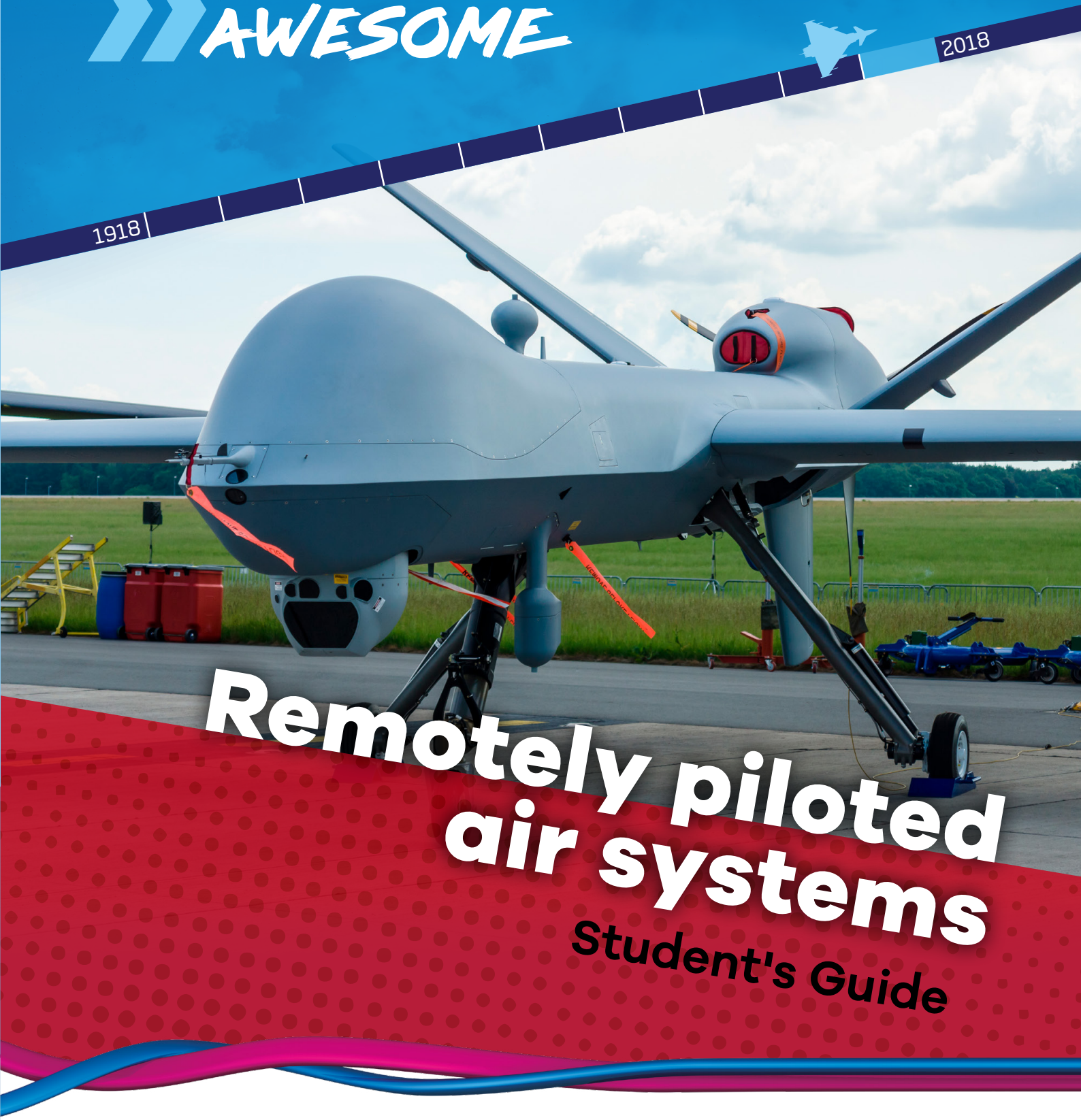
AIMING FOR AWESOME

1918 2018



Remotely piloted air systems

Student's Guide

ROYAL ACADEMY OF ENGINEERING

RAF 100

2018. THE YEAR OF ENGINEERING

The aim of this resource is to give students the opportunity to investigate the impact of science, technology, engineering and mathematics (STEM) on the design, production and control of Remotely Piloted Aircraft Systems.

