The 4th Marine Robotics Competition in Okinawa　２０１８

The bylaw of the competition ver 1.0.0

1.　Schedule of Competition

10/13(Sat): Team Practice, Workshop, Social Event
10/14(Sat): Competition Rounds, Awards Ceremony

１．１　schedule in details

●1st day of the competition：　10/13(Sat):

Venue

- Registration, Opening Ceremony, Workshop, Space for Robotics Maintenance: Ginowan Marine Support Center (near the Fishing Harbor)
- Team Practice: Ginowan New Fishing Harbor (see Figure 1-1-1.)
- Social Event: Ginowan Yui-Marche (near the Fishing Harbor)

Time Table

9:00	Registration
10:00	Opening Ceremony, Orientation Session
10:10	Presentation by corporate sponsors
10:50	Draw lots to decide the order of
11:20	Workshop
12:10	Briefing on AUV rounds
	Briefing on ROV rounds
	Briefing on the Performance of Free-Style Vehicles
13:00	Safety Inspection, Team Practice
16:30	finish Team Practice
17:30	begin Social Event
19:00	finish Social Event
20:00	Space for Robotics Maintenance will be closed.

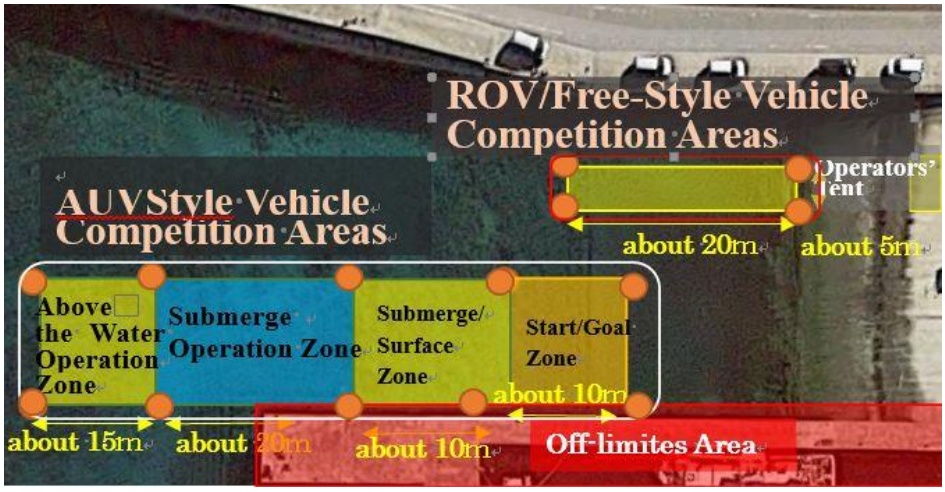

Figure 1-1-1　Competition Areas (Ginowan New Fishing Harbor)

●2nd day of the competition：10/14(Sun)

Venue

・Competition Areas: Ginowan New Fishing Harbor
・Meet-up area, Awards Ceremony: Ginowan Marine Support Center

Time Table

*the time table below may change depends on the number of the teams.

9:00 Meeting Up (Teams' Captains and Judges)

9:45 begin the 1st Qualifying Rounds of ROV（Rounds of ROV and AUV are played by turns.）

Roll Call for Teams (15 minutes before rounds), Team Swap: 5minutes,

Match Time: 5minutes, Withdrawal: 5minutes *the same goes for Final Rounds

*Number of teams：6

〔ROV〕Team Name	Roll Call	Preparation	Round	Finish Withdrawal
Team A	9:30	9:40	9:45 - 9:50	9:55
Team B	9:40	9:50	9:55 - 10:00	10:05
Team C	9:50	10:00	10:05 - 10:10	10:15
Team D	10:00	10:10	10:15 - 10:20	10:25
Team E	10:10	10:20	10:25 - 10:30	10:35
Team F	10:200	10:30	10:35 - 10:40	10:45

9:50 begin the 1st Qualifying Rounds of AUV（Rounds of AUV and RUV are played by turns.）

Roll Call for Teams: 15 minutes before rounds, Team Swap: 5minutes,

Match Time: 5minutes, Withdrawal: 5minutes *the same goes for Final Rounds

Start Lunch Break

*Number of teams：5

〔AUV〕Team Name	Roll Call	Preparation	Round	Finish Withdrawal
Team A	9:35	9:45	9:50 -9:55	10:00
Team B	9:45	9:55	10:00-10:05	10:10
Team C	9:55	10:05	10:10 -10:15	10:20
Team D	10:05	10:15	10:20 -10:25	10:30
Team E	10:15	10:25	10:30 -10:35	10:40

