

RYERSON UNIVERSITY
DEPARTMENT OF MATHEMATICS
GRAPHS AT RYERSON (G@R) SEMINAR

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Date: Monday, May 1, 2017

Time: 10am

Location: ENG 210

Search-and-Fetch with 2 Robots on a Disk

Abstract:

We initiate the study of a new problem on *searching and fetching* in a distributed environment concerning *treasure-evacuation* from a unit disk. A treasure and an exit are located at unknown positions on the perimeter of a disk and at known arc distance. A team of two robots start from the center of the disk, and their goal is to fetch the treasure to the exit. At any time the robots can move anywhere they choose on the disk, independently of each other, with the same speed. A robot detects an interesting point (treasure or exit) only if it passes over the exact location of that point. We are interested in designing distributed algorithms that minimize the worst-case treasure-evacuation time, i.e. the time it takes for the treasure to be discovered and brought (fetched) to the exit by any of the robots. The communication protocol between the robots is either *wireless*, where information is shared at any time, or *face-to-face* (i.e. non-wireless), where information can be shared only if the robots meet. For both models we obtain upper bounds for fetching the treasure to the exit. Our main technical contribution pertains to the face-to-face model. More specifically, we demonstrate how robots can exchange information without meeting, effectively achieving a highly efficient treasure-evacuation protocol which is minimally affected by the lack of distant communication. Finally, we complement our positive results above by providing a lower bound in the face-to-face model.

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