Unmanned vehicles

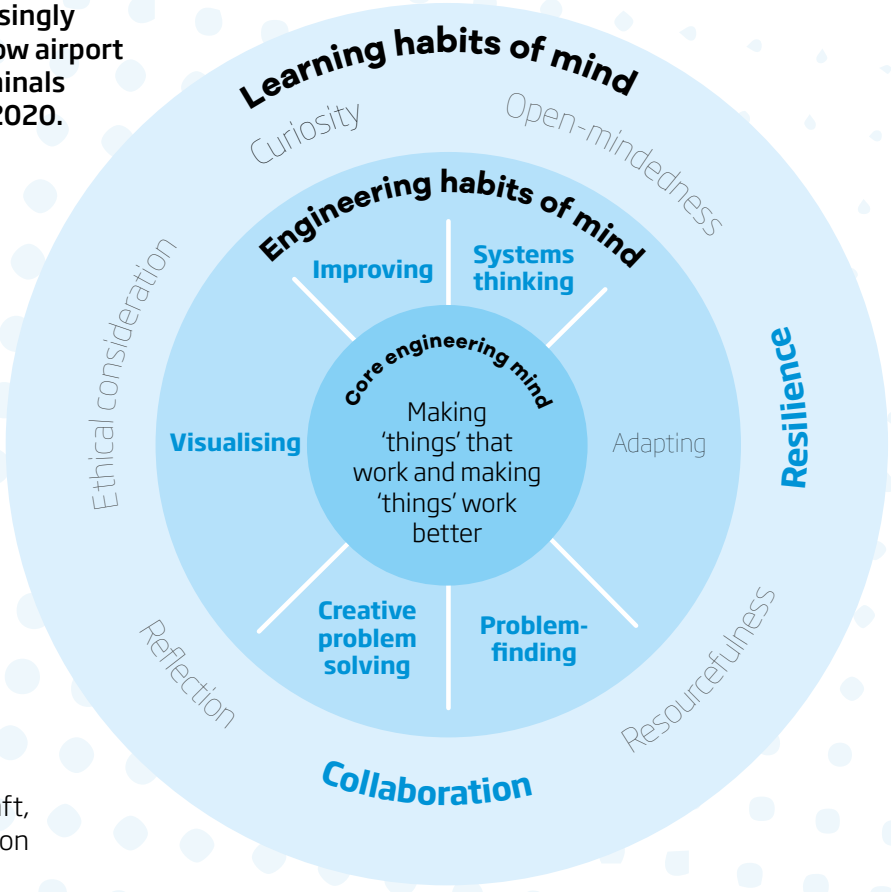
Unmanned vehicles are becoming increasingly common, with driverless pods at Heathrow airport that transport passengers between terminals and self-driving cars due to hit roads by 2020.

Unmanned vehicles are not just confined to the roads though, they can be designed to travel across any terrain , even if it is unreachable or dangerous to humans.

This allows us to explore more and previously unreachable areas of the world, and the universe. Unmanned vehicles have been used to research the deepest depths of the oceans and the furthest reaches of the solar system.

In 2005 the RAF began to use remotely piloted air systems (RPAS) when a new unit, No. 1115 Flight, was formed at Creech Air Force Base in Nevada. The squadron has now relocated to RAF Waddington in Lincolnshire.

As of March 2009, the squadron operated 12 three-man teams to pilot its Reaper aircraft, supporting intelligence specialists, information communications technicians, signallers, and meteorologists.



TIME TO THINK

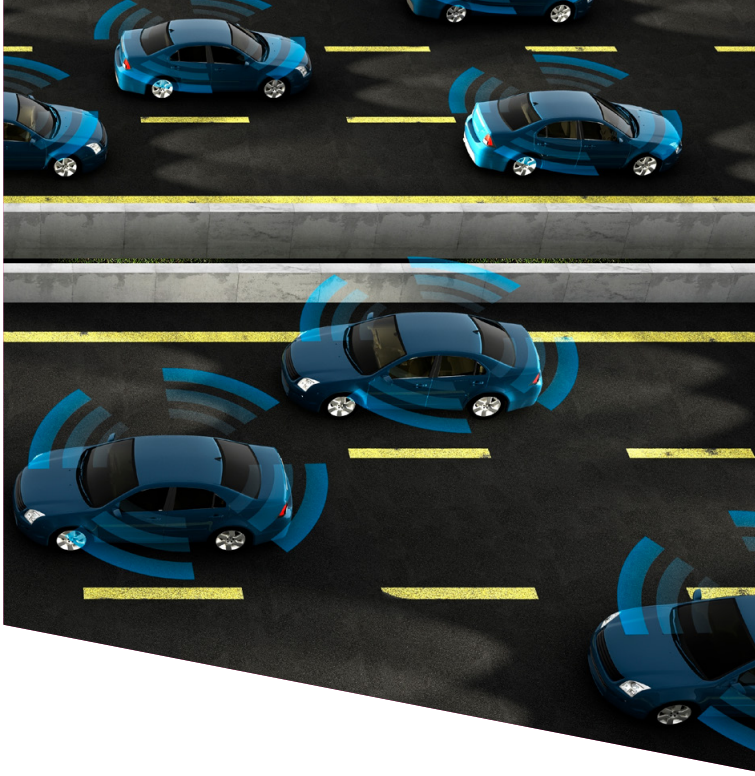
Self-driving cars move autonomously. The vehicles have a variety of sensors, such as radar, lasers and GPS to navigate their surroundings without a driver.

Advanced control systems interpret the information to identify the best route to take, as well as obstacles in the road.

