Official Rules for the International Aerial Robotics Competition
国际空中机器人大赛 官方规则 任务8
MISSION 8

INTRODUCTION

The primary purpose of the International Aerial Robotics Competition (IARC) has been to "move the state-of-the-art in aerial robotics forward" through the creation of significant and useful mission challenges that are 'impossible' at the time they are proposed, with the idea that when the aerial robotic behaviors called for in the mission are eventually demonstrated, the technology will have been advanced for the benefit of the world.

简介

国际空中机器人大赛(IARC)的根本目标是通过设置具有挑战性的、实用而有意义的比赛任务推进空中机器人最先进技术的进步。这些任务在提出时是几乎不可能实现的，而当其最终被空中机器人完成时，世界将受益于因此所得到的技术进步。

Mission 8 will build on past missions to demonstrate both enhanced Mission 7 behaviors as well as new aerial robotic behaviors unique to Mission 8.

国际空中机器人大赛的第8代任务将基于之前的一系列任务，参赛机器人需要在任务8中展现出强于在任务7中的表现，同时需具备任务8所要求的独特性能。

TECHNOLOGIES TO BE DEMONSTRATED

Beyond those technologies and behaviors that have been demonstrated during past missions (full autonomy, obstacle avoidance, tracking, etc.) the following are emphasized:

1. Man-machine interaction (non-electronic command and control)
2. Fused sensory enhancement of a human operator by a fleet of aerial robots
3. Swarm interaction
4. Aerial target designation
5. Head-to-head interaction with opposing aerial robots

要求技术特性

除了之前一系列任务所要求的技术特性（如全自主能力、避障能力、导航制导能力等）以外，任务8的参赛机器人还需要具备如下特性：

1. 非电子人机交互能力（即对无人机的非电子控制，如语音控制，手势控制等）
2. 通过机群上传感器的信息融合，增强操纵人员的态势感知能力
3. 机群间交互能力
4. 空中目标辨识能力
5. 不同空中机器人在同一片空域中执行不同任务时彼此的交互能力

As unmanned systems continue to be characterized by advanced autonomous capabilities, the human advantage grows as timely, relevant, and correct information is shared between distributed agents. Alongside advances in autonomous behavior, the collection of previously unattainable amounts of

无人机不断增强的自主能力和无人机间信息交互的瞬时性、相关性与准确性的提升，可以为人员带来额外的优势。除了先进的自主能力外，分布在多台无人机上的传感器的协同工作，允许我们采集之前难以获得的数据。然而，人们依旧需要依赖实时信息来做

salient data is possible as sensors distributed across multiple disparate assets work cooperatively towards efficient mission completion. In this environment, humans will still rely on relevant and timely information to make critical decisions, but access to much larger volumes of shared information will ultimately prove overwhelming. Command and control in this way must be considered in the context of the finite processing capabilities of humans. Unique challenges in this space include the development of appropriate dynamic tasking across teams of human and unmanned assets.

出决策，因此获取更大量的共享信息可以为人们提供压倒性的优势。 在这种情况下，人员的处理能力受限，需要考虑指令和控制问题。在这个空间中比赛面临的独特挑战是在人与无人机队员之间进行合适的动态任务规划能力的开发。

During Mission 8, these technologies will be demonstrated as a single person working with a team of aerial robots, attempts to retrieve a critical component that necessary to prevent a reactor from failing. Opposing aerial robotic sentries will attempt to prevent that person from interfering with reactor operation.

在任务8中，上述技术性能将在如下情形中得到体现：一个队员与一队无人机协同工作，试图在敌方有无人机巡逻的场地中取回某件特定物品，同时要保证不被敌方反制。

VENUES AND INTERNATIONAL TEAMS

赛区与队伍设置

The International Aerial Robotics Competition Mission 8 will be conducted at two venues: The *American Venue* and the *Asia/Pacific Venue*. The locations of these venues will be announced at the Official IARC website. Instructions about how to enter this competition are given later in these rules. Teams must designate at which of the two venues they wish to compete. Once a venue is selected, teams will continue to compete at the selected venue unless they choose to re-register and start over by paying the up-front one time Application Fee.

国际空中机器人大赛（IARC）的第八代任务将分美国赛区和亚太赛区举办。各赛区具体地址将发布于国际空中机器人大赛（IARC）的官方网站，具体的报名方式将在后文中详述。各参赛队需要指定他们希望参加哪个赛区的比赛，赛区一旦选定，参赛队需要在该赛区内完成全部比赛项目，如要更换赛区，需重新注册并重新缴纳报名费。

Each venue has visa and customs requirements that are dictated by the host country and are beyond the control of the IARC Organizer and Staff. It is recommended that international teams requiring visas, begin the visa acquisition process several months in advance of the IARC.

参加比赛所需要的签证和其他海关要求将直接由主办国家给出要求，并在国际空中机器人大赛赛委会的控制范围之外。因此，建议参加比赛的国际队伍提前数月准备签证事宜。

Check customs procedures and in some cases it may make more sense to ship equipment ahead by international courier than attempting to carry it as carry-on or checked baggage.

同时请提前查阅海关的相应要求。请注意，在某些情况下，通过国际物流将比赛器材提前运达可能要好过乘机时随身携带或托运。

NARRATIVE

The starship I-Ark is en route to colonize a Class-1 planet in the Proxima Centauri system, approximately 0.89 parsecs from Earth. A reactor failure has occurred and the substitution of a critical component is necessary. There are 5,000 colonists in suspended animation on board. As the ship's engineer, you have been awakened and released from your hibernation pod by the central computer to fix the problem, but you only have 8 minutes to retrieve the required critical replacement component and install it before the reactor shuts down permanently and all life support systems fail.

The reactor is protected by aerial robotic sentries that do not recognize you and will attack you. You have activated four aerial robots to assist you when entering the reactor control room. They will help you locate the necessary replacement component and can counter the attacks of the sentry robots which can kill you.

