

Raymond Oung

WORK EXPERIENCE

Self-employed

Independent Tech Consultant & Freelance Developer

2010 – Present

- **Embedded Systems & Control Engineering.** Design, develop, and implement embedded electronics and control systems utilizing microcontrollers, sensors, and programming languages (bare-metal C, FreeRTOS) to deliver robust and efficient embedded solutions.
- **Full-Stack Web Development.** Build and launch full-stack web applications for clients, utilizing front-end technologies (Nuxt.js, Vue.js), back-end languages (Node.js, Python), and databases (SQL, BigQuery, MongoDB, Firestore). Ensure seamless user experience through UI/UX design principles and implement secure and scalable web solutions.
- **Data Modeling & Business Intelligence.** Develop data models for client projects, optimizing data storage and facilitating efficient data analysis. Create data visualizations and dashboards to provide clients with actionable insights from their data.
- **Business Process Automation & Optimization.** Streamline business processes for clients by automating repetitive tasks using scripting languages and tools (Apps Script, Python). Identify opportunities for process improvement and implement solutions that enhance efficiency and productivity.
- **Clients:** E-studio, PDnavi, Women's Startup Lab, Rapyuta Robotics, Black Swift Technologies, mint & pepper

hapi-robo s.t., Ltd., Japan

Chief Architect

2018 – 2022

- Supported CEO in securing a 10x revenue increase through a strategic exclusive distribution deal with a leading robotics manufacturer.
- Independently designed, developed, and launched a series of electronic accessories, including a high-efficiency USB power supply and a dual-channel I2S microphone, leading to a 25% year-over-year sales growth.
- Developed and deployed a Vue.js + Firebase web application enabling remote management of Android kiosk content and robot telepresence via WebRTC, which assisted in streamlining operations and enhancing user experience.

Rapyuta Robotics Co., Ltd., Switzerland & Japan

Director of Engineering

2015 – 2018

- Worked with company executives to develop comprehensive business and technical plans, secure Seed funding, and establish a budget for a fully-autonomous outdoor teleoperated drone project.
- Spearheaded the development lifecycle of a fully-autonomous outdoor teleoperated drone and docking station, leading a team of 30+ engineers across 3 time zones.
- Authored two patents and led the engineering team for several IoT/robotic products, culminating in over 500 live demonstrations that paved the way for Series-A investments.

Product & Project Manager

2015 – 2017

- Bridged the gap between high-level vision and actionable plans by coordinating cross-functional teams. Identified risks, managed costs, defined project scope, and continuously refined product roadmap.
- Advocated agile development and led bi-weekly sprints as Scrum Master.
- Built and managed a high-performing team of 30+ engineers and technicians. Recruited top talent and fostered a collaborative environment, contributing to achieving project goals.

Senior Embedded Electronics Engineer

2015 – 2017

- Developed and manufactured mixed-signal PCBs, integrating STM32F4 microcontrollers, i.MX 6 application processors, and MEMS sensors using Autodesk EAGLE.
- Led device bring-up, including firmware development using FreeRTOS and bare-metal C.

Black Swift Technologies LLC, USA & Germany

Lead Embedded Electronics Engineer

2012 – 2015

- Independently designed and developed the embedded electronics for a fixed-wing autopilot and ground control station (SwiftPilot and SwiftStation) utilizing STM32F4 microcontrollers and various MEMS sensors using Autodesk EAGLE.
- Led device bring-up, including low-level firmware development in C, ensuring functionality of the autopilot and

ground control station.

- Authored and led the proposal for a \$120,000 USD grant from the ESA Business Incubation Centre.

Institute for Dynamic Systems and Control, ETH Zurich, Switzerland

Researcher

2008 – 2013

- Led research and development efforts for the Distributed Flight Array - a modular and reconfigurable drone.
- Led the proposal for a continuation grant (Research Grant No. 200021-127020) titled "Distributed Estimation and Control of Mechatronic Systems" from the Swiss National Science Foundation, valued at over \$478,000 USD.
- Guided over 25 undergraduate and graduate students through their theses and semester projects.

Evolution Robotics, Inc., USA

Junior Robotics Engineer

2008

- Implemented an N-view bundle adjustment algorithm in MATLAB, enhancing the accuracy and efficiency of 3D reconstruction tasks.
- Developed a custom IEEE1394 Firewire video camera driver in C++ for an embedded x86 Linux device, enabling real-time video capture capabilities.
- Evaluated the performance of the company's visual SLAM algorithm against industry benchmarks, providing valuable insights for algorithm improvement.

