

## Abstract

We consider a group of autonomous robots that is deployed to an unknown terrain. There is no central control and the robots have to organize themselves. The central challenge is that each robot senses only its direct neighborhood and is only able to communicate with robots in its direct neighborhood. This leads to many algorithmic challenges. In this thesis we study, how task assignment problems can be solved in such a scenario, such that despite the locality constraints provable globally good solution are computed. In the first part of the thesis robots are assigned to treasures that are found in the terrain. In the second part of the thesis, roles within the robot team are dynamically assigned to robots. Those assignments have to be changed over time, since the robots move. In both parts, lower bounds are shown, as well as local approximation algorithms are described and analyzed.