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Cooperative Mobile Robots Simulation Engine for the Neko Distributed Systems Prototyping Framework

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Keywords: cooperative mobile robots simulator, distributed algorithm on mobile robots, communication-based cooperating robot groups, rapid prototyping tool, computational geometry.

Programming groups of robots and ensuring their proper interactions and coordination is extremely complex and still poorly understood. The difficulty of developing robots system is due to two major factors: First, there is little control on the environment and real-world experiments are too costly (e.g., simulating earthquake environment for rescue robots). Second, there is little programmatic support for development and reuse of specialized software components and protocols, which make development of robots system become time-consuming and difficult to maintain. Hence, there is a strong need for prototyping tools as support for both research and application development.

Simulator for robots or distributed system is not a new study field. Currently a great number of them are existing. We can separated those simulators in to two groups. First group, Robot simulator, most of them provide

simulation environment for robot movement and sensor network system in 2D or 3D graphical animation. However, their main concern is only about robots motions. As a result, Implementation of communication mechanism is very difficult and time-consuming. Second group, Network simulator. These simulator allow us to do the simulation of communication on network and help us research in many things such as, message delay or the bottom neck of network. Even though some of them provide support for mobile ad-hoc network, it is still difficult to fully implement mobile robots application on them. In order to evaluate a simulation of distributed algorithm on mobile robots application, we need a simulator that fully support both of mobility and communication.

This has became an inspiration to my research. It was a starting point of the idea to present a new rapid prototyping tool for evaluating distributed algorithm on cooperative mobile robots system.