任务背景

星际飞船“方舟一号”正在前往比邻星系中的一个I类行星的途中，距地球约0.89秒差距（2.9光年）。此时，一个反应器发生故障，因此不得不进行一个关键组件的更换。飞船上有5000名出于休眠模式的殖民者，作为随舰工程师，您被中央计算机从休眠舱中唤醒，但您只有8分钟时间来取回所需的关键更换部件，否则反应堆将彻底停止工作，所有生命支持系统将失效。

反应堆受到空中机器人哨兵的保护，这些机器人哨兵不具备敌我识别能力，因此会攻击您。进入反应堆控制室时，你可以激活携带的四台空中机器人助手，帮助你定位所需的替换部件，并可以应对可能会杀死您的哨兵机器人的攻击。

You must locate the necessary component, physically retrieve it without being killed, and replace the failed component in under 8 minutes. Your aerial robotic helpers will only accept non-electronic commands of your choosing (gestures or voice commands). Sentry robots can inflict wounds which can kill you but your aerial robotic helpers have the ability to heal some wounds if they are in proximity to you and are commanded to do so.

您必须找到必要的组件，在不被杀死的情况下将它取回，并在8分钟内更换出现故障的组件。 您的空中机器人助手将只接受您的非电子命令（手势，语音命令等）。哨兵机器人会对您进行攻击，但是您的空中机器人助手有能力保护您，或在接近您并得到相关命令的时候对您进行治疗。

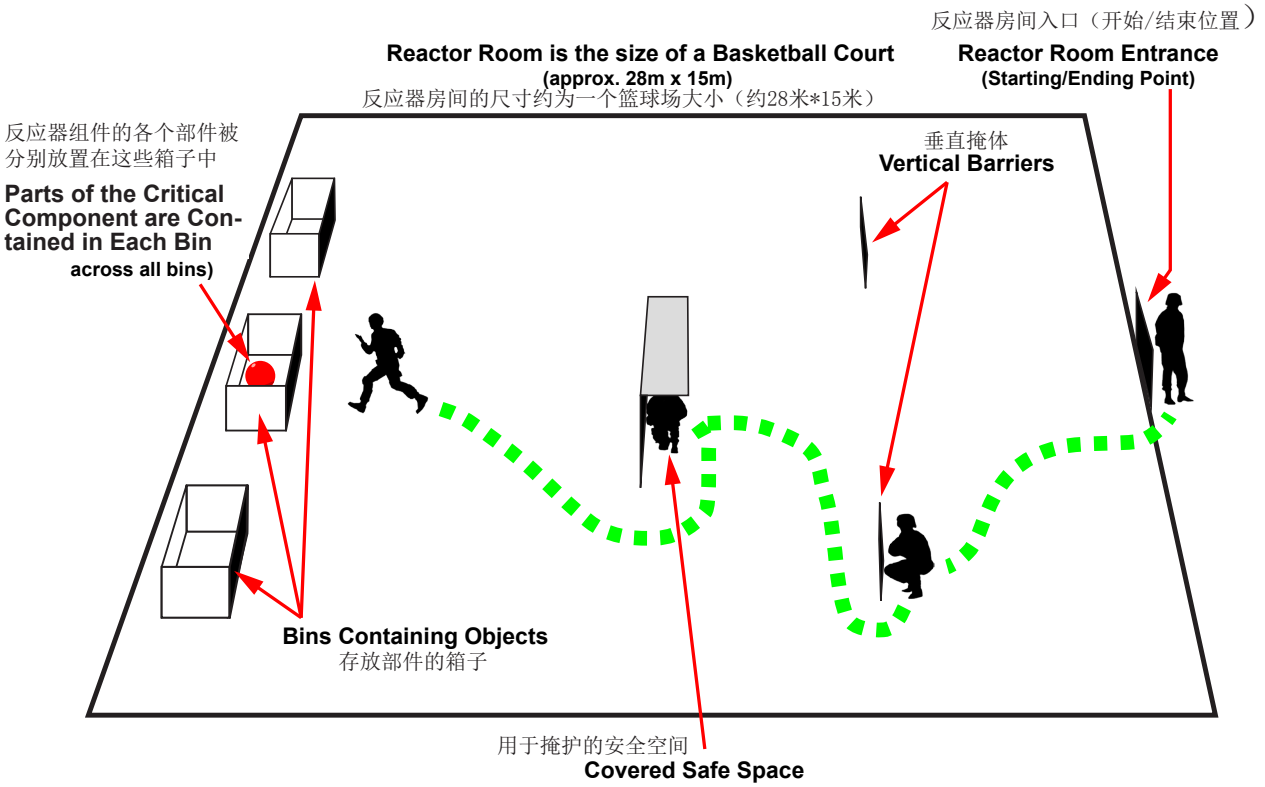


Figure 1. Search and Ingress. 图1 搜索与进入

THE REACTOR CONTROL ROOM

The reactor control room is the size of a basketball court (28m x 15m). The floor surface is of an unknown pattern. Within the reactor control room are various obstacles as shown in Figure 1. These obstacles can be used for partial cover from the view of the sentry robots. Four (4) parts bins are located somewhere at the opposite side from the Reactor Room entrance. Disassembled parts of the critical component are locked in each of the parts bins.

反应器控制室

反应器控制室的尺寸是一个篮球场大小（28米×15米），地面的花纹是未知的。在反应器控制室内有各种障碍物，如图1所示。从哨兵机器人的角度看，这些障碍物可为工程师提供一部分掩护。四个零件箱位于反应室入口对面的某个位置。反应器组建的各部件存放在各个零件箱中。