10: 40 begin the 1st demonstration of Free-Style Vehicles

Roll Call for Teams: 15 minutes before rounds, Team Swap: 5minutes,

Match Time: 5minutes, Withdrawal: 5minutes *the same goes for Final Rounds

*Number of teams：3

〔FREE〕Team Name	Roll Call	Preparation	Round	Finish Withdrawal
Team A	10:25	10:35	10:40-10:45	10:50
Team B	10:35	10:45	10:50-10:55	11:00
Team C	10:45	10:55	11:00-11:05	11:10

11：10　Start Lunch Break

11：50　Finish Lunch Break

11:50　begin the 2nd Qualifying Rounds of ROV（Rounds of ROV and AUV are played by turns.）

〔ROV〕 Team Name	Roll Call	Preparation	Round	finish Withdrawal
Team A	11:35	11:45	11:50 -11:55	12:00
Team B	11:45	11:55	12:00 -12:05	12:10
Team C	11:55	12:05	12:10 -12:15	12:20
Team D	12:05	12:15	12:20 -12:25	12:30
Team E	12:15	12:25	12:30 -12:35	12:40
Team F	12:25	12:35	12:40 - 12:45	12:50

11:55　begin the 2nd Qualifying Rounds of AUV（Rounds of AUV and RUV are played by turns.）

〔AUV〕Team Name	Roll Call	Preparation	Round	Finish Withdrawal
チーム A	11:40	11:50	11:55 -12:00	12:05
チーム B	11:50	12:00	12:05 -12:10	12:15
チーム C	12:00	12:10	12:15 -12:20	12:25
チーム D	12:10	12:20	12:25 -12:30	12:35
チーム E	12:20	12:30	12:35 -12:40	12:45

12:45　begin the Round of Free-Style Vehicles.

〔FREE〕Team Name	Roll Call	Preparation	Demonstration	finish Withdrawal
チーム A	12:30	12:40	12:45 -12:50	12:55
チーム B	12:40	12:50	12:55 -13:00	13:05
チーム C	12:50	13:00	13:05 -13:10	13:15

13:20　begin the Final Rounds of AUV （Rounds of AUV and RUV are played by turns.）

〔AUV〕 Team Name	Roll Call	Preparation	Round	finish Withdrawal
2nd team of Qualifying Rounds	13:05	13:15	13:20-13:25	13:30
1st team of Qualifying Rounds	13:15	13:25	13:30-13:35	13:40

13:25　begin the Final Rounds of ROV（Rounds of ROV and AUV are played by turns.）

〔ROV〕 Team Name	Roll Call	Preparation	Round	finish Withdrawal
2nd team of Qualifying Rounds	13:10	13:20	13:25-13:30	13:35
1st team of Qualifying Rounds	13:20	13:30	13:35-13:40	13:45

14:30　begin Awards Ceremony

15:00　finish Awards Ceremony

2. Scoring

1) Every team will be ranked according to the total scores among other teams participated in the same types of competition [AUV/ROV/ Free-Style Vehicle], and teams placed higher in rankings will be given highest award and outstanding performance award respectively.

2) Both of AUV and ROV's scoring consist of two criteria: scores of Workshop and competition scores, which go up to 100 points in total. The allocation of marks mentioned above is shown in Table 2-1.

Table 2-1. Allocation of Marks [AUV/ROV]

Scoring Element / Types of Competition	Workshop Scores	Competition Scores*	Max Possible
AUV/ROV	30	70	100

*Competition Scores will be given to teams based on the team's place in the rankings which is decided by the task-complete points. (see Table 2-2. Scoring Summary)

3) Scoring of Free-Style Vehicle consists of two criteria: scores of Workshop and performance scores, which go up to 100 points in total. The allocation of marks mentioned above is shown in Table 2-2.

Table 2-2. Allocation of Marks [Free-Style Vehicle]

Types of Competition / Scoring Element	Workshop Scores	Performance Scores	Max Possible
Free-Style Vehicle	50	50	100

2.1 Scores of Workshop [AUV/ROV/Free-Style Vehicle]

Scores of Workshop (teams are encouraged to display their marine robotics at their booth along with their posters.) will be graded based on the quality of posters, manner, understandability, Q&A session, and technical contents of robotics etc.

2.2 Competition Scores [AUV/ROV] and Performance Scores [Free-Style Vehicle]

1) [AUV/ROV]

Teams which participate in AUV/ROV will be ranked according to the average scores of 2 Qualifying Rounds, and top 2 teams will move into Final Round.
If all teams get 0 points in the Qualifying Rounds, final round will be canceled. And in this case, none of the teams will be given highest award and outstanding performance award.

