

Kiwamu Okabe - Research and Development Engineer

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Interests

I launched my career on developing embedded devices at Ricoh Company, Ltd, and also learned application design using functional language such like Haskell. I found Metasepi project¹ what is trying to apply strong type to embedded programming. Until now, I developed an embedded Haskell compiler named Ajhc², and also traslate documents about ATS language³ into Japanese⁴. And I published some research papers⁵.

Today, I choose VeriFast⁶ to verify C language running on embedded platform, and translate the tutorial into Japanese⁷. And I'm trying to apply the verifier to RTOS⁸.

Metasepi is very experimental and ambitious project, however I believe that it also introduces an by-product "the technology to design real software with predictable manpower and safety" regardless of embedded domain.

Work Experience

November 2016 - Present: Expert Engineer (permanent employee) at SELTECH CORPORATION

- Maintain a Hypervisor for embedded market
- Design and develop own secure OS for ARM platform

August 2014 - Present: Part-time Researcher at RIKEN Advanced Institute for Computational Science

- Research embedded functional programming running on ARM Cortex-M and AVR
- Verification for RTOS application such like ChibiOS/RT⁹ running on ARM Cortex-M

July 2013 - Present: Self-employed Software Engineer at METASEPI DESIGN

- Research and develop Ajhc Haskell Compiler
- Host meetups¹⁰ for hands-on to verify embedded application on ARM Cortex-M using STM32¹¹ board and ST-LINK¹² debugger

¹<http://www.metasepi.org/>

²<http://ajhc.metasepi.org/>

³<http://www.ats-lang.org/>

⁴<http://jats-ug.metasepi.org/>

⁵<http://www.metasepi.org/papers.html>

⁶<https://github.com/verifast/verifast>

⁷<https://github.com/jverifast-ug/translate/blob/master/Manual/Tutorial/Tutorial.md>

⁸<https://github.com/fpiot/chibios-verifast>

⁹<http://www.chibios.org/>

¹⁰<https://metasepi.connpass.com/>

¹¹<http://www.st.com/en/microcontrollers/stm32-32-bit-arm-cortex-mcus.html>

¹²<http://www.st.com/en/development-tools/st-link.html>

- ATS language evangelist
- Verification evangelist using VeriFast¹³, which is a verifier C language programs annotated with preconditions and postconditions
- Translated VeriFast Tutorial into Japanese¹⁴
- Support to develop any embedded software
- Manage Metasepi Project and develop the core technology

February 2016 - November 2016: Software Enginner (contract employee) at Life Robotics Inc.

- Design GUI application running on Linux OS, using C++ and Qt¹⁵
- Design network protocol for Robotics application
- Reason for Quitting: to challenge verification of secure application using C language and VeriFast

March 2015 - February 2016: System Enginner (contract employee) at Centillion Japan Co., Ltd.

- Technical support for stock chart application using JavaScript
- Maintain MySQL database servers
- Launch new IoT business for farming
- Design a platform¹⁶ to accelerate R programs
- Reason for Quitting: to change my job into embedded one, again

September 2014 - December 2014: Software engineer (trustee agreement) at Axsh co., LTD.

- Develop an OpenFlow application named “OpenVNet”¹⁷
- Design automation scripts for AWS using Ruby and GNU make
- Reason for Quitting: to have better salary

March 2012 - July 2013: Software Engineer (permanent employee) at MIRACLE LINUX CORPORATION

- Maintain own Digital Signage platform running on Intel architecture using Linux OS, C++, OpenGL, GTK+¹⁸ and GStreamer¹⁹
- Verify and tune up performance of Digital Signage on new Intel platform and Intel video driver
- Verify PowerPC Linux kernel and debug/fix a race condition in the SMP kernel

¹³<https://github.com/verifast/verifast>

¹⁴<https://github.com/jverifast-ug/translate/blob/master/Manual/Tutorial/Tutorial.md>

¹⁵<https://www.qt.io/>

¹⁶<https://github.com/centillion-tech/kick-r>

¹⁷<https://github.com/axsh/openvnet>

¹⁸<https://www.gtk.org/>

¹⁹<https://gstreamer.freedesktop.org/>

- Debug and fix bug of crash²⁰ command's PowerPC virtual memory paging
- Design new Windows installer using NSIS²¹
- Introduce and maintain new Git server for internal use
- Reason for Quitting: to focus researching and developing Ajhc Haskell compiler on full-time work

April 2001 - February 2012: Software Development Engineer (permanent employee) at Ricoh Company, Ltd.

