

# Kiwamu Okabe

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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 like ARM Cortex-M MCU and RTOS. Also I learned application design using functional language such like Haskell, and published some research papers<sup>1</sup> about such languages.

## Skill Set

### *Deep knowledge for Unix-like Kernel and User Space*

I am an expert for Unix-like kernel such like Linux, because I provided technical support for NetBSD, 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 like FreeRTOS, ChibiOS/RT<sup>2</sup>, ARM Cortex-M, ESP8266, AVR and MSP430. Also I launched a new IoT business using TWELITE wireless platform<sup>3</sup> at Centillion Japan.

### *Leadership*

I was leading a technical team of twenty people to support the OS at Ricoh. And also I have experience in leading offshore team in china to maintain web application at Centillion Japan.

### *Research Security and Quality*

A prototype of own Secure-OS similar to OP-TEE<sup>4</sup> 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 like Haskell and verification of C language such like VeriFast<sup>5</sup>, which are useful to keep the quality of products.

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<sup>1</sup><http://www.metasepi.org/papers.html>

<sup>2</sup><http://www.chibios.org/>

<sup>3</sup><https://mono-wireless.com/>

<sup>4</sup>[https://github.com/OP-TEE/optee\\_os](https://github.com/OP-TEE/optee_os)

<sup>5</sup><https://github.com/verifast/verifast>

## Work Experience

### *July 2013 - Present: Freelance Researcher*

- Research and develop Ajhc Haskell Compiler<sup>6</sup>
- Host meetup<sup>7</sup> for hands-on to verify embedded application on ARM Cortex-M using STM32<sup>8</sup> board and ST-LINK<sup>9</sup> debugger
- ATS language evangelist<sup>1011</sup> for embedded devices
- Verification evangelist using VeriFast, which is a verifier C language programs annotated with preconditions and postconditions
- Translated VeriFast Tutorial into Japanese<sup>12</sup>
- Support to develop any embedded software
- Manage Metasepi Project<sup>13</sup> and develop the core technology

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

- Research and develop new software platform for wire bonding during semiconductor device fabrication

### *August 2014 - October 2017: 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/RT running on ARM Cortex-M

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

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

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

- Design GUI application running on Linux OS, using C++ and Qt<sup>14</sup>
- Design network protocol for Robotics application
- Reason for Quitting: to challenge verification of secure application using C language and VeriFast

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<sup>6</sup><http://ajhc.metasepi.org/>

<sup>7</sup><https://metasepi.connpass.com/>

<sup>8</sup><http://www.st.com/en/microcontrollers/stm32-32-bit-arm-cortex-mcus.html>

<sup>9</sup><http://www.st.com/en/development-tools/st-link.html>

<sup>10</sup><http://www.ats-lang.org/>

<sup>11</sup><http://jats-ug.metasepi.org/>

<sup>12</sup><https://github.com/jverifast-ug/translate/blob/master/Manual/Tutorial/Tutorial.md>

<sup>13</sup><http://www.metasepi.org/>

<sup>14</sup><https://www.qt.io/>

*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 platform<sup>15</sup> 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”<sup>16</sup>
- 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+<sup>17</sup> and GStreamer<sup>18</sup>
- 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
- Debug and fix bug of crash<sup>19</sup> command’s PowerPC virtual memory paging
- Design new Windows installer using NSIS<sup>20</sup>
- 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

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<sup>15</sup><https://github.com/centillion-tech/kick-r>

<sup>16</sup><https://github.com/axsh/openvnet>

<sup>17</sup><https://www.gtk.org/>

<sup>18</sup><https://gstreamer.freedesktop.org/>

<sup>19</sup><http://people.redhat.com/~anderson/>

<sup>20</sup><http://nsis.sourceforge.net/>

- 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”<sup>21</sup>

## Publications and Reports

- Kiwamu Okabe and Hongwei Xi. “Arduino programing of ML-style in ATS”<sup>22</sup>. ML workshop, 2015.
- Kiwamu Okabe and Takayuki Muranushi. “Systems Demonstration: Writing NetBSD Sound Drivers in Haskell”<sup>23</sup>. Haskell Symposium, 2014.
- Kiwamu Okabe. “ATS 言語を使って不変条件を API に強制する”<sup>24</sup>. 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”<sup>25</sup>. 第 55 回プログラミング・シンポジウム, 2014.

## Activities

### *Open-source projects*

#### Metasepi Project<sup>26</sup>

- 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 compiler<sup>27</sup>

- 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 Group<sup>28</sup>

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

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<sup>21</sup><http://ci.nii.ac.jp/naid/110004076869>

<sup>22</sup><http://www.metasepi.org/doc/metasepi-icfp2015-arduino-ats.pdf>

<sup>23</sup><http://metasepi.org/doc/metasepi-icfp2014-demo.pdf>

<sup>24</sup>[http://www.metasepi.org/doc/20141101\\_prosym\\_summer2014.pdf](http://www.metasepi.org/doc/20141101_prosym_summer2014.pdf)

<sup>25</sup>[http://metasepi.org/doc/20140110\\_prosym55.pdf](http://metasepi.org/doc/20140110_prosym55.pdf)

<sup>26</sup><http://metasepi.org/>

<sup>27</sup><http://ajhc.metasepi.org/>

<sup>28</sup><http://jats-ug.metasepi.org/>

**Debian Maintainer**<sup>29</sup>

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

**Carettah**<sup>30</sup>

- A presentation tool written with Haskell. All of my slides<sup>31</sup> are created by the tool.

**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**

- Hiroshi Munakata CTO - SHINKAWA LTD.
- Shoi Egawa CEO - SELTECH CORPORATION
- Woo-Keun Yoon CEO - Life Robotics Inc.
- 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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<sup>29</sup><http://qa.debian.org/developer.php?login=kiwamu@debian.or.jp>

<sup>30</sup><https://github.com/master-q/carettah>

<sup>31</sup><http://www.slideshare.net/master-q/>