To qualify to move into final, AUV teams must complete the task no.2 or no.4 in Figure 4-2-1. (Robotics must submerge into the ocean in required points in their competition courses. This requirement is to make team's robotics closer to AUVs in a real-world.)

In the Final Round, teams will be ranked according to the scores of the Final Round only. Result of Qualifying Rounds will not be taken into consideration as a general rule.

Listed below is a scoring summery of Competition, which is based on teams' ranking. If teams break a rule, Judges will decide how to deal with the team concerned including disqualification of the team. (see Table 2-2.)

Table 2-3. Scoring Summery of Competition [AUV/ROV]

Rankings of Teams	Competition Scores
1st	70 points
2nd	50 points
3rd	40 points
4th	35 points
5th and under	30 points
Not to fulfill tasks at all.	0 points

[ROV]

Qualifying Rounds

1. The team which have higher scores on the 1st Qualifying Round will be placed higher in the rankings of Qualifying Rounds.

2. If top 2 teams still cannot be determined in a way above in [ROV] Qualifying Rounds 1., either of the Qualifying Rounds (1st round or 2nd round) which teams earned more points will be used to rank two teams.

Teams which read the 1st QR code before the opponent will be placed higher in the rankings of Qualifying Rounds. If both teams have the same record time of reading the 1st QR cord, then the 2nd QR code, the 3rd QR code, and the 4th QR code counterpart will be used to rank two teams in the same way. (Competition Officials will use the time recorded on the app in the tablet PC as teams' record time.)

*If top 2 teams still cannot be determined in a way above, Qualifying Rounds (1st round or 2nd round) which teams earned less points will be used in the same way..

*If both teams get full score in both 2 Qualifying Rounds, Judges will use the sum of the record time of reading the 1st~4th QR code in 2 Qualifying Rounds, and give a higher rank to teams whose sum of the time is less than the other teams.

Final Round

1. If round ends with the score tied, the same way as in Qualifying Rounds will be applied to rank finalists.
2. If both 2 teams earn no points in the Final Round, the team placed higher in the rankings of Qualifying Rounds will be a winner of the Final Round.

2) [Free-Style Vehicle]

The 2nd demonstrations in the afternoon on the day of competition will be scored.
Scoring of Free-Style Vehicle consists of two criteria as follows:

・**Technical Capability**: 20 points (Whether teams could realize the concept of robotics which they had presented in Workshop.)

・**Realization Capability**: 30 points (Whether robotics could give/achieve the performance which respective teams had presented in Workshop.)

3. Workshop [AUV/ROV/Free-Style Vehicle]

・Each team is required to conduct a Workshop. Teams are encouraged to display their marine robotics at their booth along with their posters. During the period of the Workshop, Judges will visit the booth and evaluate the Workshop scores.

・Scores of Workshop will be graded based on the quality of posters, manner, understandability, Q&A session, and technical contents etc.

1) Make sure to appeal technical contents and originality of team's robotics with one page of A4 handout (single-sided).

2) Teams can use an outlet (power point) at their booths so that they can use a laptop for the Workshop if necessary.

4. Competition and Performance in details

4.1 Robotics Requirement

[AUV/ROV/Free-Style Vehicle]

1) All robotics except for commercially available finished products are allowed.

2) **Control System Requirements:**
[AUV] Robotics must be switched to autonomous control mode during rounds. However, it is allowed to use remote control mode in order to transfer robotics to its start point before the rounds.
[ROV] Robotics must be operated with remote control.

3) **Radio:**
If teams use commercial radio control transmitter, teams should use the only radio frequency allotted to land type RC (radio-controlled boats, radio-controlled cars etc.) Using the radio frequency for radio-controlled airplane is not allowed.
A list of available wavelength and frequency will be posted on this website later.

4) **Weight:** Robotics must be less than 45kg.

5) **Size:** Robotics' maximum limit of size is shown in Figure 2-1-1.

6) **Battery:**
All Teams which use secondary batteries must take safety measures in case of a short circuit (setting fuses or circuit breakers etc).Teams which use lithium-ion batteries should pay enough attention when retrieving team's disabled marine robotics and opening its pressure resistant vessel. Should robotics have an unusual odor, please stop opening the pressure vessel and ask Competition Officials for instruction.

7) **Charge of Batteries:**
Teams must not charge secondary batteries in tightly sealed condition. Teams must pay special attention to lithium batteries because of its high risk nature.

8) **Prevention of Marine Pollution**
Competition Officials may not allow robotics' launching which may cause marine pollution such as oil leak. Robotics which uses normal O-rings is allowed be launched, however, please consult with Executive Committee in advance if you feel anxiety.

