The existence of a coordinate system can often improve the routing in a wireless sensor network. While most coordinate systems correspond to the geometrical or geographical coordinates, in recent years researchers had proposed the use of virtual coordinates. Virtual coordinates depend only on the topology of the network as defined by the connectivity of the nodes, without requiring geographical information.

The work in this thesis extends the use of virtual coordinates to scenarios where the wireless sensor network has a mobile sink. One reason to use a mobile sink is to distribute the energy consumption more evenly among the sensor nodes and thus extend the life-time of the network. We developed two algorithms, MS-DVCR and CU-DVCR which perform routing towards a mobile sink using virtual coordinates. In contrast to the baseline virtual coordinate routing, MS-DVCR limits routing updates triggered by the sink movement to a local area around the sink. In contrast, CU-DVCR limits the route updates to a circular area on the boundary of the local area. We describe the design justification and the implementation of these algorithms. Using a set of experimental studies, we show that MS-DVCR and CU-DVCR achieve a lower energy consumption compared to the baseline virtual coordinate routing without any noticeable impact on routing performance. In addition, CU-DVCR provides a lower energy consumption than MS-DVCR for the case of a fast moving sink.