- Develop BIOS and bootloader for multifunction printer on Intel architecture
- Design secure boot for multifunction printer on Intel architecture
- Develop new BIOS for multifunction printer
- Tune multifunction printer boot time as 10 seconds
- Develop POSIX thread library
- Develop and technical support NetBSD OS
- Port OS to new Intel hardware
- Reason for Quitting: to join more small and quick team

Education

- March 2001: Master of Engineering from Department of Electrical and Electronic Engineering, Tokyo Metropolitan University.
The thesis: "Multimode Quartz Crystal Microbalance"²²

Publications and Reports

- Kiwamu Okabe and Hongwei Xi. "Arduino programing of ML-style in ATS"²³. ML workshop, 2015.
- Kiwamu Okabe and Takayuki Muranushi. "Systems Demonstration: Writing NetBSD Sound Drivers in Haskell"²⁴. Haskell Symposium, 2014.
- Kiwamu Okabe. "ATS 言語を使って不変条件を API に強制する".²⁵ 夏のプログラミング・シンポジウム 2014, 2014.
- Kiwamu Okabe, Hiroki MIZUNO and Hidekazu SEGAWA. "強い型による OS の開発手法の提案"²⁶. 第 55 回プログラミング・シンポジウム, 2014.

²⁰<http://people.redhat.com/~anderson/>

²¹<http://nsis.sourceforge.net/>

²²<http://ci.nii.ac.jp/naid/110004076869>

²³<http://www.metasepi.org/doc/metasepi-icfp2015-arduino-ats.pdf>

²⁴<http://metasepi.org/doc/metasepi-icfp2014-demo.pdf>

²⁵http://www.metasepi.org/doc/20141101_prosym_summer2014.pdf

²⁶http://metasepi.org/doc/20140110_prosym55.pdf

Activities

Open-source projects

Metasepi Project²⁷

- Challenge to create an open-source Unix-like operating system designed with strong type such as ML or Haskell.
- Rewriting NetBSD kernel using Ajhc Haskell compiler. <https://github.com/metasepi/netbsd-arafura-s1>

Ajhc Haskell compiler²⁸

- Extend and add embedded features to Jhc Haskell Compiler <http://repetae.net/computer/jhc/>.
- Ajhc has thread-safe and reentrant runtime. Also has Erlang style GC. It means Ajhc's Haskell context has own GC heap. GC can run on tiny CPU such as Cortex-M3 with 32kB RAM.

Japan ATS User Group²⁹

- An user group for ATS language promotion of utilization. Translating ATS documents into Japanese.

Debian Maintainer³⁰

- Maintained uim package at Debian squeeze, and packages using Haskell at sid.

Carettah³¹

- A presentation tool written with Haskell. All of my slides³² are created by the tool.

Computer Skills

- Languages: C, C++, Haskell, ATS, Intel/ARM assembler, Ruby, JavaScript, Python
- Platforms: Linux, NetBSD, FreeRTOS, ChibiOS/RT, Android NDK, Cygwin, MinGW, Bare metal

Reference available upon request

- Hiroyasu Fukuyama CTO - SELTECH CORPORATION
- Woo-Keun Yoon CEO - Life Robotics Inc.
- Kentaro Kuroiwa Research Chief - Centillion Japan Co., Ltd.
- Yasuhiro Yamazaki CEO - Axsh Co., Ltd.
- Takayuki Muranushi - RIKEN Advanced Institute for Computational Science
- Takashi KODAMA CEO - MIRACLE LINUX CORPORATION

²⁷<http://metasepi.org/>

²⁸<http://ajhc.metasepi.org/>

²⁹<http://jats-ug.metasepi.org/>

³⁰<http://qa.debian.org/developer.php?login=kiwamu@debian.or.jp>

³¹<https://github.com/master-q/carettah>

³²<http://www.slideshare.net/master-q/>

- Shigeya SENDA - Ricoh Company, Ltd.
- Hitoshi Sekimoto Professor - Tokyo Metropolitan University, Department of Electrical and Electronic Engineering

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