Teams which use silicone liquids and the like for their robotics are required to get rid of them as much as possible before launching the robotics.

9) **Launching and Lifting**
Robotics must be launched into and lifted from the ocean by divers without using a crane. Competition Officials may not allow launching of robotics for safety considerations. If you feel anxiety, please consult with Competition Officials beforehand. Also, please keep in mind that Competition Officials including divers wear a wet suit (black)

10) **Electric Leakage Prevention:**
Robotics must have been taken electric leakage measures.

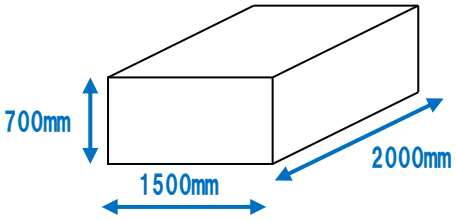

Figure 2-1-1. Robotics' Maximum Limit of Size

[AUV]

1) **Equipment of a Safety Cord**

It is mandatory for all robotics runs in AUV competition to have a Safety Cord, for fishing boats will come and go through near the competition area on the day of rounds. In order to prevent accidents, robotics must have Safety Cords so that Competition Officials can observe their location by simply watching the ocean surface and that divers can capture robotics safely by grasping the cords when robotics go off the course. Image of safety cords are shown in Figure 2-1-2.

*Safety Cords must been made up from two parts: cord and a buoy. The buoy must be more than 40mm in diameter. And the cord must be strong enough for a diver's tug, and must be the length which keeps at least 500mm intervals between robotics and a buoy.

2) **Equipment of GPS, Wi-Fi**

The teams which equip GPS device or Wi-Fi with robotics must equip them where they submerge in water with the main part of robotics during operations. It is not allowed to equip GPS device or Wi-Fi with a buoy, which always floats on water.

*Use of ASV to operate robotics is allowed.

3) **Taping Up as a Reference Position of Robotics**

When teams complete the Safety Inspection, Competition Officials will hand the teams yellow tape. It is required for teams to put the yellow tape on the part of robotics where they wish to be regarded as a respective reference position by Judges.

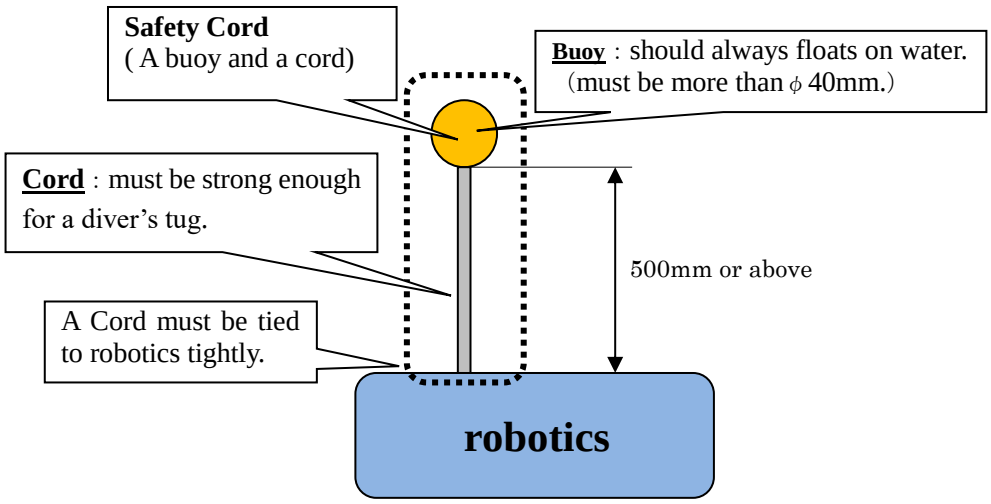

Figure 2-1-2. Safety Cord

4) Pingers will be located in halfway point and goal. The frequency of the Pingers will be 27.211kHz or 21.164kHz.

[ROV]

1) **Output of Images**
Teams are required to display images on LCD (1920×1080 resolution) which will be set up in each operators' tent via HDML terminal or VGA terminal during the operation.

2) **Electrical Power Supply**
Competition Officials will provide teams with 100-volt AC power source by power generator if necessary. The teams which hope to use the AC power source (teams which plan to supply robotics power through underwater cables etc) need to apply maximum power consumption on the application for this competition.

3) **Underwater Cables**
Teams must decide the length of underwater cables suitable for the tasks of competition. (40m or more are recommended.)

4.2 Rules of AUV/ROV Competitions, Free-Style Vehicle Performances

[AUV/ROV/Free-Style Vehicle]

1) Each team must be in a state for start before the scheduled start time of each round.