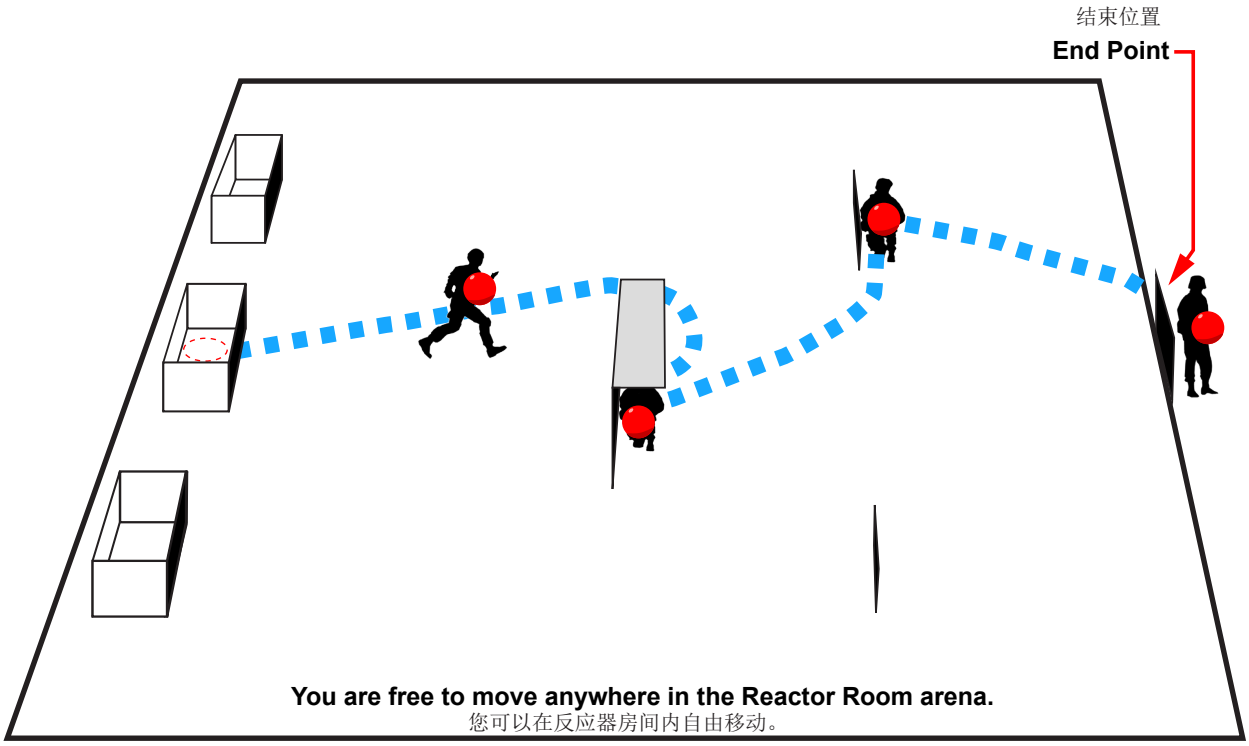


Figure 2. Component acquisition and egress (component shown is notional).
图2 组件取回与撤离

SENTRY ROBOT BEHAVIOR
(*Sentry Robots are part of the Arena*)

Sentry robots will scan the reactor control room for intruders and will attempt to kill them with laser beams. Originally designed to kill rodents onboard the starship during the 8 year journey, the sentry robot laser beams are weak, but a human that is hit by these lasers 10 times will die.† Sentry robots will attack any foreign objects that they detect and will approach and follow those objects until they can neutralize them with their laser beams. Lasers require 5 seconds to recharge between firings, so the maximum attack rate is once per 5 seconds by any given sentry robot. Only one sentry robot will attack a given target at a time. The effective range of these lasers is unknown to you.

哨兵机器人行为模式
（哨兵机器人是比赛场地的一部分）

哨兵机器人将搜索反应堆控制室的入侵者，并试图用激光束杀死他们。最初设计的目的是为了在8年的旅程中杀死星舰上的啮齿类动物。哨兵机器人激光束很弱，但是被这些激光击中10次的人类将会死亡。†

哨兵机器人将攻击他们检测到的任何异物，接近并追踪这些物体，直到用激光束消灭它们。每次激光发射至少需要5秒钟的时间间隔来充电，所以任何一个的哨兵机器人最大的攻击速度是每5秒一次。一次只有一个哨兵机器人会攻击一个给定的目标。这些激光器的有效范围是您并不清楚的。

HELPER ROBOT BEHAVIOR
(*Helper Robots are designed by you*)

Your aerial robotic helpers must be man-safe and must be controlled by any non-electronic means (no RF, acoustic, or optical signaling devices). They can only be commanded and controlled by your body gestures or vocal commands.

助手机器人的行为模式
（助手机器人由参赛队伍自行设计）

您的助手机器人必须是对人员安全的（如将螺旋桨包裹在保护罩中），并且只能由非电子手段（不能是射频、声学或光信号装置）控制，如手势或声音指令。

†This number may increase or decrease from year to year.

† 这个数字可能会逐年增加或减少。

They should be able to provide a video stream to you using FPV-like display goggles or a WiFi mobile display device (receive only) that allows you to see what they see. For operational efficiency, it is desirable that they be able to communicate electronically amongst themselves. They must avoid collisions with sentry robots and can not land in the arena (if they land or if they collide with a Sentry robot, they will be disabled by a Judge). Your aerial robotic helpers can heal your laser hit wounds with a surgical laser (identical to the sentry robot laser, but coded differently), however only four such healings are possible. The presence of the surgical laser can also prevent sentry robot laser hits from being effective for 5 seconds if within range and directed toward you at the same time you are shot by a sentry robot. Finally, it is desirable that your aerial robotic helpers have an endurance of at least 8 minutes but their endurance is not mandated.

他们应该能够通过类似FPV的视频眼镜或Wi-Fi移动显示设备（仅限接收信号）为您提供实时视频。为了提升操作效率，我们希望这些机器人助手能够彼此互相通信。他们需要能够避免与哨兵机器人发生碰撞，且不能在场地内着陆（如果他们着陆或与哨兵机器人相撞，本轮比赛他们将不能重新起飞）。您的助手无人机可以用治疗激光（与哨兵机器人的激光形式相同，但编码不同）对您进行治疗，每次治疗激光可以治疗一次攻击激光伤害，但在每轮比赛中，每台助手无人机只能发射一次治疗激光。在您被治疗激光持续照射时，哨兵机器人的攻击激光将对您无效持续5秒。最后，您的助手无人机建议至少需要8分钟的续航时间，但不作强制要求。

You have 4 aerial robotic helpers (and therefore 4 healing opportunities). [*The primary task for your engineering design team on Earth is to develop and test these four aerial robotic helpers prior to your voyage*].

