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jWebDust: A Java-based Generic Application Environment for Wireless Sensor Networks

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Abstract. Wireless sensor networks can be very useful in applications that require the detection of crucial events, in physical environments subjected to critical conditions, and the propagation of data reporting their realization to a control center. In this paper we propose jWebDust, a generic and modular application environment for developing and managing applications that are based on wireless sensor networks. Our software architecture provides a range of services that allow to create customized applications with minimum implementation effort that are easy to administrate. We move beyond the “networking-centric” view of sensor network research and focus on how the end user (administrator, control center supervisor, etc.) will visualize and interact with the system. We here present its open architecture, the most important design decisions, and discuss its distinct features and functionalities. jWebDust allows heterogeneous components to interoperate (real world sensor networks will rarely be homogeneous) and allows the integrated management and control of multiple such networks by also defining web-based mechanisms to visualize the network state, the results of queries, and a means to inject queries in the network. The architecture also illustrates how existing protocols for various services can interoperate in a bigger framework - such as the tree construction, query routing, etc.

1 Introduction

Wireless sensor networks are very large collections of small in size, low-power, low-cost sensor devices that collect and disseminate quite detailed information about the physical environment. Large numbers of sensor devices can be deployed in areas of interest (such as inaccessible terrains or disaster places) and use self-organization and collaborative methods to form a sensor network. The flexibility, fault tolerance, high sensing fidelity, low-cost and rapid deployment characteristics of sensor networks help to create many new and exciting application areas for remote sensing.

This wide range of applications is based on the use of various sensor types (i.e. thermal, visual, seismic, acoustic, radar, magnetic, etc.) in order to monitor a wide variety of

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