

# FREQUENTLY ASKED QUESTIONS (FAQ)

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Mohamed Bin Zayed International Robotics Challenge

Inspiring the future of Robotics • صياغة مستقبل الروبوتات



جامعة خليفة  
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## GENERAL QUESTIONS

- 💡 When will the organizers publish the details of the communications network to be used during the competition?**  
Details of the communication network can be found at <http://www.mbzirc.com/challenge>
- 💡 When will the organizers publish the details of the scoring scheme?**  
We will provide more details on the scoring scheme in due course.
- 💡 Can a team embed a GPS receiver in the UAVs and/or UGV?**  
Yes.
- 💡 Will the organizers provide a 3D mock-up of the arena?**  
Draft indicative 2D layout of the Arena is given in Appendix 1. This will be finalized soon.
- 💡 Can some sort of mechanism be used to secure the UAV once it lands, like magnets for example?**  
Teams may add landing assistance mechanisms to the UAVs.
- 💡 What is the maximum allowable altitude?**  
The maximum allowable flying altitude is 20 m.
- 💡 Should we consider existence of wind on the challenge days? What type of weather do we expect during the challenge? Is the challenge going to be moved around if it is raining or if it is windy?**  
It could be windy on the challenge days. Historical weather data for Abu Dhabi can be found at: <http://www.myweather2.com/City-Town/United-Arab-Emirates/Abu-Dhabi/climate-profile.aspx>  
We do not plan to reschedule the event provided that it is safe to do so
- 💡 Will the participants be allowed to remote control with full bandwidth?**  
Yes. Off line-of-sight remote control is allowed without bandwidth throttling. However, as outlined in the Challenge Description document (available at [www.mbzirc.com](http://www.mbzirc.com)), the scoring scheme will provide a higher reward for autonomous task execution.
- 💡 What kind of software and tools will be provided?**  
None.
- 💡 Will you provide simulations of 3D objects and arena in ROS / Gazebo?**  
No.
- 💡 How will you allow teams around the world to test and prepare locally as much as possible?**  
We plan to allocate rehearsal time slots to teams, prior to the competition days in March 2017.
- 💡 Can we customize the arena to assist in localization?**  
No, except teams may place localization devices in the base station as outlined below in Q14.
- 💡 Can UAVs use offsite (cloud) processing?**  
No.
- 💡 Can we place localization device in the base station (e.g. DGPS)?**  
Teams may place localization devices in the base station.
- 💡 Will key GPS coordinates or marking on the ground indicating the direction towards the area of the area be provided?**  
Teams will have access to the site prior to the event during the rehearsals, and will be allowed to map the track before the competition.

💡 **The document currently indicates that the challenge will start by means of a whistle. Does that mean that our autonomous system must be able to detect the whistle blow or will there be additional means to trigger the system, such as a network broadcast or visual cues in the starting arena?**

Autonomous whistle detection is NOT expected. Human triggering of the robots is allowed without penalty, at the start whistle.

💡 **Could you give us more information about the arena for the competition? What surface will be there? Grass, sand or asphalt.. Is there a flat terrain?**

The arena will be a flat surface, with a slight slope to allow drainage. The surface is asphalt.

💡 **What is the environment around the field?**

Please see layout plan in Appendix 1.

💡 **Is the maximum dimension of the UAVs measured from axis to axis or the blades?**

The UAVs should be able to fit into a box with the maximum dimensions (1.2 m x 1.2 m x 0.5 m).

💡 **If in the system, the image is transmitted from UAV to ground computer, the image is then processed in ground computer, and the processed information is transmitted back to UAV, all autonomously, will this style be seen as human supervision?**

This will be considered autonomous

💡 **Are the UAV's allowed to touch or move on the ground?**

Yes

💡 **Can we map only the track or even the entire area during the rehearsals on the site before the event?**

Yes, you can map the arena area during rehearsals.

💡 **Can we map the area using a remote controller to control the aerial vehicle?**

Yes, you can remote control the UAV during rehearsals.

💡 **Does the environment around the field contain some kind of static 3D structures, such as buildings, walls, etc.?**

There will be towers at the edge of the arena to support the netting structure. Please also see layout plan in Appendix 1.

💡 **Can we have the location of the site of the competition?**

The event will take place at Yas Marina Circuit - Vehicle Dynamics Area.

💡 **Are the organizers able to provide assistance in receiving and storing our batteries prior to the event, or be able to direct us to somebody who may be able to help us in this regard?**

We are currently negotiating this with the Event Management company and more details will be published soon

💡 **Can you give us more details about what bandwidth will be available?**

There will be a dedicated communications network in competition arena based on WiFi - IEEE 802.11 (ISO/CEI 8802-11). Details about the communications network can be found at <http://www.mbzirc.com/challenge>.

💡 **Will the bandwidth be deliberately throttled?**

No

💡 **Will there be guaranteed coverage across the area at all reasonable altitudes?**

We will provide teams with 3D signal coverage maps, and teams can use these maps to assess the coverage.

