systems

Fall 2011
## Course Projects

João Pedro Sousa

CS 895 / SWE 821 /SWE 795 / ECE 699
George Mason University

---

fire response team
story

- a fire is detected at a forested area with sparse buildings
- a first-response team is dispatched to check for and help evacuate remaining occupants
- dismounted first responders (FRs) carry cell phones that help them gather context and share it with other FRs
- command unit gathers context from FRs and may change mission plan and/or escape routes

1
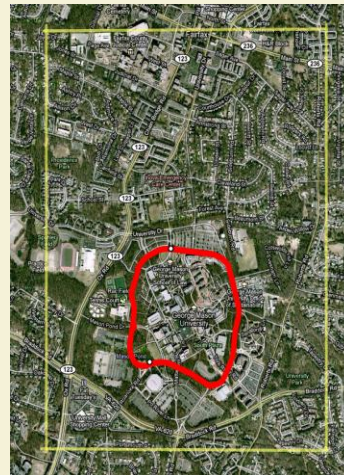
fire response team
story

- FRs input observations
    - here
    - there, e.g. 200ft in *that* direction
  - presence and severity of fire
  - status of roadways
    - current or impending blocking by fire (time estimate)
- FRs input intention/plan
  - to move
    - there, e.g. 100ft in *that* direction

- don't worry how this is input
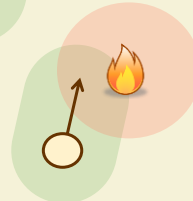 - stub it out

---

fire response team
story

- source app annotates context events
  with area of relevance

- recipient app registers area of interest
  with recipient middleware

- recipient middleware
  tags event with space-time relevance
  and makes it available to app level
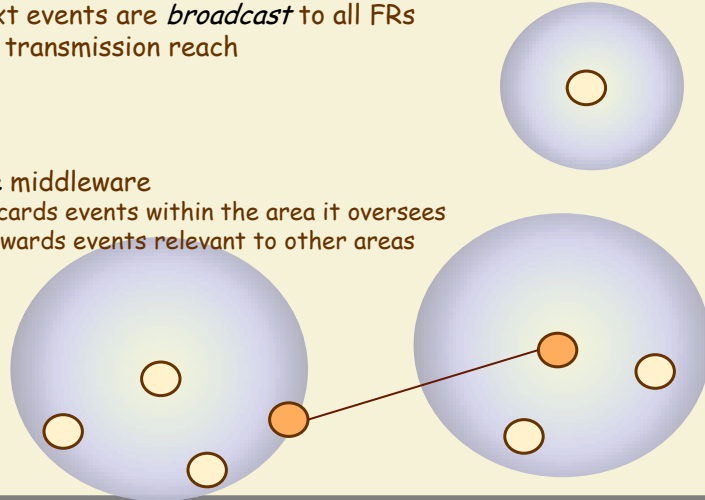
project A
context dissemination

- context events are *broadcast* to all FRs within transmission reach

- bridge middleware
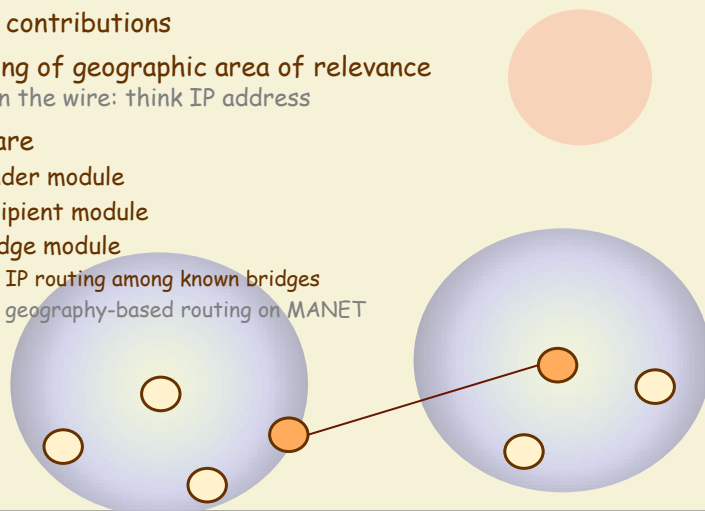 - discards events within the area it oversees
  - forwards events relevant to other areas

---

project A
context dissemination

technical contributions
- encoding of geographic area of relevance
  to go on the wire: think IP address
- software
  - sender module
  - recipient module
  - bridge module
    - IP routing among known bridges
    - geography-based routing on MANET

project B
reasoning about context

kinds of context

- environment surrounding FR
  - locations and severity of fire
  - status of roadways
    - current or impending blocking by fire (time estimate)
- mission plan & evacuation route
  - FR intention to move to different location
- FR location, activity, health indicators e.g. heart rate…
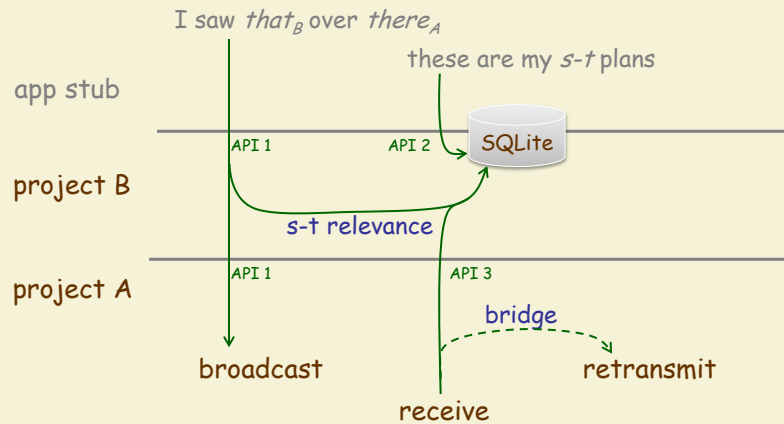- FR device status e.g. battery duration…

project B
reasoning about context

technical contributions

- encoding of contextual events
  to go on the wire: think payload, XML…
- encoding of space-time routes: mission plan, escape route
- software: relevance engine
  - determine relevance area based on current loc & routes
  - classify *relevance* & *time criticality* of incoming events

- define the APIs to receive events & routes reach the engine
  - stub it out

big picture

I saw *that$_B$* over *there$_A$*

these are my *s-t* plans

app stub

API 1   API 2   SQLite

project B

s-t relevance

project A

API 1   API 3

bridge

broadcast   receive   retransmit

next steps

- form group ~2 people for either project
  - indicate project preference by Saturday, Sept 17
    - if ≠ A | B, email a 2-page topic description
  - topics confirmed by Sunday, Sept 18

- present system design Sept 28
  - problem description
  - high-level logic of each component
  - APIs and content & format of interactions
  - turn in **report** for detailed feedback by instructor