

## **MISSION 7 UPDATE AND RELEASE OF MISSION 8 RULES**

对任务7的更新以及任务8的发布 （见下文中文翻译）

As shown in the 2017 video uploaded to the IARC website (<http://www.aerialroboticscompetition.org>) Mission 7 behaviors have been demonstrated in 2017 by different teams, but no single team has demonstrated everything yet. Based on the outstanding 2017 performances, we suspect that ALL the required Mission 7a behaviors will be demonstrated in 2018 by one or more teams however, it could be another year or more until enough teams are demonstrating these 7a behaviors with adequate proficiency to conduct an interesting 7b demonstration. We will therefore offer prize money in 2018 to the team that BEST performs all of the Mission 7 behaviors (interacting with vehicle using “top touch” or “front blocking” to get at least 4 ground robots to go across the green line). “BEST” means that the team either gets the most robots ( $\geq 4$ ) across the line (not just accidental line crossings), or the team that does it in the least amount of time if more than one team happens to get the same maximum number across the green line.

The behaviors of 7b will then be rolled into the new Mission 8 and all new teams are encouraged to enter Mission 8. Along with this announcement, the Official Mission 8 rules are being released at the IARC website (<http://www.aerialroboticscompetition.org>).

### **PROCEDURE FOR 2018**

Teams planning to compete in Mission 7 in 2018 are required by 1 June 2018 to post an online video showing that the necessary behaviors of Mission 7 can be demonstrated prior to arrival at either venue. The video must show takeoff, flight, ground robot interaction to modify its course (using either or both “top touch” or “blocking” maneuvers), and these must be done fully autonomously. Teams unable to provide this proof of capability will not be viable competitors in the 2018 final Mission 7 competition, but can apply for Mission 8. The IARC Judges will verify each team’s ability to fly fully autonomously prior to the actual competitions. Fully autonomous flight is fundamental to the IARC and has been demonstrated in the IARC as early as 1993, so only teams that can demonstrate fully autonomous flight will compete.

The details for making application to IARC Mission 8 are contained in the Official Rules found as a link from <http://www.aerialroboticscompetition.org> .

In summary, the behaviors to be developed by Mission 8 teams are all very important to autonomous UAVs and are far beyond what current commercial and military drones can do, so when accomplished, we will be advancing the state-of-the-art in aerial robotics through the conduct of Mission 8.

Quoting from the DRAFT Mission 8 rules, the state-of-the-art technologies to be demonstrated are described as:

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 (as in Mission 7b)

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 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.

#### MISSION 8 CONCEPT VIDEO:

<http://www.aerialroboticscompetition.org/assets/video/mission8promo.mp4>

如2017年的比赛视频（已上传至IARC官网，网址：<http://www.aerialroboticscompetition.org>）所示，许多支队伍在任务7中都实现了部分比赛要求。但是目前为止，尚无任何队伍圆满地实现了所有任务目标。不过根据2017年各队的杰出表现，我们相信，在2018年中，将会有至少一支队伍能够圆满完成任务7a的所有要求。然而，如果有更多的参赛队伍拥有足够的实力参加相对更有趣的任务7b，我们可能需要举办一年或者多年比赛来让更多的队伍实现7a的技术能力要求。

因此，在2018年，我们将终止任务7的比赛并为任务7中表现最佳的队伍颁发年度大奖与奖金，其中表现最佳指的是空中机器人通过按压地面无人车的顶部或是降落在无人车正前方的方式，将最多的无人车（要求至少不少于4辆）从绿线处赶出比赛场地（不受空中机器人驱赶而自行通过绿线的数目不计入有效成绩），如果恰好有多支队伍的数目相同，则用时最短的队伍为最佳队伍。

我们将把任务7b所要求的能力综合进新的任务8中，我们鼓励所有新报名的团队参加任务8。任务8的规则将随此通知一起发布在IARC官方网站（网址：<http://www.aerialroboticscompetition.org>）。

#### 2018年度安排

希望在2018年完成任务7的参赛团队需要在2018年6月1日之前在网上上传一段视频，证明他们的表现足够在正式比赛时完成全部任务要求。视频需包括起飞、飞行、与地面机器人交互来改变其行驶方向（使用顶部触碰和/或正前方阻挡的方式），且上述全部要求在自主飞行下完成。

无法证明空中机器人足以实现上述性能的团队将不得参加2018年的任务7比赛，但可以报名参加任务8。注意，大赛裁判将裁决参赛团队的无人机的自主飞行能力。因为全自主飞行是IARC比赛自1993年创办以来的最基础的要求，一切比赛任务都需基于无人机的自主飞行能力。

获取任务8报名指南与比赛规则，请登录：<http://www.aerialroboticscompetition.org>

总的来说，在任务8中飞行器需要表现出的性能对无人机的自主飞行能力提出了非常重要的要求，并且这些任务要求到目前为止远超现有的商用与军用无人机的性能。因此，如果任务8在未来能够成功实现，世界将得益于这些为了完成任务8而实现的技术进步。

任务8中，我们要求无人机所具备的尖端技术包括：

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

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，可以为操纵人员带来额外的优势。除了先进的自动化性能外，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。但是在这种情况下，操纵人员处理信息的能力是有限的，这就要求无人机不仅能够通过操纵人员的指令，同时也能通过与其他无人机的交互，来明确在不同情况下的具体任务。

任务8概念视频

<http://www.aerialroboticscompetition.org/assets/video/mission8promo.mp4>