您共有4个空中机器人助手（因此共有4个治疗的机会）。［你们在地球上的工程设计团队的首要任务是在航行之前开发和测试这四个空中机器人助手］。

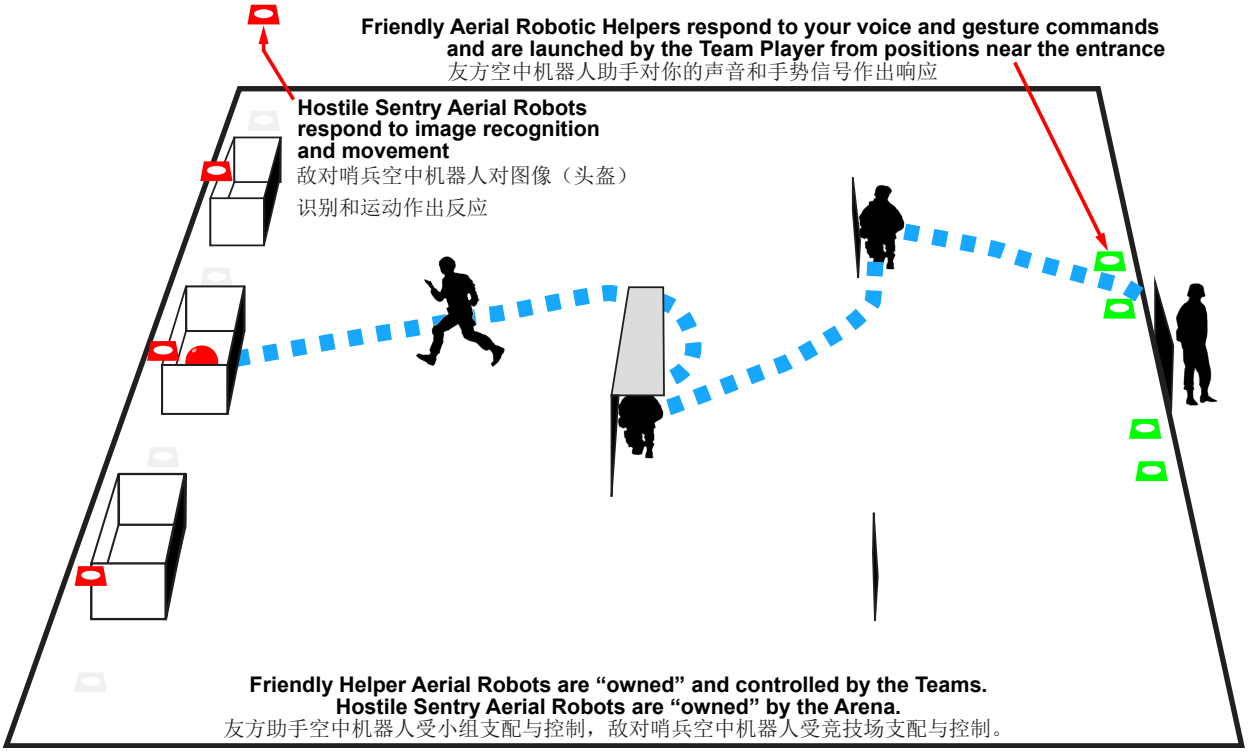
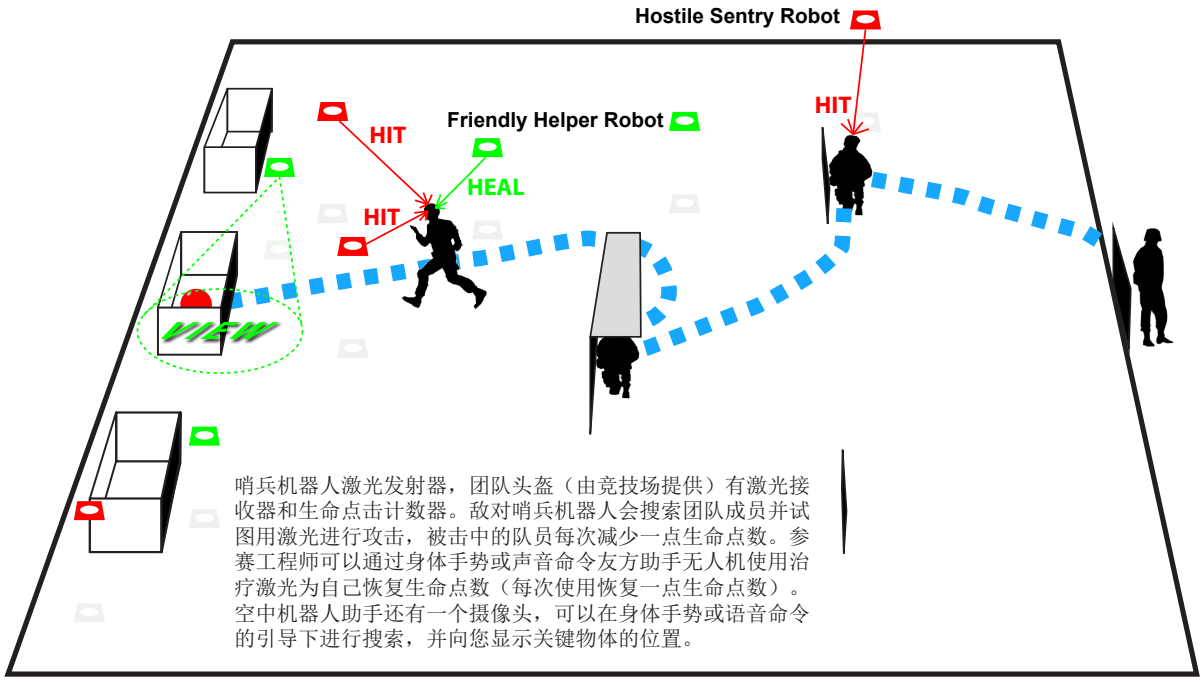


Figure 3. Aerial Robot initial placement.
图3　空中机器人的初始位置



Hostile Sentry Robots have Laser Designators (*like "Laser Tag"*). The team helmet (supplied by the Arena) has Laser Receptors (*like Laser Tag*) and a "Hit Counter". Hostile Sentry Robots seek out the team player and try to hit him (taking away a "life"). Friendly Helper Robots can be summoned by body gesture or voice to come and heal by giving back a "life". Friendly Aerial Robots also have a camera to search and show you where the critical object is located when so directed by body gesture or voice command.

