

# TRON Forum Admission Guide

## TRON Forum

TRON Forum (Location: Shinagawa, Tokyo, Chair: Ken Sakamura, Dean, Faculty of Information Networking for Innovation And Design (INIAD), Toyo University) was established in 2002 to promote TRON Project which aims to realize the open Internet of Things (IoT) free from constraints of organizations and applications based on "open source," "open data" and "open API." The forum has conducted vigorous activities led by Chair Sakamura focusing on T-Engine Project that aims to improve the development environment of embedded systems and operating Ubiquitous ID Center which promotes and disseminates ubiquitous ID architecture and its component technologies such as ucode.

TRON Forum's activities have been expanding. Chair Ken Sakamura was honored with an ITU150 Award<sup>(\*)</sup> in 2015 for proposing TRON open architecture, the pioneering work of ubiquitous networking and the IoT. He was the only winner in Asia among the six winners that included Bill Gates. For example, the Institute of Electrical and Electronic Engineers, Inc. (IEEE), the world's largest institute of electrical and electronic engineers, adopted an OS specification for IoT devices based on  $\mu$ T-Kernel 2.0 as an IEEE standard as "IEEE 2050-2018"<sup>(\*)</sup> in 2018. The forum has established TRON IoT Vulnerability Advisory Center (TIVAC) in 2019.



TRON Forum Chair: Ken Sakamura

(\*)1) On the occasion of the 150th Anniversary of International Telecommunication Union (ITU: the United Nations specialized agency for information and communication technologies (ICTs), HQ: Geneva, Switzerland), ITU150 Awards were launched to recognize individuals past and present from government, ICT industry, academia, and civil society that have contributed to improving lives of world citizens through ICT innovations developed, promoted or implemented by ITU. (<https://www.itu.int/en/150/Pages/awards.aspx>)

(\*)2) "IEEE 2050-2018" is available on the following website of the IEEE STANDARDS ASSOCIATION. (<https://standards.ieee.org/standard/2050-2018.html>)

# Member Benefits

## Member categories

TRON Forum offers the member categories shown in Table 1: Executive Committee, A-, i-, B-, e-, O-, Academic, Supporting and Liaison.

- Those who want to participate in the Executive Committee which decides the operation policies of the forum should join as Executive Committee members.
- Companies which would like to conduct standardization activities through discussions in working groups (WGs) should join as Executive Committee or A-members.
- Companies in the IoT-related business should participate in the forum as Executive Committee, A-, or i-members. Companies in the open data-related business should participate in the forum as Executive Committee, A-, or O-members.
- Companies in the embedded systems industry in need of receiving the outputs of the forum's activities early should participate in the forum as B-members.
- e-member category should meet the needs of those involved in the promotion of ubiquitous computing.
- Those in academia can participate in the forum as Academic members without membership fee. They may also participate as i- and/or O-members at their request.

The forum members can access software and related documents, etc. prior to the eventual release to the public, and access members-only documents.