💡 **Can we place our WiFi router in the base station? Can we place WiFi repeaters in multiple places around the arena?**

There will be a dedicated communications network in competition arena based on WiFi - IEEE 802.11 (ISO/CEI 8802-11). Details about the communications network are published at <http://www.mbzirc.com/challenge>. You will NOT be allowed to place your wifi router and repeaters in the competition arena or the base station.

💡 **What kind of WiFi antenna will you provide for competitors (connected to access point supplied by MBZIRC organization): MIMO polarization or single polarization, or both?**

There will be a dedicated communications network in competition arena based on WiFi - IEEE 802.11 (ISO/CEI 8802-11). MBZIRC will be installing the wireless access points in and around the arena that will transmit the competition wireless network. The competitors are responsible for the receivers and antenna as well as their integration into the robots.

💡 **Can we provide and use our own WiFi radios or access point?**

You will not be allowed to use your own WiFi network. There will be a dedicated communications network in competition arena based on WiFi - IEEE 802.11 (ISO/CEI 8802-11). Competitors are responsible for the wireless network receivers integrated into their robots. Competitors are not allowed to install their own access points.

💡 **In case of UAVs - is it allowed to have 2.4GHz link and standard RC controller for Emergency use only (drone is stuck, 5GHz link failed and we cannot control UAV)?**

Yes, standard RC links in compliance with the UAE regulation (check <https://www.tra.gov.ae/assets/9061HalC.pdf.aspx>) are allowed but only for emergency and RTK GPS.

💡 **Are we able to do point-to-point communication between vehicles on a different band to the specified WiFi network?**

You will not be allowed to use your own WiFi network. There will be a dedicated communications network in competition arena based on WiFi - IEEE 802.11 (ISO/CEI 8802-11). Details about the communications network can be found at <http://www.mbzirc.com/challenge>. More detailed specifications of the communications network will be provided in due course.

💡 **Will we be able to assign static IP addresses or will a mean for host discovery be provided?**

Wireless network will be a layer 2 connection between the wired connection in the 'base' and the wireless connection to the drone and will have DHCP enabled but static addresses can also be used if required. Standard discovery protocols will not be blocked on the competition networks. The team will request to register their Wi-Fi MAC addresses for the competition arenas.

💡 **What are the expected latency and bandwidth of the network?**

We do not intend to degrade the quality of the network, so the latency will within the expected normal range. Bandwidth is dependent on the capability of the receivers and how the competitors integrate them with the robots.

💡 **Will homogeneous network coverage be guaranteed or can the network quality vary over the arena?**

We will provide teams with 3D signal coverage maps, and teams can use these maps to assess the coverage.

## CHALLENGE 1

💡 **What will the truck look like?**

The approximate shape and dimensions of the truck are shown in the Challenge Description video at [www.mbzirc.com](http://www.mbzirc.com). More details will be provided in due course (expected in January 2017).

💡 **Will the organizers provide a CAD description of the type of objects that would be encountered in the arena with visual features?**

Information on all the objects in the arena is specified in the Challenge Description document (available at [www.mbzirc.com](http://www.mbzirc.com)). Additional objects will not be introduced.

- 💡 We need some supplementary information about the obstacles such their shapes and height?**  
Information on all the objects in the arena is specified in the Challenge Description document (available at [www.mbzirc.com](http://www.mbzirc.com)). Additional objects will not be introduced.
- 💡 What kind of surface is the landing platform for the UAV made of?**  
The landing platform is made of mild steel plate. A technical drawing of the landing pad is given in Appendix 2.
- 💡 Will you define a safety zone for the UAV to stay in?**  
The UAVs should stay within the flight envelope specified in the challenge description document, at all times.
- 💡 Is there a bar on to which the UAV can latch on while landing?**  
No.
- 💡 Is the event going to be held in day light or night?**  
The event will be held in day light.
- 💡 Do you have the landing pattern printed to send us its real picture or could you give us a more detailed specification of the pattern? Can we rely on the black pattern with white background as it is in the pdf? Do you know width of the lines used for drawing the pattern?**  
A draft technical drawing of the landing pad is given in Appendix 2.
- 💡 Do you know the surface and color of the road?**  
The surface is asphalt.
- 💡 Will the shape of the road match the figure 8 drawn in the description document exactly?**  
A draft indicative 2D layout of the Arena is given in Appendix 1.
- 💡 Will the ground vehicle follow the specified speed curve given in figure 3 of the description document exactly?**  
The diagram should be considered as indicative only. We will provide more details of the speed profiles in due course. As the vehicle is manually driven, variances in the speed and path are to be expected and therefore planned for when preparing for the competition.
- 💡 Do we allow teams to create a tether (or similar?) to assist in landing?**  
No, and similar systems are also not allowed
- 💡 An unpowered UAV's rotors will spin if wind blows against them. This is likely to occur after the UAV has landed on the back of the truck traveling at 15 km/h. However, the challenge document states "A successful landing is when a point of contact of the UAV is within the landing circle, with propulsion off and rotors not spinning." Will wind turning the rotors cause a landing to not count?**  
Spinning of rotors due to the wind, after the propellers are switched off, will not be penalized.

