

ET ROBOCON rules for Bluetooth

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ET ROBOCON Technical committee



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1. Bluetooth communication

Since 2011, it has been allowed to use Bluetooth communication during a race. This new technology has two meanings, one is a trigger for new strategy and modeling approach which were not seen in the past, and other is technical experiment for ET ROBOCON beyond 2011. ET ROBOCON technical committee realizes that current rules and judge system might not be sufficient against potential intended violations because it is difficult to judge the status of Bluetooth wireless communication without special equipments due to its invisibility and use of Bluetooth during the race is the first challenge in ET ROBOCON. In addition to the rules, fairness of the race also tends to rely on moral of participants. ET ROBOCON has two aspects, one is a robotics competition and other is an educational opportunity for engineers and students. Hence, please remind that success of ET ROBOCON in this year also impacts further evolution of ET ROBOCON in future.

1.1. Guidance at race venue

Bluetooth is a wireless communication standard which uses 2.4GHz frequency band and this frequency band also widely used in other wireless communication standards. Hence, if ET ROBOCON participants and visitors freely use wireless communication at the race venue, it might be a cause of interfere with Bluetooth communication used for the race. All visitors and all participants include ET ROBOCON committee members should keep the following rules as the guidance at the race venue.

Uses of the following equipments which are not related to the race are restricted at the race venue:

- Turn off wireless communication features of PC (turn off Wi-Fi, Wireless LAN, Bluetooth and other wireless communication features)
- Do not use PC related equipments which have wireless communication features (includes wireless mouse and keyboard)
- Turn off wireless LAN, Bluetooth feature of mobile phone
- Turn off wireless communication features of (digital) camera and video
- Power off Mobile game devices and music players
- Power off other types of devices which have wireless communication features



Note 1: It is allowed to use mobile phone, (digital) camera and video considering purpose and convenience of visitors.

Furthermore, all participants have to keep the following rule:

- Except for the participants in the race and right before the race, power off NXTway-ET as long as possible to avoid potential Bluetooth interferes



1.2. Bluetooth Communication Equipments (BCE)

All equipments used for Bluetooth communication with NXTway-ET during the race are called “Bluetooth Communication Equipments” (BCE). BCE should satisfy the following conditions:

- Size of BCE should be within the size of ordinary laptop PC in storage (length, width and height)
- BCE should have CPU, memory and battery (and also better to have Bluetooth communication capability)
- From the time for waiting for the race at waiting zone until the end of the race (at least, longer than thirty minutes), BCE should work without external power supply.

Note 1: ET ROBOCON committee does not provide external power supply to BCE during that period

- Furthermore, additional equipment for Bluetooth communication is allowed to use (e.g. Bluetooth dongle). Additional equipment should satisfy the following conditions:
 - It does not have any other functionality except for Bluetooth communication capability
 - It should be connected to other BCE via non-wireless interface and the length of a cable for the connection has to be shorter than 40cm
- Bluetooth capability of BCE should be certified by Bluetooth SIG and modification of Bluetooth capability is prohibited
- BCE should be commercially available at brick and mortar or online stores
- Radio (remote) control equipments are prohibited to use

Furthermore, following things about BCE are prohibited during the period from the time waiting for the race at waiting zone until the end of the race:

- Connect to any external equipments except for the additional equipment which is enabling Bluetooth communication
- Use of any non-contact user interface
- Use of any sensing devices which can be used to measure physical quantity except for the ones which are used for contact user interface and essential for BCE



- Use of any communication devices or any output devices except for the Bluetooth communication with NXTway-ET and essential for BCE

1.3. Software for BCE

There is no restriction for software and its development environment to be used for BCE. ET ROBOCON committee does not support software for BCE.

1.4. Approval for BCE

Participants have to get approval for BCE from ET ROBOCON committee prior to the race.