**Table 1 Member categories and activities of TRON Forum**

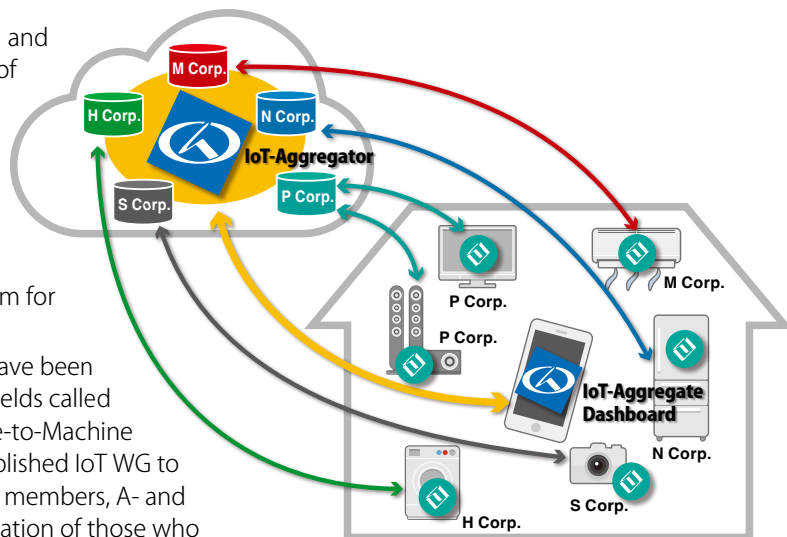
Member category / Activity content	Executive Committee members	A-members	i-members	B-members	e-members	O-members	Academic members	Liaison members	Supporting members
Participation in Executive Committee meetings	○	×	×	×	×	×	×	×	×
Participation in General meetings	○	○	○	○	○	○	×	△*1	○
Participation in Marketing Committee meetings	○	○	×	×	×	×	×	△*1	×
Participation in WGs	○	○	×	×	×	×	×	△*1	×
Participation in IoT WG	○	○	○	×	×	×	○	△*1	×
Participation in Open Data WG	○	○	×	×	×	○	○	△*1	×
Participation in Seminars	○	○	○	○	○	○	○	△*1	○
Executive Committee -members-only web pages	○	×	×	×	×	×	×	×	×
A-members-only web pages	○	○	×	×	×	×	×	×	×
i-members-only web pages	○	○	○	×	×	×	○	×	×
B-members-only web pages	○	○	○	○	×	×	×	×	×
e-members-only web pages	○	○	○	×	○	×	×	×	×
O-members-only web pages	○	○	×	×	×	○	○	×	×
Academic members-only web pages	○	×	×	×	×	×	○	×	×
Liaison members-only web pages	○	×	×	×	×	×	×	○	×
Supporting members-only web pages	○	×	×	×	×	×	×	×	○
ucode Allocation (General)	○	○	○	×	○	×	○	×	○
ucode Allocation (Provider)	○	○	○	×	○*2	×	×	×	○
Monthly e-mail magazine distribution	○	○	○	○	○	○	○	○	○

\*1: Can participate if approved by the Executive Committee \*2: If three shares or more are paid

## The IoT (Internet of Things)

TRON Project was the world's pioneer to conduct the research and development (R&D) and technology standardization activities of ubiquitous computing and embedded systems, the important technologies to support the IoT. The project has been conducting them since 1984, almost 40 years ago. The project has produced fruitful results such as ITRON specification OS and T-Kernel which are real-time OS kernels, ubiquitous ID architecture which is the application platform of ubiquitous computing, and ucode which is a standard ID system for ubiquitous computing.

In recent years, these results of the technology development have been disseminated to the world, and have been used widely in the fields called with the keywords such as the Internet of Things (IoT), Machine-to-Machine (M2M) and Cyber-Physical System (CPS). TRON Forum has established IoT WG to deploy the research results even further. Executive Committee members, A- and i-members can participate in it. We look forward to the participation of those who actively promote the IoT.



## TRON IoT Vulnerability Advisory Center (TIVAC)

An urgent issue is to develop the system of Computer Security Incident Response Team (CSIRT) to deal with the security problems of IoT devices, such as exemplified by "URGENT/11," a vulnerability problem of the TCP/IP protocol stack. Therefore, TRON Forum has established "TRON IoT Vulnerability Center (TIVAC)" to collect and disseminate security vulnerability information on the general IoT systems, devices and other embedded systems as well as TRON-related ones widely and quickly.



## Open data

Open data is data version of public infrastructure, so to speak: API to access highly public data is published, and such data is made available via network. TRON Forum has established Open Data WG to promote open data.

## Embedded systems

TRON Forum B-member category should meet the needs of manufacturers of embedded products, providers of developer tools, OSs and middleware, and those who conduct business in the embedded systems ecosphere such as semiconductor vendors, etc. There are material, software, etc. released only to the members involved in embedded systems, such as "T-Kernel 2.0 AeroSpace" and "T-Kernel Test Suite."

## Ubiquitous computing

If you are interested in ubiquitous ID architecture that uses ucode, which is an ID system to allocate unique ID to objects, places and concepts across the boundaries of companies and industrial sectors, please participate in the forum as e-member. e-members can receive allocation of 48-bit (281 trillion) ucode space without additional fees.

## WG activities

There are Working Groups (WGs) in TRON Forum as below. Executive Committee members and A-members can participate in all the WGs. (i-members and O-members can participate in related WGs.) We look forward to your active participation in the forum's standardization activities.

