**Interprocess Communication in Distributed Wireless Sensor Network**

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*Abstract*—Wireless Sensor Network (WSN) has been deployed in a wide range of mission critical task from bushfire detection to water quality monitoring. Such system can be abstracted by representing each sensor with one process in computer system. This report proposed an algorithm that utilize inter-process communication mechanism to simulate such communication pattern. The experiment considerable performance improvement and

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# Introduction

Inter-process Communication (IPC) defines a set of mechanism that support data sharing and communication among[1]. It is commonly used in wireless sensor network (WSN) as communication management method. This report aims to explore different IPC approaches to simulate the communication pattern in the network.

Target network is assumed to be a 2-dimensional cartesian grid, where each coordinate represents a sensor (process). An extra process is introduced to simulate base station in network. The simulation consists of multiple iteration, and for each iteration each sensor sends an encrypted message of random number to its neighbor. An encrypted event is to be reported to base station if the sensor receives at least 3 identical numbers from its neighbor.

# Design Scheme for IPC

Message Passing Interface (MPI) is a library specification for message-passing in distributed system [2], which is also one of the most used message passing standard in both industry and academy [3]. MPI provides rich features of both point-to-point and collective communication. Compare to other standards, MPI provides several advantages. (1) MPI provides more portable libraries compare to older message passing standards [4]. (2) MPI is capable of delivering high performance on HPC system, and it is optimized on the hardware [4][5]. The implementation of MPI standard is vendor specific. One of the most used open source implementations is OpenMPI [6]. Therefore, I have chosen OpenMPI to implement sensor-sensor and sensor-base communication.

OpenMP stands for Open Multi-Processing. It is an application programming interface that support shared memory parallelization. Its behaviors are defined by a set compiler directives and runtime environment variables [7]. OpenMP follows fork-join model whereas at the start of program, there is only one master thread. A set of slave threads can be dynamically forked, and workload is distributed across slave processes. In the case of WSN, OpenMP is deployed to speedup encryption and decryption process.

# encryption and decryption

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## Some Common Mistakes

* The word “data” is plural, not singular.
* The subscript for the permeability of vacuum **0, and other common scientific constants, is zero with subscript formatting, not a lowercase letter “o”.
* In American English, commas, semi-/colons, periods, question and exclamation marks are located within quotation marks only when a complete thought or name is cited, such as a title or full quotation. When quotation marks are used, instead of a bold or italic typeface, to highlight a word or phrase, punctuation should appear outside of the quotation marks. A parenthetical phrase or statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within the parentheses.)
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* There is no period after the “et” in the Latin abbreviation “et al.”.
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An excellent style manual for science writers is [7].

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| Table Head | Table Column Head | | |
| --- | --- | --- | --- |
| Table column subhead | Subhead | Subhead |
| copy | More table copya |  |  |

a. Sample of a Table footnote. (Table footnote)