1.5. Pairing of BCE and NXTway-ET

It needs to perform Bluetooth pairing process between BCE and NXTway-ET and make sure that the pairing process is completed before the inspection of NXTway-ET. For the pairing process, following rules are applied to prevent unintended pairing and to confirm the guidance at the race venue:

- Bluetooth device name should be a team ID which is given from ET ROBOCON committee and add *ET* as the pre-fix of the device name (E.g. if the team ID was *1*, the device name would be *ET1*)
- Bluetooth pass key should be unique from the NXT default one (*1234*)

1.6. Placement of BCE



Following rules are applied for placement of BCE during the race:

- Place BCE to a place where ET ROBOCON committee specified (e.g. on a desk) and get approval from the committee (= completion of the placement of BCE)
- Operation of BCE after the completion of the placement is prohibited unless approved by the committee
- Make sure that BCE should be placed as it is while operating BCE during the race. Intended move of BCE (e.g. holding it by hand) is prohibited except for the following cases:
 - Unavoidable slight move of BCE by normal operations
 - If BCE was moved from the specified place by accident (e.g. dropped from a desk), participant should recover it

Note 1: Configuration of bonus point for the race is performed after completion of calibration and placement of NXTway-ET on the race track and placement of BCE.

1.7. Communication between BCE and NXTway-ET

Following rules are applied for communication between BCE and NXTway-ET during the race:

- Depending on the condition of race venue, Bluetooth communication might have some trouble during the race, it would be treated as inevitable

Note 1: ET ROBOCON committee does not guarantee the condition of Bluetooth communication at race venue

- Bi-directional Bluetooth communication between BCE and NXTway-ET is always allowed
- NXTway-ET can communicate with only BCE which is approved by ET ROBOCON committee
- Establish Bluetooth connection between BCE and NXTway-ET by the completion of the placement of BCE



1.8. Operation of BCE

Following rules are applied for operation of BCE during the race:

- Operation of BCE is defined as “Contacts with BCE or any kind of information inputs to BCE”
- Operation of BCE is allowed only when NXTway-ET statically stopped (“Static Stop” (SS)) after the race began by ET ROBOCON committee. If NXTway-ET transitioned to none SS state even only at once, after that, operation of BCE is prohibited until the end of the race

Note 1: SS state means that “Only left wheel, right wheel and tail contact on the race track and all of left wheel motor, right wheel motor and tail motor are stopped”.



- It is allowed to monitor BCE during the race
- Only one participant in a team is allowed to operate BCE and it is prohibited to change the operator during the race
- Participant who is in charge of operating BCE is prohibited to use any other equipments except for BCE and NXTway-ET during the race

Note 2: This is the rule to consider possibility that participant gets some information which affects the result of the race by using other equipments.

Note 3: It is allowed to use some equipment which is necessary for participant's daily life.

Note 4: It is allowed to get information from public equipments such as a projector screen which is placed by ET ROBOCON committee.

- Participant who is in charge of operating BCE is prohibited to get information which affects the result of the race from other participants or supporters

Note 5: This is the rule to consider possibility that other participants or supporters who get information by using some equipment and transfer it to the participant who is in charge of operating BCE.

Note 6: It is allowed to get information from unintended cheering at race venue.

1.9. Penalties for rules violation

Following penalties are applied for the participants who violated the rules:

- [Guidance at race venue](#) is a guidance to manage the race seamlessly, thus, ET ROBOCON committee alerts it, but no penalties are applied to the participants.

Note 1: In case of intended malicious violations by participants might be considered as disqualification

- When a violation of [Bluetooth Communication Equipments \(BCE\)](#) is realized after robot inspection, the participants shall be disqualified
- When a violation of [Approval for BCE](#) is realized after robot inspection, the participants shall be disqualified
- When a violation of [Pairing of BCE and NXTway-ET](#) is realized after robot inspection, the participants shall be disqualified
- When a violation of other rules is realized in the race , the participants shall be disqualified

Note 2: Penalties for the violations are defined in the ET ROBOCON rules document

Note 3: In case of intended malicious violations such as remote control, further penalty might be considered in addition to the penalties described in the Note 1



2. FAQ

Q1: Is Bluetooth a must item for the race?

In ET ROBOCON 2012, Bluetooth is NOT a must item for the race. NXTway-ET has a Touch Sensor and manual start using the Touch Sensor is also allowed by the rules. Furthermore, ET ROBOCON 2012 course is designed to be able to get the goal without using Bluetooth.

Q2: Is it allowed to use bi-directional Bluetooth communication if participant does not operate BCE?

As described in [Communication between BCE and NXTway-ET](#), regardless of operation of BCE, it is always allowed to use bi-directional communication between BCE and NXTway-ET.

Q3: If bi-directional communication between BCE and NXTway-ET is allowed in the race, a strategy would be expected that most of functionalities are implemented in BCE which has higher CPU performance. Is it allowed?

