Contiki Course Paper Instructions

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1 Introduction

In laboratory part of this course, you will do two things: build a system with Contiki and write a short paper that presents measurements of your system. The purpose is to get experience both with building systems with Contiki and with getting experimental data from Contiki.

The paper should *not* be a project report, i.e., you should not describe what you did and in what order you did it. Rather, your paper should present the results of the system you develop as part of your project.

The papers are two-page abstracts that should be of sufficient quality to be possible to submit as a poster or demo abstract at a high-quality conference such as ACM SenSys or IEEE/ACM IPSN.

You must use the poster abstract template from ACM SenSys 2007: http://www.sics.se/~adam/sensys-templates/

You may use either LaTeX or Microsoft Word to write your paper. Papers written in LaTeX usually look better.

You must use the paper structure below. This is the paper structure used by most (good) papers in the computer systems community.

2 Paper Structure

The paper must follow the following structure:

Abstract

The abstract should contain exactly four sentences:

- First sentence: state the problem.
- Second sentence: describe why this is a problem.
- Third sentence: state your solution.
- Fourth sentence: state the primary result.

Example: Power-saving MAC protocols for sensor networks are typically designed for general purpose workloads and not specifically for data collection workloads. This may increase the power consumption for data collection networks. We present a power-saving MAC protocol that leverages the traffic patterns in a data collection network. We show that our protocol reduces power consumption with 35% compared to the general-purpose X-MAC protocol.

Introduction

The introduction should contain exactly three paragraphs:

- First paragraph: Introduction to the problem and problem statement. This is a longer version of the two first sentences in the abstract.
- Second paragraph: State alternative solutions, with references.
- Third paragraph: "The contributions of this paper are" (describe your solution and the summarize the results). *Note:* in general, the system itself is not a contribution; the measured results from the system are the contribution.

Design

The design section presents the design of your system, and may include a paragraph about implementation details.

Evaluation

The evaluation section presents the measured performance (throughput, energy, power, ...) of your system.

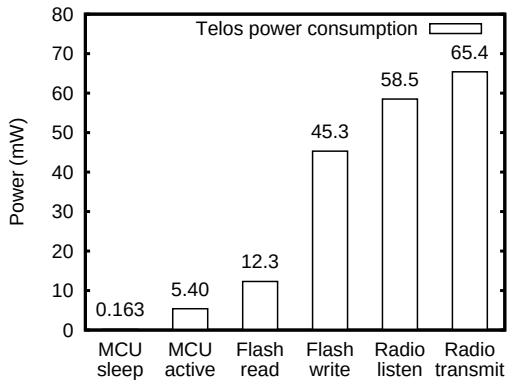

Figure 1: An example figure.

The weight of your paper should be in the evaluation; a good rule-of-thumb is that the evaluation section should be roughly half of the paper. You may use subsections with names such as "Throughput", "Power Consumption", or "Delay".

The evaluation section must contain at least one figure or table that presents a measurement of your system. Figure 1 shows an example figure.

Conclusions

The conclusions consist of one or two sentences that conclude the paper by stating how the problem is solved and that restate the primary result.

Example: We present a power-saving MAC protocol that leverages data collection traffic patterns to reduce the power consumption of the sensor network. Our protocol reduces power consumption with 35% compared

References

References should be given in standard format (bibtex plain style).

3 Measurements and Comparison

You need to provide some form of quantitative performance measurements of your system for your paper. These performance measurements is placed in the evaluation section.

Examples of measures are power consumption, throughput, delay, packet loss, number of packet transmissions, and execution speed. Power consumption is almost always important in sensor networks, and you can use the Contiki power profiling mechanism (energest) [1, 2] to get power consumption data.

If possible, you should also compare your performance data with that of an existing system. Ideally, you should compare the performance of your system with that of a state-of-the-art system. For this paper you can compare with existing Contiki mechanisms, such as the protocols in the Rime stack, or the X-MAC protocol.

You should present your measured data as a graph in a figure. You may use a table to present your results, but a graph is almost always better.

4 Styleguide

4.1 Use the Present Tense

Good "To evaluate the system, we run the system in a deployed network and measure its performance."

Bad "We have evaluated the system by ..." or "We will evaluate the system by ..."

4.2 Use the Active Form

Good "We present our system, ...", "We believe that ..."

Bad "A system is presented ...", "It is the opinion of the authors that ..."

4.3 Keep Paragraphs Together

Paragraphs consist of a leading sentence and a set of backing sentences. The leading sentence is typically a statement that summarizes the whole paragraph. The backing sentences support the statement made in the leading sentence. The backing sentences may also add additional information that is not crucial to the statement made in the leading paragraph. As an example, this paragraph follows this structure.

4.4 Use Strong, To-the-point Wording

Good "Robustness is an important property of our system. Our experimental results show that our system is robust against both node-level and network-level failure."

Bad "It can be argued that robustness is an important property of many systems, including the system

presented in this paper by its authors. The system presented in this paper therefore has been designed by the system designers with some robustness properties in mind. The authors of this paper therefore are led to believe that the system presented by the authors of this paper can achieve some form of robustness. The authors of this paper thus confirm the belief held by the authors of this paper by conducting several experiments that could be said to confirm some of the beliefs held by the authors of this paper, including those beliefs that could be related to functions of both the individual nodes, which typically are nodes in a network of sensor nodes, and the network as a whole, which typically consists of several sensor network nodes composed into what could be seen as a single logical sensor network, despite it consisting of individual distinct nodes that may fail individually."

5 Conclusions

The purpose of this laboratory exercise is twofold: to build a system with Contiki and two write a paper using Contiki. The paper should be two pages long an strictly follow the structure laid out in this paper. This structure is the standard structure used by most systems papers.

References

[1] A. Dunkels, F. Österlind, N. Tsiftes, and Z. He. Software-based on-line energy estimation for sensor nodes. In *Proceedings of the Fourth Workshop on Embedded Networked Sensors (Emnets IV)*, Cork, Ireland, June 2007.

[2] A. Dunkels, F. Österlind, N. Tsiftes, and Z. He. Demo abstract: Software-based sensor node energy estimation. In *Proceedings of the Fifth ACM Conference on Networked Embedded Sensor Systems (SenSys 2007)*, Sydney, Australia, November 2007.