Friendly Helper Robots can not collide with Sentry Robots. The critical object must be retrieved within 8 minutes.
友方助手机器人不能与哨兵机器人相撞。关键物体必须在8分钟之内完成搜索与取回。

Figure 4. Potential Actions and Events during the 8-minute run.
图4　8分钟比赛内可能出现的情况示意图

OBJECTIVE

Enter the Reactor Room and retrieve the four parts comprising the critical component, and take it out of the Reactor Room through the doorway you entered without being killed, and do it in under 8 minutes. This will only be possible with aid of your Helper aerial robots that your team must develop. Your design team's task is to create aerial Helper robots that can:

1. Fly fully autonomously
2. Stay within the arena
3. Avoid obstacles including
   a. Sentry Robots
   b. Storage lockers ("bins")
   c. Protective obstacles
4. Respond to verbal or gesture commands
5. Illuminate player with "healing beam" on command
6. Station keeping over storage bin on command

比赛目标

比赛目标是进入反应器控制室，取回反应器组件的四个部件，再从入口离开。每轮比赛需要在8分钟内完成，且不能被杀死， 您只能在您的小组必须开发的助手空中机器人的帮助下完成比赛。您的设计团队的任务是设计开发具有以下特性的空中机器人助手：

1. 全自主飞行
2. 飞行范围控制在比赛场地内
3. 躲避障碍，包括
a. 哨兵机器人
b. 部件存储箱
c. 保护掩体
4. 对声音或手势指令做出响应
5. 在相应指令发出时，使用治疗光线照射参赛队员
6. 在相应指令发出时，悬停在存储箱上方
7. 将存储箱的视频情况发送给参赛队员
8. 理想情况下，至少可以续航8分钟

7. Send video of storage bin readout to player
8. Ideally have at least 8 minute duration.

COMPETITION ADMINISTRATION

The attempt will begin upon the signal of the Judges. Teams will have 5 attempts to achieve this objective in any given competition year.

比赛管理细则

每次比赛以裁判信号为开始标志，每支队伍在每届比赛中共将有5次尝试的机会。

Teams must be ready to begin their attempt when called. Each team will have one "pass" allowing them to move to the rear of the attempt queue. Teams that are absent or not ready when their turn in the attempt queue arrives, shall forfeit that attempt.

团队必须随时准备开始他们的每轮尝试。每支团队都有一个“暂时跳过”的机会，允许他们移动到本轮比赛的最后。若某支队伍在使用跳过后再次排到该队伍时，该队伍仍未做好准备，则视为放弃此次尝试。

A monetary prize will be awarded to the first team to perform the mission. More than one team may successfully perform the mission in a given year, but the one doing so in the least amount of time will win the grand prize. Determination of the final winner will be announced once both the American and Asia/Pacific Venues have been completed in any competition year.

第一个完成任务的团队将获得大奖和奖金，若有不止一个团队成功完成任务，则用时最少的团队将获得此奖项，此奖将在美国和亚太赛区均比赛完毕后颁发。

The grand prize will begin at $10,000 and will increase by $10,000 for each year that the mission remains incomplete. Competition sponsors may add to the prize award at their discretion.

大奖的初始奖金为10, 000美元，如某一年的比赛任务没有队伍完成，该年度的奖金将累积到下一年。同时比赛赞助商可以自行决定是否增加奖金金额。

AERIAL ROBOT DESIGN DETAILS

The hostile sentry aerial robots belong to the arena and will be designed and operated by the arena staff. These aerial robots will be autonomous and to enhance gameplay, "directed autonomy" may be used to keep them in the arena and within reasonable altitude bounds, should they wander.

空中机器人设计要求细则

敌方的哨兵机器人属于大赛场地，由赛委会工作人员设计和操作。这些空中机器人将是自主飞行的，为了增强游戏性，如果他们在场地中的漫游飞行过于随机，“定向自主飞行”可以使他们以一个恰当的高度保持在赛场范围内。

Teams will design four (4) friendly aerial robotic helpers based on off-the-shelf platforms (preferred) or original designs. These aerial robots must be man-safe in that their propulsors must be completely enclosed so that the judge can not touch the rotating propulsor with a finger.

每支团队将基于现有的无人机平台（推荐）或自行设计的平台，设计四个友方空中机器人助手。这些空中机器人必须是对人员安全的，即他们的螺旋桨必须是完全封闭的，以防裁判的手指碰到桨叶。每个机器人都必须

A shutdown switch uniquely keyed to each of the 4 aerial robots must be provided to a Judge so that the aerial robots can be disabled independently.

配备一个独立的关机开关，以便在特殊情况发生时，裁判可以随时关闭这个飞行器。

The aerial robots must not be controlled by any electronic means (no RF, acoustic, or optical signaling devices). They can only be commanded and controlled by body gestures or vocal commands.

不得使用任何电子手段（如射频，声学或光信号装置）来控制空中机器人。他们只能通过身体手势或声音命令来指挥和控制。

They should be able to provide a video stream to the person in the arena using FPV-like display goggles or a WiFi mobile display device (receive only) that allows that person to see what the aerial robots see. An HDMI signal shall also be provided to the Organizer for display on a big screen if the Organizer decides to do so.

他们应该能够使用类似FPV视频眼镜或Wi-Fi移动显示设备（仅接收信号）向场内人员提供实时视频，以允许该人员看到空中机器人看到什么。如果组委会要求的话，该实时视频也应可以通过HDMI信号同步在大屏幕上显示。

For operational efficiency, it is desirable that the 4 aerial robots be able to communicate electronically amongst themselves. For example, if they are all searching for the critical object and the person in the arena determines that all of its parts have been found, a command to return to the person received by one helper robot could be communicated to all others so that they break off their search and also return to the person without having to be individually instructed to do so.

为了提升效率，我们希望4个空中机器人能够彼此进行电子通信。例如，如果他们都在搜索组件，但参赛队员确定已经找齐了所有部件，则一个辅助机器人可以将接收到的命令（如停止搜索，返回人员处等等）发送给所有其他人，以便令所有其他机器人中止搜寻。

Friendly helper robots must avoid collisions with sentry robots and can not land in the arena (if they land or if they collide with a Sentry robot, they will be disabled by a Judge). Your aerial robotic helpers can heal laser hit wounds sustained by the person in the arena with a “surgical laser” (identical to the sentry robot laser, but coded differently— the design of which is provided separately from these Rules). When commanded to do so, each aerial robotic helper can heal one wound one time by focusing its surgical laser on the person in the arena for approximately 1 second. A total of 4 healings are possible. Continuously focusing a surgical laser on the person can neutralize new hits by sentry robots for up to 5 seconds.