2) It is not allowed to change teams' turns right before the rounds/demonstrations due to the robotics problem etc.

3) Match time/ allotted time for demonstration are 5 minutes.

4) Teams can restart the run/performance by the aid of divers if robotics becomes unable to continue its run/performance due to the robotics failure. However, teams must restart robotics from the start point in that case. Robotics which failed to pass the Safety Inspection based on [4.1 Robotics Requirement] will not be allowed to operate in competition courses.

[Precautions]

5) All robotics are required to undergo Safety Inspection on the 1st day of the competition, prior to the Team Practice.

6) The maximum depth of competition courses are about 3.5m.

7) If robotics moves buoys as boundary markers, Rule Personnel may forcibly brought back the robotics to its start point with the aid of divers and instruct the team to restart. Swinging buoys will be permitted. However, moving buoy weight will not be permitted.

8) Conditions of the competition courses will constantly change under the influence of natural environment such as waves and winds.

9) Figure 4-2-1 and Table 4-2-2 are the just the image. It is team's responsibility to grasp the accurate course layout on the day of the competition.

10) Breaking a rule may result in the team's disqualification. Rule Personnel will decide how to deal with the offending teams in such cases.

11) Teams are required to take measures to protect their PC against water preparing for rainy weather.

12) Teams are not allowed to enter a multiple type of competition with single marine robotics in principle for the convenience of time table of the match.

4.2.1 AUV Competitions

1) AUV Competition Overview

Robotics must start near the center of Start/Goal Zone, submerge in the ocean while robotics runs in the middle of the Submerge/Surface Zone, then continue to run in submerging state until arriving the Above the Water Zone. After crossing into the Above the Water Zone, robotics is required to surface and to keep running above the water. Then robotics must submerge again when entering the Submerge Zone and keep running underwater until it enters Submerge/Surface Zone. After that, robotics must surface and return to the Start/Goal Zone with running above the water.

Teams compete with others for scores by completing each task below.

(2) Criteria for AUV Competition Scores

1) The contents of tasks which teams can earn points by completing them are shown in Figure4-2-1.

*1 “Submerge Operation” in task no.2 is defined as robotics’ moving from above the water to underwater. It is also required that the most upper parts of robotics do not come out from the water surface in this definition.
*2 “Surfacing” in task no.3 is defined as robotics’ moving from underwater to above the water. The most upper parts of robotics need to come up to the water surface in this definition.

2) When Judge makes decisions on whether robotics crossed the finish line and the like, the yellow tape which is on robotics will be used as a reference position.

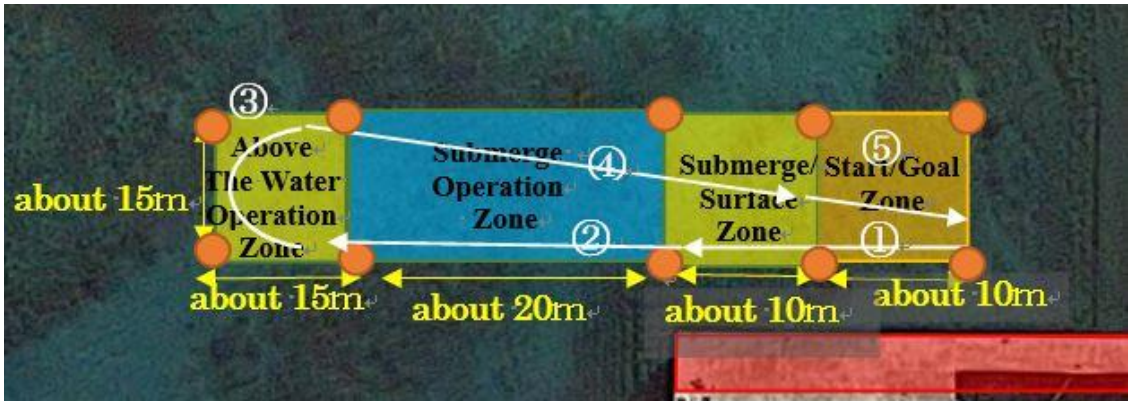

Figure 4-2-1. AUV Competition Course

Task no.	Elements of Tasks	Scores
1	Operating above water from Start/Goal Zone to Submerge/Surface Zone in ①	15 points
2	Submerge Operation in ②. (The time robotics submerge will be timed)	25 points
3	Surfacing within the Above the Water Operation Zone in ③	20 points
4	Submerge Operation in ④. (The time robotics submerge will be timed)	25 points
5	Operating above water from Submerge/Surface Zone to Start/Goal Zone in ⑤	15 points

Table 4-2-2. Scoring Summary of AUV

(3) Requirement in playing in AUV rounds

1) It is the necessary condition to complete tasks that robotics have kept autonomously controlled since its start.

