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Brief

I launched my career on developing embedded devices using Unix-like kernel at Ricoh Company, Ltd. The experience was not only for designing device drivers but also including debug of virtual memory. And I have experience in IoT platform such as ARM Cortex-M MCU and RTOS. Also I learned application design using functional language such as Haskell¹, and published some research papers² about such languages.

I would like to continue to pursue quality improvement technologies (including security) regardless of the software layer.

Skill Set

Deep knowledge for Unix-like Kernel and User Space

I am an expert for Unix-like kernel such as Linux, because I provided technical support for NetBSD³, which is a Unix-like OS similar to Linux, at Ricoh. My skill is not only for NetBSD but also Linux. In fact, a race condition bug in PowerPC Linux kernel was fixed by me in only five days at MIRACLE LINUX.

Wide experience in IoT platform

I have a wide experience in IoT platform such as FreeRTOS, ChibiOS/RT⁴, ARM Cortex-M, ESP8266, AVR and MSP430. Also I launched a new IoT business using TWELITE wireless platform⁵ at Centillion Japan.

Research Security and Quality

A prototype of own Secure-OS similar to OP-TEE⁶ was designed by me at SELTECH. It runs with the other RTOS on ARM Cortex-M MCU. Also I have a wealth of experience in strong static typing language such as Haskell and verification of C language such as VeriFast⁷, which are useful to keep the quality of products.

¹<https://www.haskell.org/>

²<http://www.metasepi.org/papers.html>

³<http://netbsd.org/>

⁴<http://www.chibios.org/>

⁵<https://mono-wireless.com/>

⁶https://github.com/OP-TEE/optee_os

⁷<https://github.com/verifast/verifast>

Work Experience

July 2013 - Present: Freelance Researcher

Responsibilities:

- Researching and developing Ajhc Haskell Compiler⁸
- ATS language⁹ evangelist for embedded devices
- Verification evangelist using VeriFast¹⁰, which is a verifier C language programs annotated with preconditions and postconditions

Key Achievements:

- Published some research papers¹¹
- Translated ATS documents into Japanese¹²
- Translated VeriFast documents into Japanese¹³

October 2019 - March 2020: Software Engineer (trustee agreement) at QuantumCore CORPORATION

Responsibilities:

- Porting a machine learning called “reservoir computing” onto ARM Cortex-M MCU
- Porting the machine learning onto Android platform

Key Achievements:

- Developed a library for linear algebra running on ARM Cortex-M MCU

February 2018 - July 2018: Software Architect at SHINKAWA LTD.

Responsibilities:

- Researched and developed new software platform for wire bonding during semiconductor device fabrication

Key Achievements:

- Created a parser to understand SHINKAWA own embedded script language
- Evaluated EtherCAT¹⁴ protocol for the realtime application

⁸<http://ajhc.metasepi.org/>

⁹<http://www.ats-lang.org/>

¹⁰<https://github.com/verifast/verifast>

¹¹<http://www.metasepi.org/papers.html>

¹²<http://jats-ug.metasepi.org/>

¹³<https://github.com/jverifast-ug/translate>

¹⁴<https://www.ethercat.org/>

August 2014 - October 2017: Part-time Researcher at RIKEN Advanced Institute for Computational Science

Responsibilities:

- Researched functional programming for embedded platform

Key Achievements:

- Published some research papers¹⁵

November 2016 - October 2017: Expert Engineer (permanent employee) at SELTECH CORPORATION

Responsibilities:

- Researched and developed new Secure-OS for ARM Cortex-M platform

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

Responsibilities:

- Developed GUI application running on Ubuntu OS, using C++ and Qt¹⁶ for single arm robot

Key Achievements:

- Designed a network protocol for the robotics application

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

Responsibilities:

- Technical support for stock chart application using JavaScript
- Maintained MySQL database servers
- Manager for offshore development in China

Key Achievements:

- Launched new IoT business for farming
- Design a platform¹⁷ to accelerate R¹⁸ programs

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

Responsibilities:

- Developed an OpenFlow application named “OpenVNet”¹⁹

Key Achievements:

- Provisioned and automated deploying the OpenVNet on AWS platform using Ruby and GNU make

¹⁵<http://www.metasepi.org/papers.html>

¹⁶<https://www.qt.io/>

¹⁷<https://github.com/centillion-tech/kick-r>

¹⁸<https://www.r-project.org/>

¹⁹<https://github.com/axsh/openvnet>

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

Responsibilities:

- Developed own Digital Signage platform running on Intel architecture using Linux OS, C++, OpenGL, GTK+²⁰, GStreamer²¹
- Supported and debugged own Linux distribution

Key Achievements:

- Debugged and fixed a race condition in the SMP kernel on PowerPC platform
- Debugged and fixed bug of crash²² command's PowerPC virtual memory
- Designed new Windows installer using NSIS²³

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

Responsibilities:

- Developed own platform for multi-function printer based on NetBSD OS

Key Achievements:

- Developed OptionBIOS and bootloader for the platform on Intel architecture
- Designed secure boot for the platform on Intel architecture
- Compressed boot time of the printer onto 10 seconds
- Verified m:n POSIX thread library

Education

- March 2001: Master of Engineering from Department of Electrical and Electronic Engineering, Tokyo Metropolitan University.
The thesis: "Multimode Quartz Crystal Microbalance"²⁴

Publications and Reports

- Kiwamu Okabe and Hongwei Xi. "Arduino programing of ML-style in ATS"²⁵. ML workshop, 2015.
- Kiwamu Okabe and Takayuki Muranushi. "Systems Demonstration: Writing NetBSD Sound Drivers in Haskell"²⁶. Haskell Symposium, 2014.

²⁰<https://www.gtk.org/>

²¹<https://gstreamer.freedesktop.org/>

²²<http://people.redhat.com/~anderson/>

²³<http://nsis.sourceforge.net/>

²⁴<http://ci.nii.ac.jp/naid/110004076869>

²⁵<http://www.metasepi.org/doc/metasepi-icfp2015-arduino-ats.pdf>

²⁶<http://metasepi.org/doc/metasepi-icfp2014-demo.pdf>

- Kiwamu Okabe. “ATS 言語を使って不変条件を API に強制する”.²⁷ 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”.²⁸ 第 55 回プログラミング・シンポジウム, 2014.

Activities

Open-source projects

Metasepi Project²⁹

- 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 compiler³⁰

- 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 Group³¹

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

Debian Maintainer³²

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

Computer Skills

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

Reference available upon request

- Shingo Akiyoshi CEO - QuantumCore CORPORATION
- Hiroshi Munakata CTO - SHINKAWA LTD.
- Shoi Egawa CEO - SELTECH CORPORATION
- Woo-Keun Yoon CEO - Life Robotics Inc.

²⁷<http://www.metasepi.org/doc/20141101-prosym-summer2014.pdf>

²⁸<http://metasepi.org/doc/20140110-prosym55.pdf>

²⁹<http://metasepi.org/>

³⁰<http://ajhc.metasepi.org/>

³¹<http://jats-ug.metasepi.org/>

³²<http://qa.debian.org/developer.php?login=kiwamu@debian.or.jp>

- Kentaro Kuroiwa Research Chief - Centillion Japan Co., Ltd.
- Yasuhiro Yamazaki CEO - Axsh Co., Ltd.
- Junichiro Makino Team Leader - RIKEN Advanced Institute for Computational Science
- Takashi KODAMA CEO - MIRACLE LINUX CORPORATION
- Shigeya SENDA - Ricoh Company, Ltd.
- Hitoshi Sekimoto Professor - Tokyo Metropolitan University, Department of Electrical and Electronic Engineering

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