友方助手机器人必须避免与哨兵机器人发生碰撞，也不能在比赛过程中着陆（如果他们着陆或与哨兵机器人相撞，本轮比赛他们将被裁判禁用）。你的助手机器人可以用“治疗激光”（与哨兵机器人激光器相同，但编码不同，设计细则将由相关文档提供）治疗激光伤口。当这样做时，助手机器人需要将治疗激光在队员身上持续照射1秒钟来增加一点生命点数。 总共可以进行4次治疗。持续将治疗激光照射在队员身上可以使伤害激光无效最多5秒钟。

Finally, it is desirable that your aerial robotic helpers have an endurance of at least 8 minutes but their endurance is not mandated by these Rules.

最后，你的空中机器人助手的续航能力建议至少达到8分钟，但是规则并不对续航能力做强制要求。

THE ARENA

The arena will be approximately the size of a basketball court (28m x 15m). The floor pattern, surrounding walls and ceiling, and lighting parameters are unknown. The arena boundary will be marked and for safety, all activity should remain within this boundary.

比赛场地

竞技场将大约是一个篮球场的大小（28米×15米）。地板、墙壁和天花板图案和照明参数是未知的。竞技场边界将有相关标记，为了安全起见，所有活动都应该保持在这个边界之内。

The person attempting to retrieve the critical object will wear an instrumented helmet that is provided by the arena staff. The use of this helmet is mandatory and will contain laser hit sensors and "life counter" circuitry. The helmet may not be obstructed with any worn covering, object, or by hands.

上场试图取回反应器部件的队员将被必须佩戴由比赛工作人员提供的头盔，该头盔包含激光扫描传感器和生命点数计数器。头盔在佩戴时不能被手或任何除掩体外其他物品遮挡。

Obstacles, bins, and objects will be provided in the arena and placed in a manner similar, but not exactly to that shown in Figure 1. The exact placement is unknown. The entry/exit point is the center of one end of the arena.

障碍物，储物箱和待取组件将由比赛组委会中提供，放置的方式与图1所示相似，但不完全相同，具体位置未知。进出口位于竞技场一条边的中心。

The "critical object" will be distributed within the 4 locked bins. A code is required to unlock the bins. Near each bin is a section of the necessary code which must be viewed nearly simultaneously to decipher the code as each code display will reveal only a portion of the code (the composite code will remain the same throughout a given run). Simultaneously viewing and overlay of the code segments will reveal the code that unlocks all of the 4 bins containing the "critical object". The person in the arena will need to use this code to unlock each bin until all of the parts of the critical component have been retrieved. During this time, the person should attempt to avoid attacks by the sentry robots.

反应器组件的各个部件将分别在锁在4个储物箱内。需要密码才能解锁。在每个储物箱的顶部是解锁密码的一部分码，必须在一定的时间间隔内查看所有四个代码，否则代码将刷新。每个代码显示只会显示密码的一部分，将四个储物箱顶的代码组合才能显示出完整密码。（组合后的密码将在8分钟尝试内保持不变）。参赛队员需要用这个密码来解锁每个储物箱，直到关键组件的所有部件都被取到。在此期间，队员应该试图避免哨兵机器人的攻击。

EXAMPLE
Code for 2468

Bin Display 1

Bin Display 2

Bin Display 3

Bin Display 4

Above is a Version 1 code with Error Correction level "H". An example code generator can be found online at: https://createqrcode.appspot.com This is what will be used as a QR Code standard for the IARC.

The "critical object" to be retrieved will be the same at both the American and Asia/Pacific Venues, but will be unknown to teams prior to the first venue event. This object may change from year to year. The layout of both the American and Asia/Pacific Venue arenas will be substantially the same, although the physical surroundings, lighting, sound level, and RF environment may differ. Helper aerial robot designs must be robust enough to account for these variations.

每年比赛，在美国和亚太地区的反应器组件都是相同的，但是在第一场比赛之前，这个反应器的具体样式是未知的 。美国和亚太地区的场馆布局将基本相同，但环境，照明，声音水平和射频环境可能有所不同。因此空中机器人助手必须被设计的必须足够强大，来兼容这些变化。

ENTERING MISSION 8

The official web pages for the competition are your source for all information concerning rules, interpretations, and information updates regarding the competition. In anticipation of the upcoming event, the official rules and application form will be obtained from the official web pages and will not be mailed to potential competitors. If you have received these rules as a hard copy from some other source, be advised that the official source of information can be found at:
http://www.aerialroboticscompetition.org/

任务8报名指南

比赛官方网页提供有关比赛规则，解释和更新的所有信息。 官方规则和申请表可以从官方网站上获得，且并不会发送给潜在的竞争对手。如果您从其他来源收到这份规则的纸质版，请注意官方的信息可在以下网址找到：
http://www.aerialroboticscompetition.org/

The application form is available electronically at:
http://www.aerialroboticscompetition.org/entryform.php

电子申请表单可以在以下网址中获得：
http://www.aerialroboticscompetition.org/entryform.php

All submissions must be in English. The completed application form is not considered an official entry until an Application Fee (1500 U.S. Dollars - American Venue, or 9,900 RMB - Asia/Pacific Venue) is received on or before June 1 of the current year for which a team officially enters the Competition and each subsequent year that the team participates (this fee is NON-REFUNDABLE if a team is either unable to attend or chooses not to attend).

所有提交的文件必须用英文撰写。每支队伍的比赛报名费用为1500美元（美国赛区）或9,900人民币（亚太赛区），且需要在当年的6月1日或之前缴纳 。（注意：如放弃参赛，报名费用不可退还）

On the final day of the competition, each team captain will receive a rebate (500 U.S. Dollars - American Venue, or 3,300 RMB - Asia/Pacific Venue). Teams failing to show up to the competition, or leaving prematurely, agree to forfeit their rebate.

在比赛的最后一天，每队队长可以收回500美元（美国赛区）或3300人民币（亚太赛区）的退款，若未参加比赛或提前离开比赛，则视为放弃这部分退款。

Teams must be based at a university and must have an identified academic faculty advisor. Only one team per university unit is allowed to compete, and each team must have uniquely-developed aerial robotic hardware (no sharing of aerial robots).