2) Each team is allowed to use whichever mode, autonomous control mode or remote control mode to transfer team’s robotics to its start point.

3) Start point of robotics will be near the center of Start/Goal Zone. It is required to submerge when robotics cross into the Submerge Operation Zone.

4) Teams must have buoys of the safety cords floated on the ocean surface throughout rounds.
*This condition is also required while robotics operates in Submerge Operation Zone.

5) Robotics must operate above the ocean surface when it is in Start/Goal Zone, Submerge/Surface Zone, and Above the Water Zone. (Robotics must operate in underwater in other Zones.)

6) It is required that robotics operate in underwater when it enters Submerge Operation Zone from Above the Water Operation Zone.

7) Surfacing within the Submerge Operation Zone is allowed only once. However, robotics must not continue the state (operating above the water) in that case. More than 2 times surfacing within the Submerge Operation Zone or operating above the water after the first time of surfacing within Submerge Operation Zone will not earn points of the task.

8) When robotics goes off its course, the robotics may be forcibly placed beck into its start point by divers in Rule Personnel's judgment. However, the previous scores of the teams concerned will be hold.

9) Judges will time each team in task no.2 and task no.4 in Table 4-2-1. (Those times will be used to rank teams when they are tied with competition score. For the way of handling with tie game, please see 2.2. 1).

4.2.2 ROV Competition

(1) ROV Competition Overview

There will be 4 targets (Figure 4-2-5 a,b) located in competition courses. Teams competes the number of the QR codes which robotics read.

1) Matches consist of Qualifying Rounds and Final Rounds. All teams will go Qualifying Rounds, and top 2 teams will move into the Final Rounds.

2) Each team will play the match two times at the same course in Qualifying Rounds. Teams which proceed to the Final Round will play the match once in the Final Round.

3) Teams will start the match one by one.

4) Start Point are designated near the edge of water. Each team must operate robotics above the water to transfer it to the Start Point.

5) Competition course is about 5m×20m (see Figure 4-2-2). 4 targets shown in Figure 4-2-5 will be located within the ROV competition course, and points will be awarded for reading QR-codes on the targets.
*the length of competition course might change few meters according to the tide level.

6) In both Qualifying Rounds and Final Rounds, Competition Officials will specify targets (Ex. Target ①, Target ②, Target ③, Target④) and QR code numbers (Ex. QR1, QR2, QR3, QR4) for each team when rounds begin. The course layout and images of a target are shown in Figure 4-2-4, 4-2-5a,b).Teams need to read the QR code which is designated. (see Figure 4-2-6)
*sample instruction: QR1 on target①.

7) Teams must write down the information which teams read from QR codes on the report sheets. The report sheet must be submitted to Judges in headquarters tent after the match finish.

