

Sample Handout – *Robots that fly ... and cooperate*

1. Vocabulary

Match the following words with their definitions:

English	Definition
___ aerial	1 the total weight that something can lift as it flies
___ autonomous	2 able to move quickly and change position easily
___ unmanned	3 calculate
___ onboard processors	4 computers inside a vehicle
___ sensors	5 equipment that reacts to changes in the outside conditions
___ figure out	_____
___ scaled down	6 in the air
___ agile	7 independent, able to make its own decisions
___ obstacles	8 made smaller
___ payload-carrying capacity	9 manage to control a problem or do something difficult
___ overcome	10 things that get in the way of something
___ in formation	11 together with other vehicles in a fixed pattern
	12 with no people to operate something

2. Lead-in/Orientation

Work in groups. Discuss what you know about remote control aerial robots, sometimes known as drones. Talk about the following points:

- what they look like
- how they fly
- how they are operated
- how big (or small) they are
- their current applications
- their cost
- any problems associated with them

3. Comprehension

Choose the correct options to make true sentences.

- 1 The robots that Vijay Kumar is talking about are different from unmanned aerial vehicles because they *are smaller / have* sensors.
- 2 To make the robot fly straight up, you increase the speed of *two / all four* of the rotors.
- 3 The computer in each robot sends commands to the motors *600 / 700* times a second.
- 4 A smaller robot can *fly for longer / turn more quickly*.
- 5 These robots can be used to *find lost objects / check for danger* in buildings.
- 6 Controlling the motor *power / movement* of the robots is very complicated, so the scientists needed to simplify the mathematics.
- 7 A 'minimum-snap trajectory' is the robot's way of flying as *fast / smoothly* as possible.
- 8 The team were inspired by nature when trying to programme the robots to *communicate / coordinate* with each other.
- 9 For lots of robots to fly in formation, it is *essential / impossible* to coordinate their actions in a central computer.
- 10 The disadvantage of working together to lift objects is the *risk of collisions / the decrease in agility*.

4. Discussion

Work in groups. Discuss the questions.

A

Which aspects of the robots' abilities are most impressive, in your opinion?

B

Vijay Kumar's talk was given in 2012. How do you think the technology has evolved since he gave his talk?

C

What are practical application of the technology do you think is most useful?

D

Vijay Kumar claims that the aerial robots have many real-world applications. Discuss other applications that the technology could have. Use these areas to think of ideas.

agriculture, cartography (map making), communications, construction and architecture, education, emergency services, espionage (spying) and secret services, industry, leisure and entertainment, retail, tourism, transport and logistics