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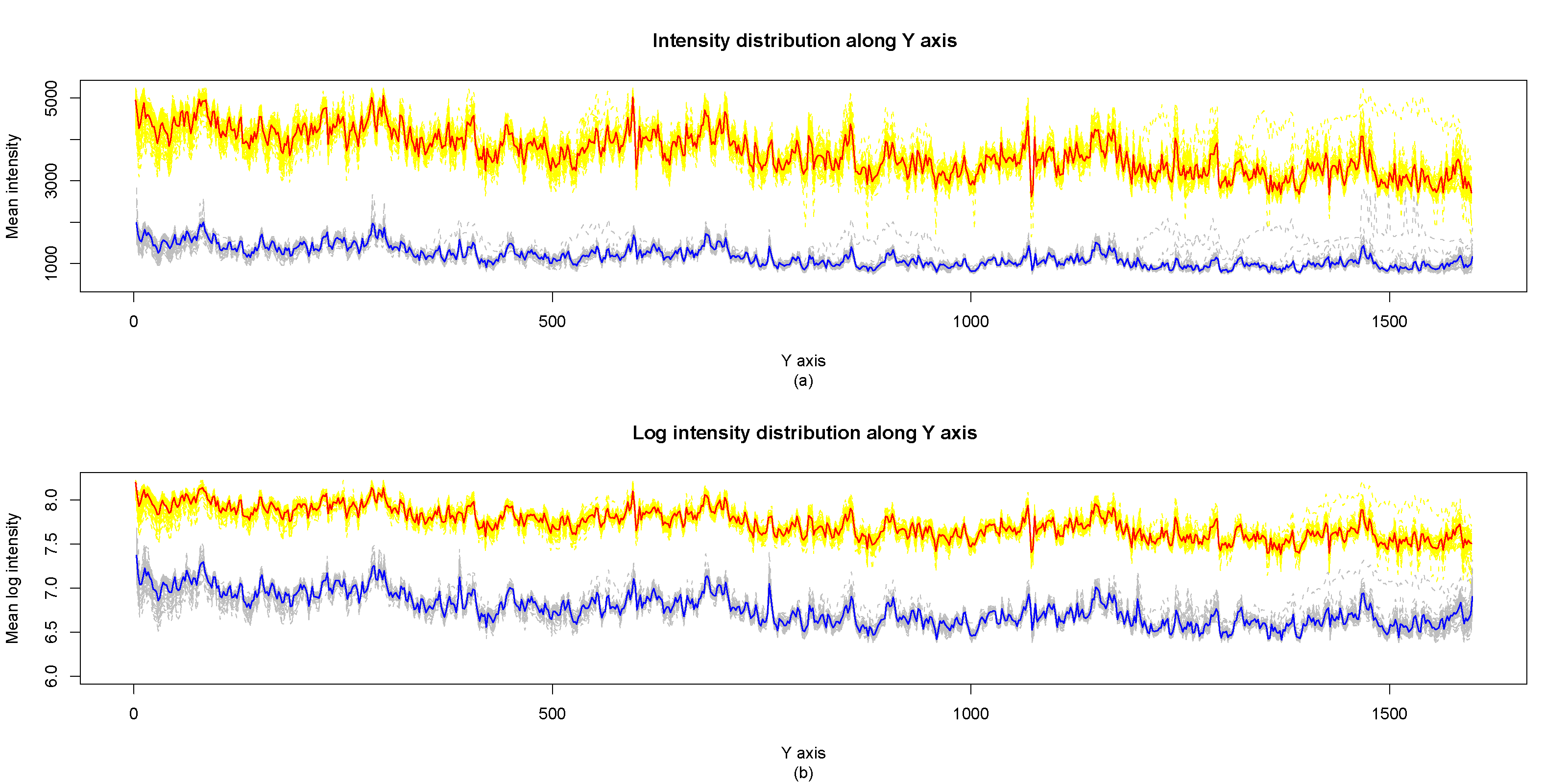
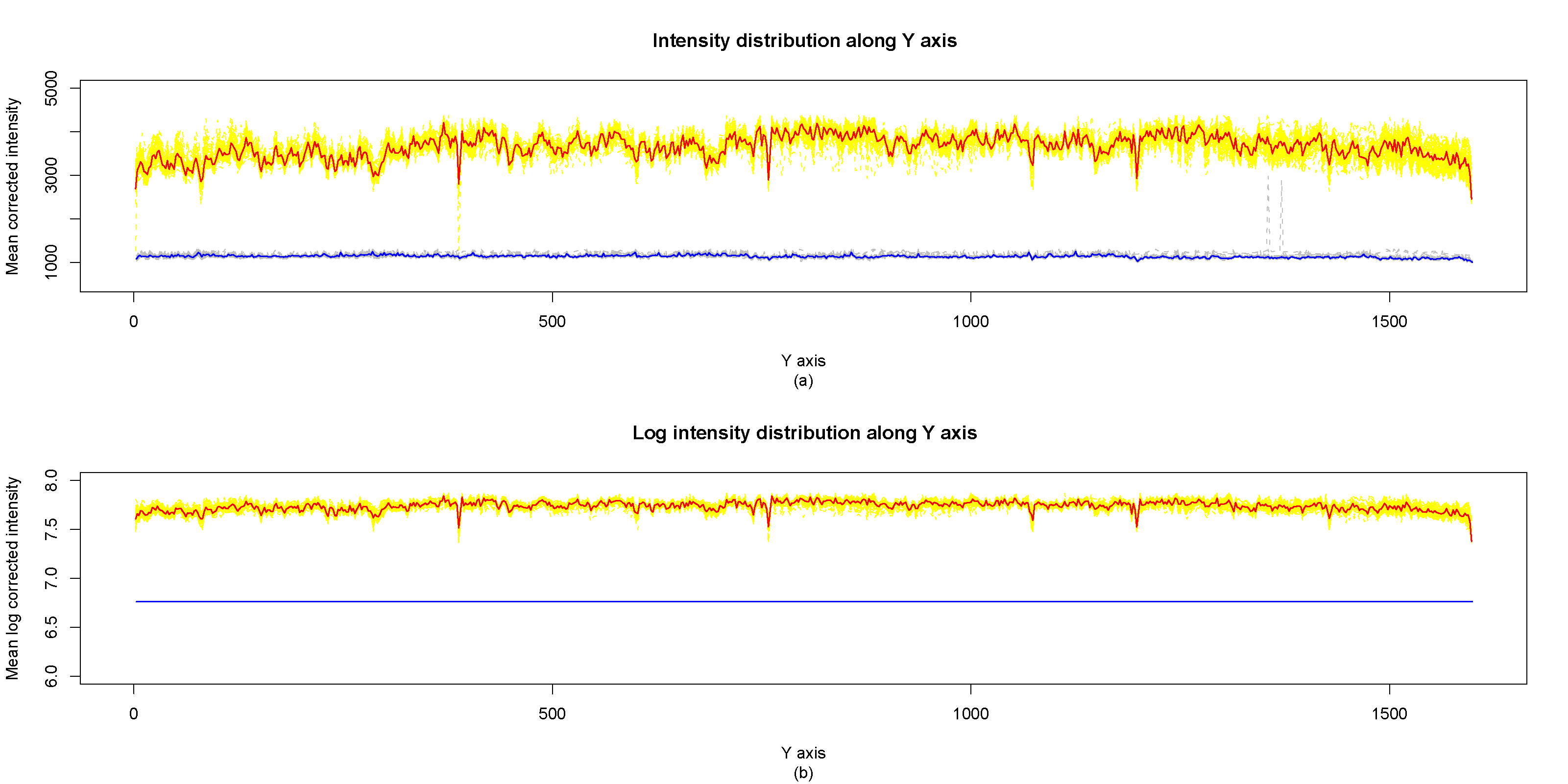
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8. Electronic Publication: Digital Object Identifiers (DOIs):

Article in a journal:

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Article in a conference proceedings:

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1. Example of a TWO-COLUMN figure caption: (a) this is the format for referencing parts of a figure.