

COMBINATORICS
SEMINAR

Sentry Selection

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Abstract: Suppose we have a collection of sensors in a large region, each of which can detect events within a disk of radius 1. We wish to devise a schedule so that each sensor can sleep for much of the time, while making sure that the whole region is covered by the sensors that are awake. A natural way of doing this is to partition the sensors into k subsets, each subset of sensors covering the whole region. Then in time slot t we activate all the sensors in subset $(t \bmod k)$. If this is possible we say the sensors are k -partitionable. An obvious necessary condition is that each point in the region is covered by at least k sensors (k -coverage), but this is not in general sufficient. We show that for random deployments of sensors k -coverage usually implies k -partitionability, and identify the most likely obstructions to k -partitionability when this fails. This leads to some natural unsolved problems involving k -partitionability of (deterministic) configurations of disks. This is joint work with B. Bollobas, A. Sarkar, and M. Walters.

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