Geographic Routing with Context-awareness for Sensor Networks

Jiaxi You, Dominik Lieckfeldt, and Dirk Timmermann
Institute of Applied Microelectronics and Computer Engineering
University of Rostock, 18119 Rostock, Germany
{jiaxi.you|dominik.lieckfeldt|dirk.timmermann}@uni-rostock.de

Abstract – Sensor networks offer a promising way to solve important issues in life science automation, like detecting hazardous conditions or monitoring environmental parameters with low maintenance and installation effort. In life science automation, sensors will most likely be deployed indoors and therefore the presence of obstacles, node failure, traffic jams, etc has to be considered. As a result, the relatively high complexity of sensor deployment results in communication failure even between sensors which are within transmission range. Despite their desirable high efficiency, geographic routing algorithms have to be optimized to be applicable in these kinds of scenarios. Besides, energy consumption, scalability and routing efficiency are also key design challenges for geographic routing in sensor networks.

In this work, we propose a novel routing algorithm based on hole-detecting techniques for sensor networks. Because of the growing scale of modern sensor networks, routing algorithms based on global knowledge are becoming impractical due to their storage requirements on sensor nodes. Our approach locally sets up detour paths to bypass almost all kinds of convex and concave communication holes. Furthermore, by propagating the contour of holes among limited number of nodes, alternative detour paths are established when necessary. According to various context information of a sensor network, such as the size of holes, or the residual energy of nodes, different detour paths can be used to achieve optimal routing paths or load balance of the network.