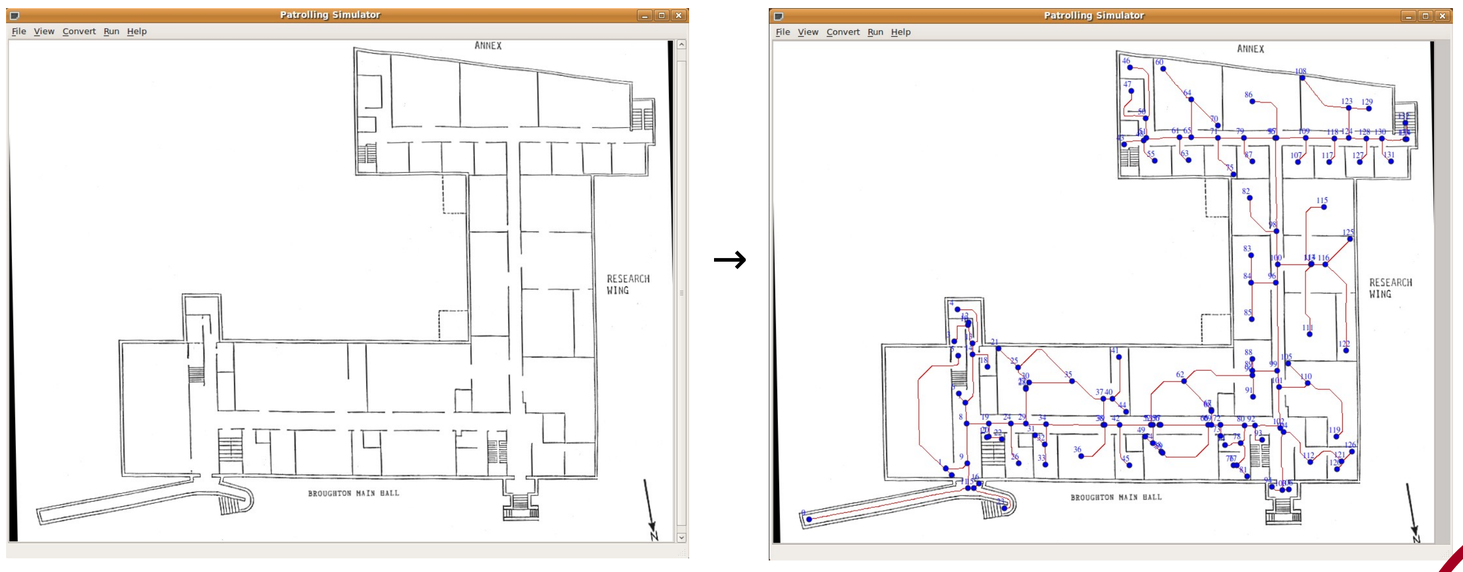
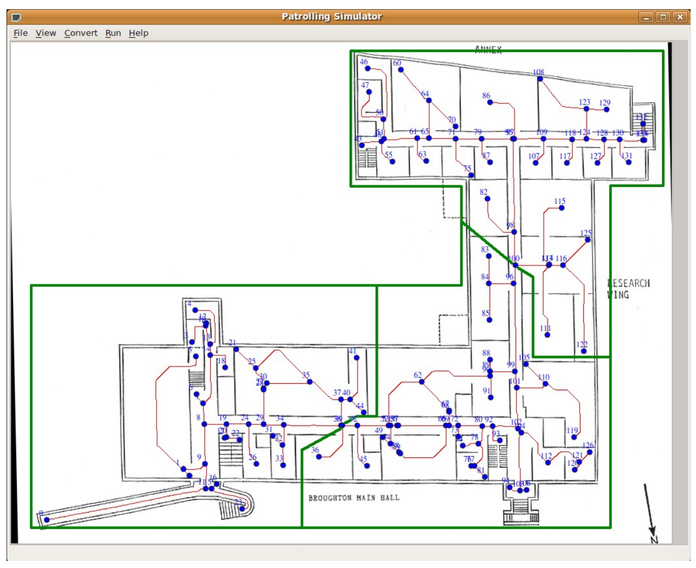
RoboCops: A Study of Coordination Algorithms for Autonomous Mobile Robots in Patrolling Missions

Acquiring the Graph



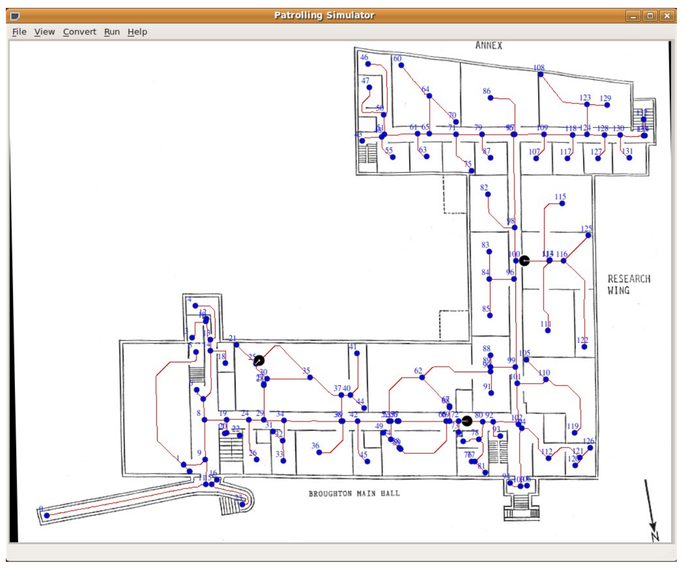
Stage One:
Obtaining a Topological Graph-Like Map from a regular greyscale image (modelled as an occupancy grid).

MSP Algorithm – Partitioning Phase



Stage Two:
Partitioning of the topological map into patrolling regions. (e.g. 3 regions)

MSP Algorithm – Local Patrolling Phase



Stage Three:
Each region is assigned to a different mobile robot for local patrolling.

Properties

- Simple, robust, distributed, effective and scalable;
- No redundant patrolling work;
- Easy to implement fault-tolerance and collision avoidance mechanisms;
- No need for communicating systems and expensive sensors;
- Difficult for evaders to predict good areas for intrusion;
- Local patrolling based on Euler and Hamilton paths and circuits, as well as longest paths and non-Hamilton cycles as alternative.

Objectives

- Survey of different existent patrolling strategies with teams of mobile robots;
- Development of a new algorithm, based on both partitioning and cyclic strategies, named MSP (Multilevel Subgraph Patrolling) Algorithm;
- Implementation of a Patrolling Simulator for testing and validation of the MSP strategy.

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