Figure 4-2-2. ROV Competition Course

Figure 4-2-3. Image of Operators' Tent

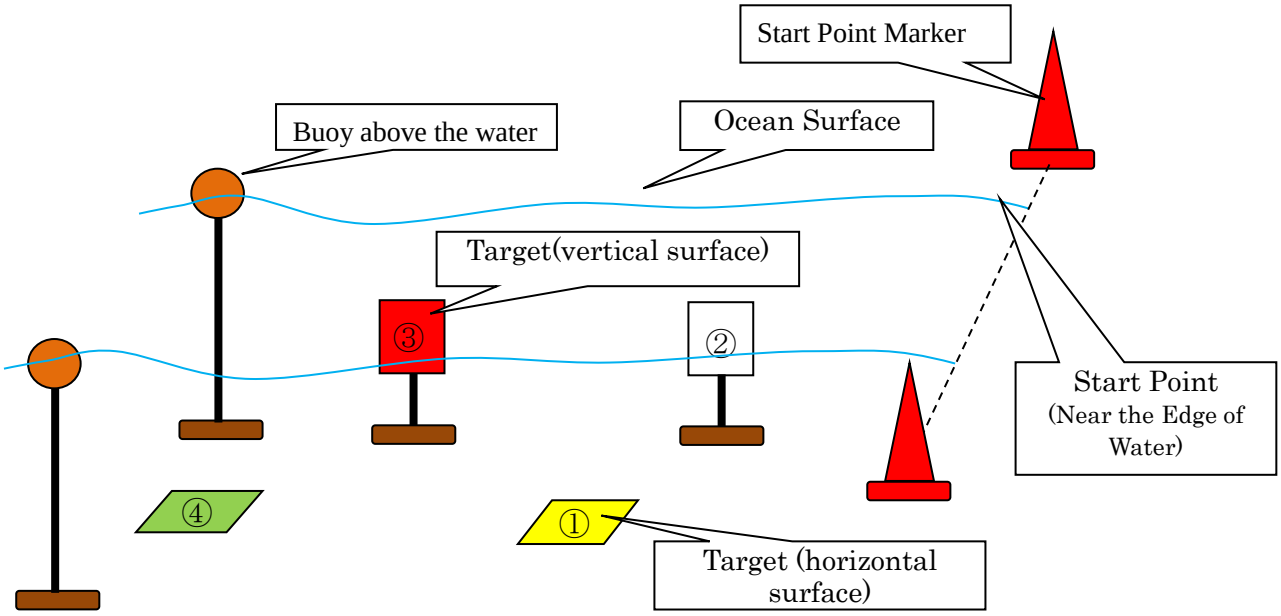

Figure 4-2-4. ROV Competition Course Layout

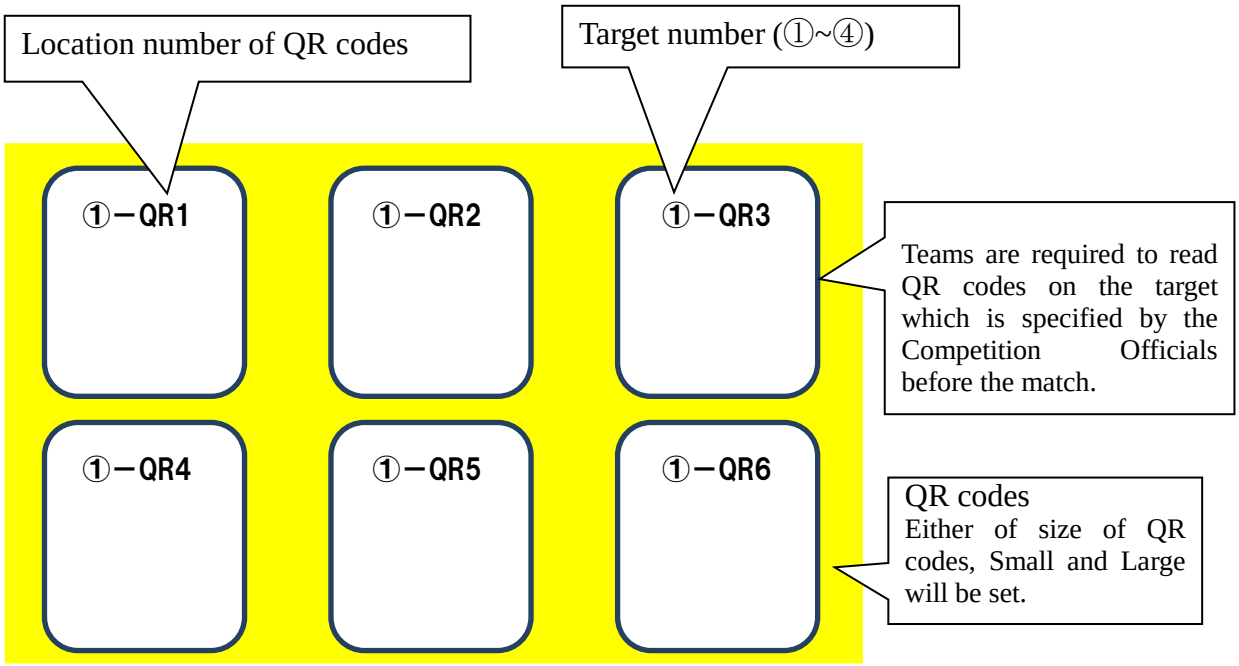

Figure 4-2-5a. Image of a Target part 1

Target	BG color of QR codes
Target①	yellow
Target②	white
Target③	red
Target④	green

Figure 4-2-5b Image of a Target part 2

Figure 4-2-6. Image of the Way to Read QR

(2) Criteria for ROV Competition Scores

Teams can earn points by reading QR codes. The scoring of tasks is listed in table 4-2-3.

Table 4-2-3. Scoring Summery of ROV

Target no.	Scores
①	25 points
②	25 points
③	25 points
④	25 points

(3) Requirements in playing in ROV rounds

1) Staffs will transfer team's robotics from top of the slope to the edge of water. After that, teams must operate robotics to transfer it to its Start Point. Start Point is an extension of pylon as a start point marker. (see Figure 4-2-4)

2) Teams must complete tasks in serial order of the target number (①→②→③→④).

