Interactive Stress Analysis for CAD Models via Machine Learning

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1 INTRODUCTION

As a new technology, Wireless Sensor Networks (WSNs) has a wide range of applications [Schulz et al. 2017], including environment monitoring, smart buildings, medical care, industrial and military applications. Among them, a recent trend is to develop commercial sensor networks that require pervasive sensing of both environment and human beings, for example, assisted living [Chen et al. 2016] and smart homes [**???**].

> "For these applications, sensor devices are incorporated into human cloths [**????**] for monitoring health related information like EKG readings, fall detection, and voice recognition".

While collecting all these multimedia information [**?**] requires a high network throughput, off-the-shelf sensor devices only provide very limited bandwidth in a single channel: 19.2 Kbps in MICA2 [**?**] and 250 Kbps in MICAz.

In this article, we propose MMSN, abbreviation for Multifrequency Media access control for wireless Sensor Networks. The main contributions of this work can be summarized as follows.

- To the best of our knowledge, the MMSN protocol is the first multifrequency MAC protocol especially designed for WSNs, in which each device is equipped with a single radio transceiver and the MAC layer packet size is very small.
- Instead of using pairwise RTS/CTS frequency negotiation [**????**], we propose lightweight frequency assignments, which are good choices for many deployed comparatively static WSNs.
- We develop new toggle transmission and snooping techniques to enable a single radio transceiver in a sensor device to achieve scalable performance, avoiding the nonscalable "one control channel + multiple data channels" design [**?**].

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2 PREVIOUS WORK

2.1 Frequency Assignment

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We propose a suboptimal distribution to be used by each node, which is easy to compute and does not depend on the number of competing nodes. A natural candidate is an increasing geometric sequence, in which

$$P(t) = \frac{b^{\frac{t+1}{T+1}} - b^{\frac{t}{T+1}}}{b-1}, \tag{1}$$

where $t = 0, \ldots, T$, and b is a number greater than 1.

In our algorithm, we use the suboptimal approach for simplicity and

2.1.1 *Exclusive Frequency Assignment.*

In exclusive frequency assignment, nodes first exchange their IDs among two communication hops so that each node knows its two-hop neighbors' IDs. In the second broadcast, each node beacons all neighbors' IDs it has collected during the first broadcast period.

Eavesdropping. Even though the even selection scheme leads to even sharing of available frequencies among any two-hop neighborhood, it involves a number of two-hop broadcasts. To reduce the communication cost, we propose a lightweight eavesdropping scheme.

3 PROPOSED SOLUTION

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4 EXPECTED RESULTS

Winning

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