- **T3 WG** ..... Examine "T3 generation" specifications such as T-Kernel 3.0 and  $\mu$ T-Kernel 3.0.
- **IoT WG** ..... Examine issues to realize Aggregate Computing model proposed by Chair Sakamura. For this fiscal year, "Open API SWG" will be established to study the practical application of various specifications and technologies.
- **Quasi-zenith Satellite WG** ..... Study the development of middleware that runs on TRON OS for dealing with signals from quasi-zenith satellites, which can realize high-precision positioning with sub meter or centimeter accuracy.
- **Open Data WG** ..... Examine various technologies for open data.
- **Education WG** ..... Lecture at the seminars and review the seminar contents.
- **Research and Study WG** ..... Survey embedded Real-time OS usage trends and report the result.
- **ITRON WG** ..... Perform maintenance of ITRON specifications.

## TRON Forum Annual Fee and Validity Period of Membership

TRON Forum's activities are held on an annual basis from April 1 to March 31. Irrespective of the timing of participation, the membership is valid only for the applicable year.

The annual fee for each member category is as follows.

If you enroll after the third quarter (from October 1 to March 31), you will be eligible for the "Reduced Annual Fee." For the details, please contact the secretariat.

<b>Executive Committee members</b>	A-members that pay 3,000,000 yen or more
<b>A-members</b>	One share 1,000,000 yen/year (Please pay one or more shares.)
<b>i-members</b>	One share 300,000 yen/year (Please pay one or more shares.)
<b>B-members</b>	One share 100,000 yen/year (Please pay one or more shares.)
<b>e-members</b>	One share 100,000 yen/year (Please pay one or more shares.)
<b>O-members</b>	One share 100,000 yen/year (Please pay one or more shares.)
<b>Academic members</b>	Free
<b>Liaison members</b>	Free
<b>Supporting members</b>	Please contact us.

## μT-Kernel 3.0 Seminar

TRON Forum holds seminars on μT-Kernel 3.0, a real-time OS for IoT edge nodes, from introduction to its application. Please see the TRON Forum web page for the schedule.

<https://www.tron.org/ja/seminar/>

Seminars are conducted in Japanese.

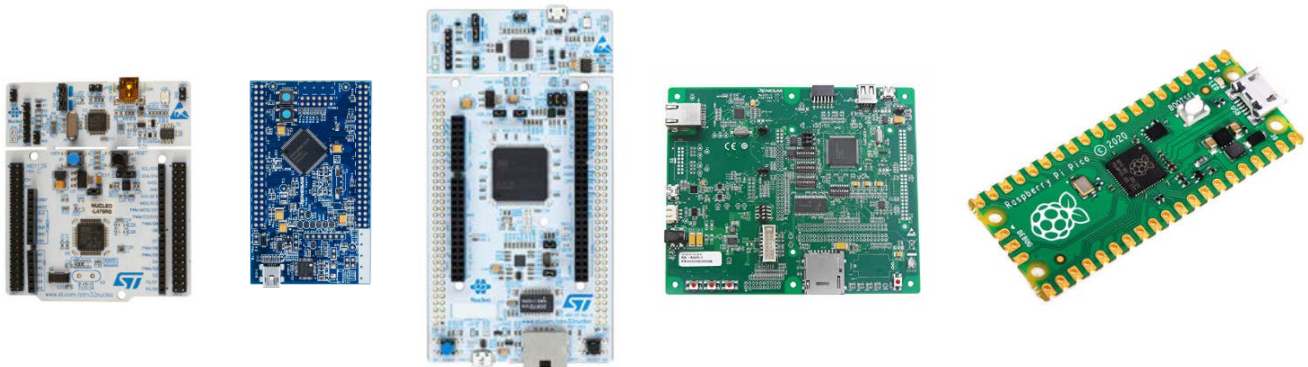


## μT-Kernel 3.0 BSP

TRON Forum has released Board Support Package (BSP) that implements μT-Kernel 3.0, a real-time OS for IoT edge nodes on commercial off-the-shelf CPU boards.

- μT-Kernel 3.0 BSP is available from GitHub.  
[https://github.com/tron-forum/mtk3\\_bsp](https://github.com/tron-forum/mtk3_bsp)

- Supported Microprocessor Boards  
<https://www.tron.org/tron-project/what-is-t-kernel/hwinfo/>



(From left to right) STM32L476 Nucleo-64, RX65N Renesas Target Board, STM32H723 Nucleo-144, RX65N Renesas Starter Kit+, and Raspberry Pi Pico

### Inquiries

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