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THESIS

IMPLEMENTING REMOTE IMAGE CAPTURE/CONTROL IN A WIRELESS SENSOR NETWORK UTILIZING THE IEEE 802.15.4 STANDARD

by

Daniel E. Krehling

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Thesis Co-Advisors: John Gibson Gurminder Singh

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Today's warfighter requires an in-depth view of the battle space in order to best plan for future operations, assess the current operating environment, and prevent Implementing Remote Image Capture/Control in a Wireless Sensor Network Utilizing the IEEE 802.15.4 Standard or respond to attacks. The deployment and use of wireless sensor devices could serve as a force multiplier by enhancing a commander's security posture, providing a view of the current environment, and gathering Implementing Remote Image Capture/Control in a Wireless Sensor Network Utilizing the IEEE 802.15.4 Standard intelligence for analysis. The use of low-power imaging devices, coupled with the flexibility provided by a wireless sensor network, could provide such enhancements.

The objective of this research was to explore the feasibility of remote management and control of a low-power/low-cost wireless sensor network by implementing a point-to-point wireless network utilizing IEEE 802.15.4 equipped devices to control, capture, and transfer image data from a remote sensor node to the controlling host. This platform was used to test the viability of the system at various ranges and operating environments. The results demonstrated that the IEEE 802.15.4 compliant devices used in this research are able to operate over long distances (1000 meters), in harsh RF environments, with a high degree of reliability.

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Daniel E. Krehling

Captain, United States Marine Corps Implementing Remote Image Capture/Control in a

Wireless Sensor Network Utilizing the IEEE 802.15.4 Standard B.S., University of South Alabama, 2001

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Author: Daniel E. Krehling

Approved by: John Gibson Thesis Co-Advisor

Gurminder Singh Thesis Co-Advisor

Peter Denning

Chairman, Department of Computer Science iii

ABSTRACT

Today's warfighter requires an in-depth view of the battle space Implementing Remote Image Capture/Control in a Wireless Sensor Network Utilizing the IEEE 802.15.4 Standard in order to best plan for future operations, assess the current operating environment, and prevent or respond to attacks. The deployment and use of wireless sensor devices could Implementing Remote Image Capture/Control in a Wireless Sensor Network Utilizing the IEEE 802.15.4 Standard serve as a force multiplier by enhancing a commander's security posture, providing a view of the current environment, and gathering intelligence for analysis. The use of low-power imaging devices, coupled with the flexibility provided by a wireless sensor network, could provide such enhancements.

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I. INTRODUCTION

A. MOTIVATION

The past decade has seen an explosion in the research, development, and deployment of devices for use in wireless sensor networks (WSN). In the February 2003 edition of Technology Review, WSNs were listed as one of the top ten emerging technologies poised to dramatically influence the field of computing [1]. These networks include both the sensors that Implementing Remote Image Capture/Control in a Wireless Sensor Network Utilizing the IEEE 802.15.4 Standard detect aspects of the physical environment, as well as the devices that perform the routing of the captured information in the network to the desired destination. WSNs have been around for many years, however, renewed interest has resulted from the popularity of wireless local area networks and their underlying technologies, such as 802.11(a), Implementing Remote Image Capture/Control in a Wireless Sensor Network Utilizing the IEEE 802.15.4 Standard (b), and (g). Advances in integrated circuit design and microprocessor technologies, along with advanced routing algorithms and low-power operation, have propelled WSNs into the twenty-first century. These devices are quickly becoming a ubiquitous part of our environment as the cost and power requirements continue to fall and the processing and overall functionality continue to rise. WSNs can be found in a myriad of places, including industrial and home automation, workplace safety, consumer electronics, healthcare monitoring, agricultural control, and military applications [2].

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