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Interactive Museum project

Mote network ranging capabilities

TEST REPORT

DSD – Distributed Software Development Course

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Introduction

The goal of the test was to determine if the mica2 motes can satisfy the Interactive museum dynamic mote requirements. In this document, brief overview of mote range testing is given: test environment, test description, conditions in which the test was conducted, test results and result comments. Finally, we conclude the document, give some thoughts on further work and references to the web sites and documents.

Test environment

TinyOS library and OS 1.1.0-1, test client application written in Java

Description

Base mote attached to the computer. Remote mote application provides some basic over-the-air control of the CC1000 RF transciever (found in mica2 mote) through CC1000Control interface.
Every second, mote broadcasts "I'm alive" message. On PC side, client testing application gathers any received message and allows user to obtain and change current amplification level.

NOTE: mica2 motes had standard antenna attached. Radio line between remote mote and base mote wasn't obstructed by any obstacle.

Conditions

- overall: *room conditions*
- temperature: *21 °C*
- air pressure: *1017 hPa*
- relative air humidity: *51%*

Results

Minimum range of the mica2 motes: *0.40 - 0.50 m.*
Next possible range: *3.30 - 3.90 m.*

Comments

Radio range of the motes is controlled by changing the output power of the C1000 transciever.
Output power ranges from -20 to +10 dBm, and can be changed in 1dBm steps. Next possible range (3.30 - 3.90 m) was reached at -19 dBm output power while increasing power to -18 dBm resulted in too big range. Value of that range is undetermined at this point, but is larger than 8 meters, which isn't feasible for our application testing in small computer labs. Of course, mote battery has also impact on radio range at given output power.

Conclusion

While it would be better that there is more finer granularity of output power ajusment (so that is possible to adjust the range to cca. 2 meters), achived range will also be satisfactory. So, mica2 motes can in Interactive museum project assume dynamic mote role.

Further work

There is also an option of removing external antenna from the mica2, and conduct range testing again.This action will decrease mote radio capabilities for sure, and the consequence will be achievement of somewhat finer range tuning. But, removing antenna could cause physical damage to the hardware, so permission of the customer is required.

References

http://www.tinyos.net

http://www.chipcon.com/files/CC1000_Data_Sheet_2_3.pdf

Interactive museum design description