3) If robotics moves in on other team's courses and interfere with other teams, the errant robotics will be forcibly placed beck into its Start Point by divers in Rule Personnel's judgment.

4) Up to 3 members from each team are allowed to enter the Operators' Tent. Changing the members in Operator's Tent is not allowed during a match..

5) Each team can designate one member as a Cable Adjustor. Cable adjustors will not be allowed to enter Operators' Tent during a round.

6) Members in Operators' Tent must operate robotics using the images transmitted from robotics in operation with the eye on competition course. (See Figure 4-2-3.)
In addition to that, Cable Adjustors are allowed to give hints of robotics' location to their members in Operators' Tent.

7) Listed below are the screens which teams are allow to output images of QR codes to read.
However, teams need to output the images during the operation of the robotics on WIDE 21.5 inch LCD in any case.

・WIDE 21.5 inch LCD (1920×1080 resolution) placed in each Operators' Tent
・Teams' own display　(Bringing own display in Operators' Tent is allowed.)
・Screen on robotics controller

Teams must read QR codes on a screen by using the tablet PC with built-in camera which Competition Officials will provide for teams. The image of tablet PC above is shown in Figure 4-2-6.
・Model number of the tablet: ASUS Zen Pad 7.0 (planning to use)
・Designated app: "QR code reader" (Seller: @Honestly App).

4.2.3 Free-Style Vehicle competition

Free-Style Vehicle Competition Overview

- There will be two opportunities for each team to perform a demonstration during this competition. Only the 2nd demonstration in the afternoon will be scored. Please take the 1st allotted time for a demonstration in the forenoon as an opportunity to practice.

(1) Teams must perform demonstrations in the ROV Competition Course. The demonstration must starts from the Start/Goal Zone of the course.

(2) Teams must operate their robotics where the Judges direct.

(3)It is required to perform demonstrations within allotted time, 5 minutes for each team.

(4)Teams must explain on teams' robotics and on its performance during demonstrations.

(5) More than 2 members of Operator and the Person who explain teams' robotics in each team are not allowed in each team.

5. FAQ

Q1: Is it OK to equip robotics with reading QR code function in ROV Competition and write down the results on the report sheets? Is it also need to submit the images of QR code in that case?

A: It is allowed to equip robotics with reading QR code function, however, Judges will only decide the time which teams read the QR code based on the recorded time on the tablet PC which Competition Officials will provide for teams when scores of the teams are tied. If you use the robotics with reading QR code function, the time which your teams read the QR coed will not be officially recorded.

Q2: Does the Competition Officials prepare the tents for teams?

A: Yes. Competition Officials provide teams with tents.

Q3: Is it allowed to communicate with team members by using transceiver during the match?

A:No. This is because ROV competition is modeled on ocean exploration and we assume that teams search the target by using the information obtained from camera or sensor which equipped on their robotics. Therefore we consider it is undesirable that the team members who can look down on the situation of robotics and target can tell the operator of robotics where they should move. However, we allow the cable adjustor to stand in front of the Operator's Tent and give a hint to the team members who operate robotics.

Q4: According to the rules, each team will give performance in Free-Style Vehicle competition. Does that mean teams can decide the contents of performance freely without the regulation of the rules? Also, does teams need to give a performance using all areas of competition courses?

A: We don't set a regulation on the contents of performance of Free-Style Vehicle competition. And teams don't need to use the all areas of competition courses. (Of courses teams can use all areas if they want to.) We expect teams to appeal that they realize the concept they presented in the Workshop, for Technical Capability and Realization Capability are the scoring criteria.

Q5: We are building drone and are planning to operate it in the competition. Is it possible to do it?

A: You need a get permission from MLIT to operate drone in Competition Area, Ginowan New Fishing Harbor (densely populated area). If you need, please apply permission to MLIT referring to HP of MLIT by yourself.

Also, be careful that the applications used in your drones may programmed to operate only in the area where use of drone is allowed.

Q6: About the locations of buoys which are set along with the course of AUV, will Competition Officials provide us with the information such as GPS?

A: We will not announce the location of buoys, for we will not take a survey of it. The course of AUV is only as a guide. Please get GPS data of them during the Team Practice by yourself in case you need it.

Q7: Can we get Safety Cord of AUV from Competition Officials?

A: No. We require each of teams to prepare Safety Cord within fixed rules.

Q8: Is it possible to use the external power supply during the demonstration of Free-Style Vehicles? We have some trouble with the performance of our robotics by using its buttery now, and it might move only with an external power supply. The power consumption of our robotics is about 100W, 25-Volt, 5A.

A: We will prepare power generators AC 100V for the use of ROV rounds, so please use them.