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AH

Additional Topics Q1 2002

You are required to design a Sentient Computing System using Active Bats to locate people and physical objects

Indicate how you would model the environment and represent space in your architecture [8]

Show how you would use the tracked objects' dynamics to process and filter incoming location data [8]

Discuss the feasibility of a spatial monitor that generates events in terms of geometric containment and overlapping [4]

Model the real world using software objects
Each object can be a Corba object with its persistent state stored in a database
The model schema can contain many interface types
The world model can handle all system-level issues such as sessions, events, persistence,transactions
Thus applications can control the environment and query its state
Space can be represented in 3D or 2D
2D is probably sufficient
2D spaces can be represented as geometrically defined areas
B-tree encoding is attractive as spatial computations can be carried to the appropriate granularity

If two bats are attached to a fixed object its orientation can be determined
If a person is wearing a bat then shadowing of receivers can be used to determine orientation
Big jumps or accelerations can be considered errors and filtered out (ie discarded)
Erroneous small jumps and accelerations cannot be distinguished from correct sightings
However sightings which only change by a few centimetres can be filtered out to reduce computational load
Objects near a moving object can start to be located more frequently just in case they start moving
It may be possible to use the 3D height information to determine if people are standing or sitting

A spatial monitor is feasible but scalability has to be considered
Use B-trees to represent the 2D geometric zones around each object
Let applications register the granularity of geometric computation they require
Now compute containment and overlapping events as physical objects move