Autonomous Systems Laboratory, ETH Zurich, Switzerland

Research Assistant

2006 – 2007

- Developed a co-simulator using ADAMS and Simulink to model and analyze the performance of ESA's ExoMars rover's rocker-bogie suspension system.
- Implemented a sigma-point Kalman filter in C++ for sensor-corrected 3D odometry, enabling robot pose estimation in challenging environments.
- Created a MATLAB to Lego Mindstorms NXT interface in C for a graduate-level Autonomous Mobile Robotics course, facilitating rapid prototyping and experimentation for students.

Institute of Aerospace Studies Space Robotics Laboratory, University of Toronto, Canada

Research Assistant

2005 – 2006

- Refactored a visual localization algorithm in C++, achieving a 30% improvement in computational performance.
- Completed the electro-mechanical design of a front-loader module for an autonomous space-robotics vehicle using SolidWorks for 3D modeling and Altium for PCB design.

MDA Ltd., Canada

Research Assistant

2004 – 2005

- Co-developed a real-time visual motion estimation algorithm utilizing FastSLAM with SIFT features for a custom-built autonomous ground vehicle, which enabled real-time navigation and obstacle avoidance in unstructured environments.
- Conducted research and analysis to select optimal motors and resolvers for NASA's Mars Phoenix Lander.
- Independently designed and built an electro-mechanical prototype of a next-generation orbital replacement unit, which facilitated over 50 successful live client demonstrations.

VOLUNTARY ACTIVITIES

dancebots.ch and mint & pepper, Switzerland & Remote

Robotics Workshop Co-Creator & Instructor

2011 – Present

- Co-created a robotics workshop series for students aged 9-18, fostering interest in STEM fields through hands-on learning in basic electronics and software development. Over 10,000 students have participated to date.
- Designed and open-sourced a mixed-signal PCB utilizing the ATtiny series microcontroller, specifically for educational robotics kits. Additionally, established a supply chain for manufacturing these kits, making robotics education more accessible.
- Developed and released an open-source QT-based Programming Tool and Python package for programming the robots, fostering collaboration within the robotics community. Additionally, implemented a CI/CD pipeline and regularly contribute to code reviews, ensuring code quality and maintainability.

- Spearheaded the mechanical and power systems design of a solar-powered electric vehicle, leading our team to a remarkable 5th place finish (out of 18) in the world and 1st place finish among all North American teams at the prestigious 2007 World Solar Challenge (Adventure Class).

- Co-founded and managed a 22-member national-level team
- Placed top 10 out of more than 150 teams at the 2006 Toronto International Dragon Boat Festival
- Awarded Rookie of the Year (2003), and Most Valuable Player award (2004, 2005) on the University of Toronto Engineering Dragon Boat Team

EDUCATION

Ph.D., ETH Zurich, Mechanical Engineering, 2013

M.Sc., ETH Zurich, Mechanical Engineering, 2008

B.Sc., University of Toronto, Electrical Engineering, 2006

AWARDS AND GRANTS

Mechatronics Best Paper Award, Elsevier International Federation of Automatic Control, 2014

Top 10 Business Idea, »venture«, 2014

Business Incubation Grant, European Space Agency Business Incubation Center, 2013

Research Grant No. 200021-127020, Swiss National Science Foundation, 2013

Best Paper Award Finalist, IEEE International Conference on Robotics and Automation, 2010

General Chairs' Recognition Award for Interactive Papers, IEEE Conference on Decision and Control, 2009

RoboCup World Champions (Nanogram League), 2007

Queen Elizabeth II Aiming for the Top Scholarship, Ontario Government, 2001 – 2006

Innovation Award, MacDonald Dettwiler and Associates, 2005

Cummins Scholarship for Leadership and Community Outreach, 2002

PRESENTATIONS AND EXHIBITIONS

European Space Application Investment Forum, Toulouse, France, 2014

ZURICH.MINDS, Zurich, Switzerland, 2013

University of Colorado Boulder, Research and Engineering Centre for Unmanned Vehicles, Boulder, USA, 2013

Festival Robotique, Lausanne, Switzerland, 2013

ACM/IEEE Conference on Information Processing in Sensor Networks, Philadelphia, USA, 2013

IEEE International Conference of Intelligent Robots and Systems, Algarve, Portugal, 2012

ETH Zurich Maturandentage, Zurich, Switzerland, 2011

Swiss Science Center Technorama, Winterthur, Switzerland, 2011

Robots – The Podcast for News and Views on Robotics, World Wide Web, 2010

IEEE International Conference on Robotics and Automation, Anchorage, USA, 2010

Joint 48th IEEE Conference on Decision and Control and 28th Chinese Control Conference, Shanghai, China, 2009

Canadian International Autoshow, Toronto, Canada, 2004

PUBLICATIONS

Patents

[1] R. Oung, C. Smith, C. Dubs, and Y. Okamoto, "Landing guide system of unmanned flying object," April 2019, Patented.