每支比赛队伍必须来自于大学，且必须有一个确定的指导教师。每个大学的同一院系只能有一支队伍参赛（即每个大学可以有多个队），且每支队伍必须使用独立的比赛设备（即不能与其他队伍共享空中机器人）。

QUALIFICATION

参赛资格

Teams may be comprised of a combination of students, faculty, industrial partners, or government partners. Students may be undergraduate and/or graduate students.

参赛团队需要由学生，教师，行业合作伙伴或政府合作伙伴组成，学生可以是本科生或研究生。

Interdisciplinary teams are encouraged (EE, AE, ME, etc.). Members from industry, government agencies (or universities, in the case of faculty) may participate, however full-time students must be associated with each team. The student members of a joint team must make significant contributions to the development of their entry. Only the student component of each team will be eligible for the cash awards.

组委会鼓励交叉学科团队（如团队成员分别来自电子信息工程，航空航天工程，机械工程等不同专业）。行业，政府机构或大学（就大学教师而言）的成员也可以参加，但每支团队必须有全日制大学生，参赛学生必须为团队作出足够的贡献，才能被认为是正式队员。只有每个团队的学生部分才有资格获得现金奖励。

Since Mission 8 of the International Aerial Robotics Competition will run until the mission is complete, anyone who is enrolled in a college or university as a full-time student (as defined by their university) any time during or after the calendar year that the team originally made application for Mission 8, is qualified to be a “student” team member.

由于国际空中机器人比赛的任务8将一直举办下去，直到任务被完成。因此在任务完成之前，对于某个学校而言，任何一名在当届比赛之前入学的学生，均有资格成为当届比赛的学生团队成员。

To qualify, a team must submit an acceptable Application Form and Application Fee. If upon arrival at the IARC and prior to the competition, the Judges determine that a team is NOT capable of demonstrating intelligent fully autonomous flight, the team will not be allowed to compete and the $500/3300RMB rebate will not be refunded. The definition of “intelligent” autonomous flight will be the ability to avoid a 0.3m x 0.3m obstacle while in autonomous flight. Further, aerial robots that do not meet safety criteria or which have no remote mechanism for disabling the aerial robot, will not be allowed to compete.

为了符合比赛资格，团队必须提交有效的申请表以及按要求缴纳申请费。如比赛开始之前，裁判认定某支队伍的机器人不足以满足比赛的智能自主飞行要求，该队将不被允许参加比赛，并且最终退款（500美元/3300人民币）也不返还。“智能”自主飞行的定义是在自主飞行中避开0.3米×0.3米障碍的能力。此外，不符合安全标准的航空机器人或没有安装遥控关机开关的机器人也将不得参赛。

Prior to the beginning of the IARC, the Judges will make these preliminary determinations. Those teams found to be in compliance will be allowed to compete in that competition year's event and will receive their rebate.

在IARC开始之前，裁判们将对以上情况做出初步判断。被认定符合条件的队伍将被允许参加本年度的比赛，并有资格获得最终退款（500美元/3300人民币）。

MAINTAINING OFFICIAL COMPETITOR STATUS

To continue to be considered an Official IARC team, teams must submit an updated online Application and their Application Fee, a list of expected attendees, and submit a Journal Paper (see below). All four of these items are due by June 1. To advertise your team, and as an aid to gaining sponsors, we recommend that each team maintain a website about their IARC team and its entry (this is not a requirement). Teams that do not comply with these requirements will lose official IARC team status and will be delisted on the IARC competitor webpage, but can be reinstated in subsequent years of Mission 8 by meeting these requirements. Unofficial or delisted teams will not be allowed to compete until their status is restored.

维持正式参赛团队状态

若某支队伍想在某年比赛结束后，仍保留IARC参赛队伍身份参加下一年度的比赛，则须更新在线申请、缴纳新的报名费用、提交参赛名单，并提交论文（见下文）。这四项均需要在每年6月1日前完成。 不符合这些要求的团队将失去IARC的官方团队身份，将在IARC竞争对手的网页上被除名，但可以在任务8的后续几年内通过重新满足这些要求而恢复。为了宣传您的团队，并获得赞助商的帮助，我们建议每个团队都建立一个关于他们的IARC团队的网站（非必需）。非正式队伍或已退出的队伍在重新报名更新参赛状态前不得参加比赛。

JOURNAL PAPER

Each team is required to submit a journal-quality paper (written in English) documenting its project. This paper will be ranked by the Judges on a scale of 0 to 100 points depending on technical quality (0 points minimum for submitting a credible paper or for those not submitting a paper by the deadline). Papers are limited to 12 pages (including figures and references, if any). The format shall be single-sided with text occupying a space no greater than 9 inches tall by 6.5 inches wide centered on each page. Font size shall be 12 point (serif font) with 14 point leading. The example format is provided as an addendum to the rules (see: Paper Format). Topics to be covered are detailed in a printable document found at: Paper Content. A file (<50 MB in size) in MS Word or PDF format of your paper is due by June 1 of each competition year. Papers are to be uploaded by the due date via the website uploader.

学术论文要求

每个团队都需要一份期刊文章水平的论文（以英文撰写）。根据技术质量，本文将由评委以0至100分进行排名（提交论文的最低为0分、截止日期后提交的论文记 0分），论文限12页内（含图片与参考文献）。论文格式应为单面、文本占用不大于9英寸高，6.5英寸宽的空间，每页居中。字体大小为12号衬线字体，行距14号。示例格式作为规则的附录提供，请参阅文件：论文格式。文章需包含的内容见文件：论文内容。您的论文的MS Word或pdf格式的文件(小于 50MB)应在每年的6月1日前通过官方网站上 传。

All papers will become part of the IARC Symposium proceedings for that year and will therefore serve as a publication reference on team member resumés. Just prior to the IARC performance days will be a symposium where selected teams will make a 10 minute PowerPoint presentation of their journal papers to the Judges and other assembled team members.

所有论文将成为该年度IARC研讨会的一部分，因此可以作为会议文章记录列入团队成员的简历中 。就在IARC比赛日之前，我们将举办一个研讨会，届时，选择的球队团队将向裁判和其他团队成员做10分钟的答辩。

COMPETITION DAYS

Upon arrival in the city hosting the American or Asia/Pacific Venues, teams must register their presence online (the IARC website will open a link to the registration page several days prior to the event at each venue). This registration is a final confirmation of a team's presence and notification of the team's contact information in case last minute change information needs to be relayed to the teams by the Organizers.