Automated cars permitted on public roads are not yet fully autonomous. They all require a human driver at the wheel who is ready to take control of the vehicle at a moment's notice.

Do you think self-driving cars are a good or bad idea?

In pairs, come up with three positives and three concerns about self-driving cars.



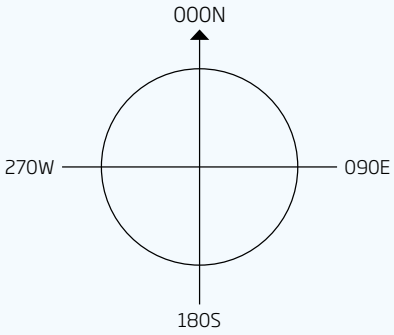
Positives	Negatives

TIME TO INVESTIGATE

You need to write a flight plan for the RPAS to get from base to landing strip A.

To avoid being detected you must not fly over radar towers. Which of the three programmes below should you use?

In these flight plans the aircraft is told which direction to travel in using bearings. For example, if the flight plan says "turn to 090" the aircraft should turn to face east.



Flight plan A	Flight plan B	Flight plan C
Turn to 180	Turn to 090	Turn to 000
Move forward one square	Move forward five squares	Move forward three squares
Turn to 090	Turn to 000	Turn to 090
Move forward five squares	Move forward two squares	Move forward three squares
Turn to 000	Turn 090	Turn to 180
Move forward two squares	Move forward one square	Move forward one square
Turn to 090		Turn to 090
Move forward one square		Move forward three squares

Can you write a simpler flight plan to get to landing strip A?

You have been given the following flight plan to fly the RPAS from landing strip A to landing strip B, however there is a problem with the plan.

The flight plan now tells the aircraft how many degrees to turn. The aircraft starts by facing east. Debug the flight plan so that the RPAS can land safely on landing strip B.

Flight Plan

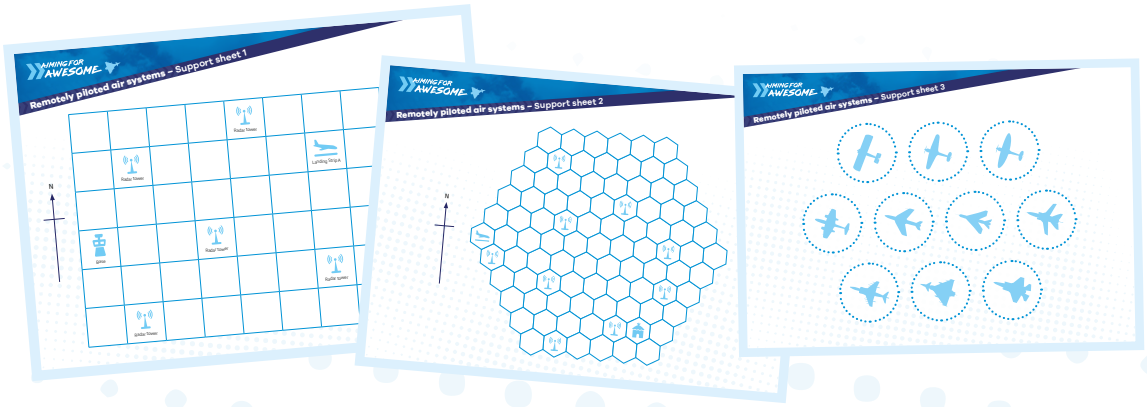
Turn 090
Move forward three squares
Turn -090
Move forward two squares
Turn 090
Move forward one square

STRETCH AND CHALLENGE

The RPAS you are responsible for is stationed at landing strip A. Your challenge is to write a flight plan to deliver aid to a village at B and return to base.

In pairs, test each other's flight plans.

Are your flight plans the same? If not, which flight plan is more efficient?



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ROYAL ACADEMY OF ENGINEERING

Royal Academy of Engineering

As the UK's national academy for engineering, we bring together the most successful and talented engineers for a shared purpose: to advance and promote excellence in engineering.

We have four strategic challenges:

Make the UK the leading nation for engineering innovation

Supporting the development of successful engineering innovation and businesses in the UK in order to create wealth, employment and benefit for the nation.

Address the engineering skills crisis

Meeting the UK's needs by inspiring a generation of young people from all backgrounds and equipping them with the high quality skills they need for a rewarding career in engineering.

Position engineering at the heart of society

Improving public awareness and recognition of the crucial role of engineers everywhere.

Lead the profession

Harnessing the expertise, energy and capacity of the profession to provide strategic direction for engineering and collaborate on solutions to engineering grand challenges.

RAF 100

The RAF 100 Youth & STEM programme has been designed to engage and inspire young people by building their interest in engineering and technical career pathways.

From cyber specialists to aerospace, aviation, electronics and mechanical disciplines, the RAF is committed to using our centenary celebrations to extend opportunity to all and to encourage greater diversity in this critical area of national skills shortages.

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