[2] R. Oung, R. Urushiyama, and K. Yunoki, "Unmanned flight body and storage system thereof," December 2018, Patented.

Journals

- [1] R. Oung and R. D'Andrea, "The Distributed Flight Array: Design, implementation, and analysis of a modular vertical take-off and landing vehicle," *International Journal of Robotics Research*, vol. 33, no. 3, pp. 375–400, October 2013.
- [2] R. Oung and R. D'Andrea, "The Distributed Flight Array," *Mechatronics*, vol. 21, no. 6, pp. 908–917, September 2011.
- [3] Z. Nagy, M. Fluckiger, R. Oung, I. Kaliakatsos, E. Hawkes, B. Nelson, K. Harada, E. Susilo, A. Menciassi, P. Dario, *et al.*, "Assembling reconfigurable endoluminal surgical systems: Opportunities and challenges," *International Journal of Biomechatronics and Biomedical Robotics*, vol. 1, no. 1, pp. 3–16, 2009.

Refereed Proceedings

- [1] Y. Okamoto, G. Mohanarajah, and R. Oung, "Rapyuta: A cloud robotics platform," in *Proceedings of the Institute of Electronics, Information and Communication Engineers*, vol. IEIE-115, no. 375, Tokyo, Japan, December 2015, pp. 61–63.
- [2] M. Kriegleder, T. D. Sundara, R. Oung, and R. D'Andrea, "Rendezvous with bearings-only information and limited sensing range," in *Proceedings of the IEEE/RSJ International Conference of Intelligent Robots and Systems*, Seattle, USA, May 2015, pp. 5941–5947.
- [3] M. Asadpour and R. Oung, "Networking algorithms on a resource-limited distributed mobile embedded system," in *Proceedings of the 12th International Conference on Information Processing in Sensor Networks*, Philadelphia, USA, April 2013, pp. 301–302.
- [4] M. Kriegleder, R. Oung, and R. D'Andrea, "Asynchronous implementation of a distributed average consensus algorithm," in *Proceedings of the IEEE/RSJ International Conference of Intelligent Robots and Systems*, Tokyo, Japan, November 2013, pp. 1836–1841.
- [5] R. Oung, M. Picallo, and R. D'Andrea, "A parameterized control methodology for a modular flying vehicle," in *Proceedings of the IEEE/RSJ International Conference of Intelligent Robots and Systems*, Vilamoura, Portugal, October 2012, pp. 532–538.
- [6] M. Kriegleder, R. Oung, and R. D'Andrea, "Distributed altitude and attitude estimation from multiple distance measurements," in *Proceedings of the IEEE/RSJ International Conference of Intelligent Robots and Systems*, Vilamoura, Portugal, October 2012, pp. 3626–3632.
- [7] R. Oung, F. Bourgault, M. Donovan, and R. D'Andrea, "The Distributed Flight Array," in *Proceedings of the IEEE International Conference on Robotics and Automation*, Anchorage, USA, May 2010, pp. 601–607.
- [8] R. Oung, A. Ramezani, and R. D'Andrea, "Feasibility of a Distributed Flight Array," in *Proceedings of the IEEE Conference on Decision and Control*, Shanghai, China, December 2009, pp. 3038–3044.
- [9] Z. Nagy, R. Oung, J. Abbott, and B. Nelson, "Experimental investigation of magnetic self-assembly for swallowable modular robots," in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*, Nice, France, September 2008, pp. 1915–1920.
- [10] A. Krebs, T. Thueer, E. Carrasco, R. Oung, and R. Siegwart, "Towards torque control of the crab rover," in *ETH Zurich Research Collection*, Zurich, Switzerland, 2008, pp. 1915–1920.

SKILLS

Software

Vue.js, Nuxt.js, Python, Node.js, HTML, CSS, JavaScript, Java, Android, C/C++, FreeRTOS, Git, Linux, shell scripting, LaTeX, SVN, MATLAB, Simulink, Octave, Docker, ROS, Rust, Scikit-learn, Keras.

Electrical

Autodesk EAGLE, KiCAD, Altium Designer, mixed-signal PCB design, microcontrollers and interfaces (UART, I2C, SPI, CAN, I2S, PWM), soldering, reflow-oven, oscilloscope, logic analyzer, spectrum analyzer.

Mechanical

Solidworks, OnShape, laser cutter, 3D printer, 2.5-axis mill, lathe, environmental testing (vibration, thermal cycling).

Control Systems

System identification, Signal Processing, Kalman filters, Linear Controls.

LANGUAGES

English (native), French (intermediate), German (basic), Japanese (basic)