

November 16, 2017

Editor-in-Chief  
IPSJ Journal of Information Processing

Dear Editor:

Please find enclosed our manuscript entitled “Component-Based mruby Platform for IoT Devices” which we request you to consider for publication as Original Article in IPSJ Journal of Information Processing.

**Abstract:** High productivity of embedded network software is required to run embedded systems within the Internet of Things (IoT). To improve the productivity, the mruby on TOPPERS embedded component system (TECS) framework, which employs a scripting language (i.e., lightweight Ruby) and supports component-based development, has been proposed. This paper proposes an extended mruby on TECS framework to use for software development of IoT devices such as sensors and actuators. The proposed framework enables that that mruby program calls TINET, a TCP/IP protocol stack for use in embedded systems, functions. In addition, this paper proposes two component-based functionality such as a componentized TINET called TINET+TECS and a componentized Two-Level Segregate Fit (TLSF) dynamic memory allocator called TLSF+TECS. TINET+TECS improves scalability and configurability, and offers software developers high productivity through variable network buffer sizes and the ability to add or remove TCP (or UDP) functionalities. TINET+TECS utilizes a dynamic TECS component connection method to satisfy the original TINET specifications. TLSF+TECS is a thread-safe memory allocator that runs at high speed and efficiently consumes memory. Experimental results of comparison between TINET+TECS and original TINET show that the execution time and memory consumption overhead are reduced and the configurability is improved.

A part of this work was reported in our conference paper (IEEE ICSS 2017) which only focuses on TINT+TECS. For more details, please refer to the summary of references.

We believe that the findings of this study are relevant to the scope of your journal and will be of interest to its readership. The manuscript has been carefully reviewed by an experienced editor whose first language is English and who specializes in editing papers written by scientists whose native language is not English.

We look forward to hearing from you at your earliest convenience.

Sincerely,

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## Summary of the Differences

This paper submitted to IPSJ Journal of Information Processing partially includes contents of our conference paper appeared at ICESSE 2017 [1]. This paper has clear differences compared to the conference version [1], as follows.

- **Cooperation with mruby on TECS framework:** This paper proposes an extended framework that links TINET+TECS which is a component-based TCP/IP protocol stack [1] with mruby on TECS framework.
- **Cooperation with TLSF+TECS:** The proposed framework also links TLSF+TECS which is a component-based dynamic memory allocator.
- **Related work:** In this paper, software development frameworks for IoT are described and compared with the proposed framework.

Conference version paper [1]

## References

- [1] Takuro Yamamoto, Takuma Hara, Takuya Ishikawa, Hiroshi Oyama, Hiroaki Takada and Takuya Azumi, "TINET+TECS: Component-Based TCP/IP Protocol Stack for Embedded Systems," In Proceedings of the IEEE 14th International Conference on Embedded Software and Systems (ICESSE 2017), Sydney, Australia, Aug. 2017
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