LOCALIZATION OF WIRELESS SENSOR NETWORKS USING MULTIDIMENSIONAL SCALING

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ABSTRACT

Wireless sensor networks found their way into a broad variety of applications including industrial automation, medical applications, highway monitoring, habitat monitoring, military applications, environmental applications, etc. All these applications require thousands of nodes deployed for sensing and controlling. Recent advances in internet, communications, information technologies, and sensor design made these applications possible and the design of cheap low power nodes using MEMS help envision all potential applications.

All these applications require knowing the locations of nodes, thus demanding a localization algorithm that is less complex in terms of computations, communication overhead and increasing the overall lifetime of the network with low life-cycle costs. In this thesis we give details of a simple mathematical technique, classical multidimensional scaling and how it solves the localization problem. This so called MDS-MAP algorithm is able to find the relative positions of nodes and with few anchor nodes available derives or maps the relative coordinates to absolute coordinates. In support we present simulation results of the MDS-MAP algorithm on three different topologies. All the simulations are carried out in MATLAB.