## CHALLENGE 2

- 💡 When the UGV is at the start position, will the panel be within view? Or might the target vehicle be occluded, for example by uneven terrain such as rocks or trees?**  
The panel will be within view when the UGV is at the start position. There will be no obstacles in the arena. The terrain will be flat.
- 💡 How and at which location the set of tools will be located on the vehicle? Will they be aligned by size?**  
The tools will be randomly distributed on pins on the panel. A draft technical drawing of the landing pad is given in Appendix 3.

💡 **Can you provide any information about the material and the color of the panel, the valve and the pins?**

The panel will be back painted plywood. The tools will be silver in color. A draft technical drawing of the panel is given in Appendix 3.

💡 **What is the height of the panel?**

A draft technical drawing of the panel is given in Appendix 3.

💡 **Is the UGV requested to drive on the road?**

No.

💡 **Will the tools and valve have the same dimension as in the description document?**

Yes.

💡 **Does the panel with the tools and the valve stem stand on/next to the 8-shaped street, as shown in the video, or anywhere in the field?**

The panel could be placed anywhere in the field

💡 **It is mentioned in the description document that wrenches follow the ISO 7738 standards. The ISO 7738 standard does not exactly prescribe the length of the wrenches. Is there any chance you can provide the exact length of each of the wrenches used at the challenge?**

A detailed description of the wrenches is given in Appendix 5.

💡 **Will there be more than one wrench of the same size on the panel?**

No

💡 **It was mentioned in the Challenge Description document that one of the 6 wrenches is appropriate for operating the valve stem. Does it mean only one wrench would fit the valve stem?**

Yes, only one will exactly fit the valve stem.

## CHALLENGE 3

💡 **Will there be any bandwidth restriction on inter-UAV communication, or UAV-supervisor communication?**

There will be no bandwidth restrictions on inter UAV communications. However, human intervention will be penalized in the scoring scheme.

💡 **What is the speed of the moving objects?**

The moving objects will traverse random trajectories, at a random speeds not exceeding 5 Km/hr as described in the Challenge Description document.

💡 **Can we change the battery during the challenge?**

No.

💡 **What are the types and shapes of the objects?**

Draft technical drawings of Challenge 3 objects are given in Appendix 4.

💡 **Will all the objects 3D models with color be made available in gazebo or some such tool?**

No.

💡 **How many UAVs can participate in the challenge? Is there a min/ max number?**

The number of UAVs taking part in Challenge 3 should be exactly 3.

💡 **Can UAVs of different forms participate or should they be similar?**

UAVs of different types can participate in challenge 3.

💡 **Is there any cost consideration? Is there penalty for high Bill Of Materials cost?**

No.

- 💡 Can the drone size increase during the challenge? If we were for instance to deploy a winch on the drones which could extend beyond 0.5m, would that violate any rule?**  
Drone size can increase during the Challenge. However, the drones should be within the specified maximum dimensions at the start and finish of the challenge.
- 💡 Will there be any penalty for not recovering the drones at the end of the challenge? Will any points be subtracted if a drone crashes during the scenario or if fails to return to a specific location before the battery power expires?**  
No.
- 💡 In the pdf specification, there is written that some numbers specifying points for each object should be printed on their surface. Do you know shape, color and size of these numbers?**  
Draft technical drawings of Challenge 3 objects are given in Appendix 4. The objects will be color coded only.
- 💡 Do you have a picture of the dropping zone?**  
The dropping zone is shown in the draft 2D layout of the Arena given in Appendix 1.
- 💡 Can we place a sign for automatic visual recognition of the zone inside the box or close to it?**  
No.
- 💡 Is it allow to have a starting platform (a flat plate) in start zone?**  
No.
- 💡 What are the shapes and size of the gripping surface?**  
Draft technical drawings of Challenge 3 objects are given in Appendix 4.
- 💡 Will all surfaces of the objects be ferrous, or just the top surface?**  
The top surfaces of the Challenge 3 objects will be ferrous, to permit the use of magnetic grasping mechanisms. Draft technical drawings of Challenge 3 objects are given in Appendix 4.
- 💡 How thick is the metal part above the objects which will be used by the magnetic end effector?**  
This is shown in the draft technical drawings of Challenge 3 objects given in Appendix 4.
- 💡 In what range are the weights of the payloads, i.e., are small objects all around 0.5 kg or are there some which are much lighter?**  
The weights of the round object will be less than 0.5kg. Draft technical drawings of Challenge 3 objects are given in Appendix 4.
- 💡 Is there a minimum size for the objects?**  
Draft technical drawings of Challenge 3 objects are given in Appendix 4.
- 💡 Will the placing box in the dropping zone be moved during the event?**  
The placing box will not be deliberately moved, however, the organizers do not guarantee that the location will be fixed.

## GRAND CHALLENGE

- 💡 How will the sequence of the triathlon be initiated?**  
All three events will take place simultaneously during the Grand Challenge.
- 💡 Can teams participating in challenges 1, 2 and 3 merge to form a joint team to participate in the Grand Challenge?**  
Yes, this is possible and encouraged.