It is OK with it. In ET ROBOCON 2012, BCE and NXTway-ET are treated as an autonomous control system and distribution of functionalities and resources within the system is a strategy for the race. However, it needs to consider several factors such as real-time constraint of NXTway-ET, overhead and redundancy of Bluetooth communications. Even if the above described strategy could be implemented; ET ROBOCON technical committee thinks that it would not directly lead to great advantage for the race.

Q4: Is it allowed to implement NXTway-ET controller onto BCE?

Yes, it is. NXTway-ET and BCE are treated as an autonomous control system.

Q5: Is it allowed to implement an application program to save logging data in BCE?

It is allowed to implement an application program to load/save data in BCE.



Q6: When/Where operations of BCE are allowed?

As described in [Operation of BCE](#), Operation of BCE is allowed only when NXTway-ET stopped statically "Static Stop" (SS) after the race began by ET ROBOCON committee. If NXTway-ET transitioned to none SS state even only at once, after that, operation of BCE is prohibited until the end of the race

Q7: According to [Bluetooth Communication Equipments \(BCE\)](#), there is a description "Radio (remote) control equipments are prohibited to use". What is more concrete example?

Game controller, game pad and joy stick controller are the examples. In those equipments, some of them have Bluetooth communication capability and it reminds radio (remote) control and it might cause some misunderstanding for audience even it was not used for that purpose, hence it is prohibited to use such equipments in ET ROBOCON 2012.

Q8: Is it allowed to use a camera device which is integrated in BCE?

As described in [Bluetooth Communication Equipments \(BCE\)](#), it is prohibited to use a camera device which is integrated in BCE. (Camera device is not used for contact user interface, and it is a sensing device to measure physical quantities of light by using CCD/CMOS image sensor)

Q9: Is it allowed to use voice recognition capability using microphone integrated in BCE?

As described in [Bluetooth Communication Equipments \(BCE\)](#), voice recognition capability is prohibited to use because it is a kind of noncontact user interface.

Q10: Is it allowed to hold BCE to operate it in the race?

As described in [Placement of BCE](#), it is a prohibited use case.



Q11: In case of using an equipment which has touch screen user interface for BCE, is it allowed to use touch screen user interface to operate it?

Touch screen user interface is a kind of contact user interface. Hence it is allowed to use it in the race according to [Operation of BCE](#).

Q12: Is it allowed to refer some documents to operate BCE during the race?

As described in [Operation of BCE](#), it is prohibited to use any other equipment except for BCE and NXTway-ET during the race. Hence it is not allowed to refer documents.

Q13: Is it allowed to refer some document file in BCE to operate BCE during the race?

With refers to [Operation of BCE](#), document file saved in BCE is treated as a part of BCE. Hence, it is allowed to refer files in BCE during the race.

Q14: According to [Operation of BCE](#), “Participant who is in charge of operating BCE is prohibited to use any other equipment except for BCE and NXTway-ET during the race”. Is it allowed to use glasses?

Glasses are treated as a case of “Note 3: It is allowed to use some equipment which is necessary for participant’s daily life”. For other equipments, please contact ET ROBOCON Technical committee.

Q15: Considering the characteristics of Bluetooth wireless communication (it is invisible), even if there was some intended violations of the rule such as remote control by whom not recognized by ET ROBOCON committee, it is hard to detect it. How these violations are restricted?

As suggested, it is difficult to detect all potential violations of the rules strictly. However, as described at the beginning of the document, (wireless) communication is a significant technical factor for the future of ET ROBOCON. If suggested unfavorable things happened in ET ROBOCON 2012, it would affect for not only those who violated the rules, but also over all future direction of

ET ROBOCON. Hence all participants should remind it.



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Q16: In [Communication between BCE and NXTway-ET](#), there is a rule about deadline for establishing Bluetooth connection which is described as “Establish Bluetooth connection between BCE and NXTway-ET by the completion of the placement of BCE”. If established connection was cut off or in trouble due to some reason, is it allowed to retry establishing the connection?

As long as operations of BCE and NXTway-ET do not violate the rules for the operations of BCE and NXTway-ET, it is allowed to retry establishing the connection.

Q17: Is it allowed to use homebrew equipment which consists of commercial available evaluation board, Bluetooth module, batteries and other stuff as a BCE?

Yes, it is allowed to use the following equipments as BCE:

- Commercial available out of the box equipment. E.g. laptop PC (+ Bluetooth dongle) or smart phone
- Homebrew equipment which consists of commercial available modules (it needs to submit modules list and building instructions to ET ROBOCON committee)