比赛日期

团队抵达举办城市后，须在网上完成报到。报到通道将在比赛前几天打开，该报到将成为团队抵达的最终确认，如团队联系方式有变动，此报到也将作为团队成员对变动信息的最终确认。

Since some teams travel great distances and must disassemble their equipment for shipping, a period will be announced when aerial robotic systems can be reassembled and aligned. This is NOT a "practice time", but is a time and place where teams can verify the correct operation of their reassembled systems. The location may or may not be the same as the IARC arena. Teams are expected to come 'ready to compete' and all 'practice' should have already occurred back at their respective universities.

若由于长途运输原因，某些团队的参赛设备必须拆卸来进行运输，则组委会会安排一段组装调整设备的时间。注意这并不是一段练习时间，而仅可用于设备的组装与调试 。调试地点可能与IARC比赛场地相同或不同，因此参赛团队需要确保在抵达前做好一切比赛准备。

For additional specific information, Teams are advised to consult the "MISSION 8 Arena Props Design Manual" found at the official IARC website under the Team Resources menu item
(TEAM RESOURCES > MISSION 8 ARENA INFORMATION)

其他具体信息， 请参考"MISSION 8 Arena Props Design Manual"。 该手册可在IARC网站 Team Resources 一页找到
(TEAM RESOURCES > MISSION 8 ARENA INFORMATION)

INTERPRETATIONS

You Are Responsible for knowing all of the information contained in the Official Rules. This page is provided as a place to find interpretations that may be added for clarity (nothing found here will be a change in the Official Rules, only clarifications or interpretations).
各参赛队有责任了解官方规则中的所有信息。本页所含信息仅为对官方规则的补充，解释。 本页不含任何对官方规则的修改信息

ABOUT YOUR HELPER AERIAL ROBOTS

Required for Mission Completion: Yes (Your Helper robots must play a central role in the problem solution)
有关空中机器人助手是否完成任务所必须：是 （空中机器人助手必须在任务完成中承当重要角色）

Recognized Healing Laser Freq.: 13 kHz ± 1 kHz (13 kHz is the center frequency of the modulation)
被识别的治疗光线频率： 13 kHz ± 1 kHz （13 kHz 为调制中央频率）

Healing Laser Opportunities: 4 (Healing opportunities can be wasted by using them when there are zero Sentry laser hits)
治疗光线使用次数：4（若未被哨兵激光击中而使用治疗光线，该次治疗光线机会将被作废）

Command & Control: Verbal or Gesture (Any clothing or gloves can be worn by the team player to enhance gesture recognition, but no encoded information (e.g., QR codes) can be imprinted on the player's clothing, nor can the clothing be "active" (e.g., gloves with transmitters in the finger joints) 指令与控制：语音或手势（参赛队员可穿戴各类服饰或手套以强化手势识别。所穿戴服饰或手套上不可含有编码信息，如QR码等。亦不可有主动发射装置，如手套指尖的发射器）

Off-board Computing: Allowed (Off-board computing must be located outside the arena boundaries)
线下计算：允许（线下计算需在比赛区范围外进行）。

Player Microphone: Allowed (the use of a microphone must be hands-free and only capable of transmitting voice commands directly to the Helper Aerial Robots or to an off-board computer outside the arena)
队员麦克风：允许（所使用麦克风需为非手持，且只能直接向辅助控制机器人或线下计算单元传递语音指令。

Player Input Device: NOT Allowed (NO keyboard, touch screen, or tactile input device is allowed within the arena. The team player is allowed to have a video OUTPUT device such as an iPad screen or VR goggles that displays information from his Helper Aerial Robot system.) 队员输入设备：不允许（比赛区内不允许任何键盘，触摸屏以及其他触摸式输入设备。参赛队员可佩戴视频显示设备，如iPad 或VR 眼镜等，以接收来自其辅助控制机器人的信息）

Number of Helper Aerial Robots: 1 to 4 (Since the IARC is held indoors, only electrically propelled aerial robots are allowed)
空中机器人助手数量：1到4（鉴于IARC在室内举行，仅允许电动推进的空中机器人）

Helper Aerial Robot Attributes: 空中机器人助手属性:

- Fully Autonomous Flight (launched from just inside the arena entrance upon command of the team player, using only voice or gesture commands) 全自主飞行（仅通过队员的语音或手势指令，在比赛区域入口区起飞）
- Obstacle Avoidance (Avoid collision with: Sentry drones, arena props, the team player himself, Judges/IARC staff, arena boundaries) 避障功能（需有能力躲避哨兵机器人，大赛场地道具，参赛队员，裁判/工作人员，大赛场地边界）
- Man-Safe (shrouded to prevent fingers from contacting propulsors) 安全（必须安装有安全罩以防止手指接触推进器）
- No tethers are allowed (air vehicles must be free-flying and not supporting or dragging payload items) 不允许使用绳索（所有空中机器人必须自由飞行，不装载，携带，拖拽任何负重）

IMPORTANT METRICS

Attempts: 5 (In any competition year, each registered team will get a total of five 8-minute attempts to complete MISSION 8)
尝试次数：5（在每一参赛年中，任何注册的参赛队总共有5次完成任务8的机会，每次8分钟）

Start: The run begins when the team player sets foot inside the arena. The Helper Aerial Robots will be pre-placed (inside the arena) next to the entrance through which the team player will enter the arena.
开始：比赛计时由参赛人员进入大赛场地开始。空中机器人助手将预先放置于参赛队员进入大赛场地的入口处。

Attempt Run: 8 minutes maximum (Runs may terminate prior to 8 minutes if (1) the 4 objects are retrieved and removed through the arena entrance; (2) 10 unhealed laser hits are received; (3) the run is terminated by the Judges due to a rules infraction; (4) the 8-minute time limit is reached.
每轮尝试时长：8分钟（每轮尝试可因以下原因而结束 （1）4个目标物均被获取且经由入口移除；（2）被不可治疗光线击中累计10次；（3）因犯规而被裁判种植；（4）8分钟时间到

Arena: The team player can not modify the arena by repositioning its obstacles, bins, or bin counters.
参赛队员不可移动目标物，箱子以及箱柜