Airgineers

Full range of Airgineers products available at:

www.rapidonline.com

Airgineers®

in partnership with AUTODESK.

Airgineers is a STEM challenge for secondary school aged students who will need to design, build and learn to fly their own radio-controlled quadcopter, often referred to as a drone.

It was created to provide a cutting-edge design and manufacture project that would allow students to learn CAD skills and apply them to manufacturing techniques such as 3D printing, laser cutting and vacuum forming as well as hand-made prototypes.

Micro Drones are just about the easiest way to learn how to make and fly a radio controlled multirotor. Teams will need to design and build an efficient and manoeuvrable micro-sized flying machine that will compete in team games, individual challenges and time trials. And just in case making your own drone wasn't amazing enough, you'll experience all the action from First Person View or FP V via a tiny camera mounted on the drone itself.

www.airgineers.co.uk

Design using free CAD software

Autodesk are the biggest name in CAD software and have products that are used in engineering, product design, architecture, film, game design and VR. Airgineers have worked closely with Autodesk to develop resources for the Fusion 360 and TinkerCAD software to help students learn how to design a drone from scratch, and the best part is that for schools and students, this software is completely free.

Fusion 360

Fusion 360 is professional-grade software that combines computer-aided design, manufacture and engineering (CAD, CAM and CAE) into a single software package. Whilst the software is installed and run locally, Fusion 360 allows users to harness the massive power of Autodesk's cloud computing to speed up rendering and processing of more complex designs.

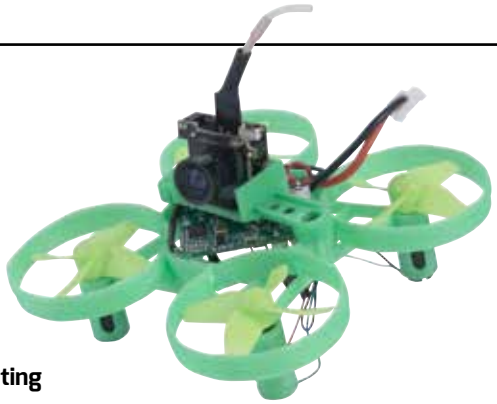
TinkerCAD

TinkerCAD is a free, easy-to-use browser-based app for 3D design, electronics and coding with a shallow learning curve. Because it is browser-based, there is no software to install and students can access it almost anywhere

Visit **www.airgineers.co.uk** to learn how to access the software.

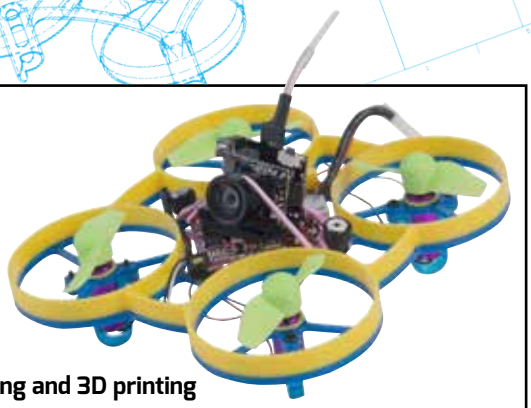
Design Examples

Airgineers Micro Drones can be manufactured using all manner of techniques and materials, each with different advantages. Here are just a few examples.



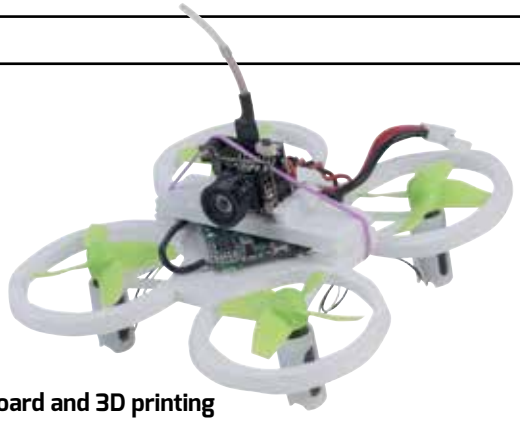
3D printing

Entirely 3D printed using two separate parts. The main frame has the motor mounts, propeller ducts and flight controller mounts. The camera is mounted using a separate bracket.



CNC milling and 3D printing

The main frame is CNC milled from HDPE and 3D printed parts are used to protect the motors and to mount the camera. HDPE has the advantage of being more robust than 3D printing and you could even try making your own HDPE sheet from old plastic milk bottles.



Foamboard and 3D printing

The motor mounts are 3D printed but the main frame, propeller ducts and camera mount are hand cut from foamboard. This has the advantage of being quick and easy to make as well as extremely light.

Vacuum forming and 3D printing

The main body and camera mount including the ducts are vacuum formed. A 3D printed part is used for the motor mounts.

Airgineers®

Watch instructional videos at:

www.airgineers.co.uk

Tutorials and safety

Video tutorials for every aspect of Airgineers Micro Drones can be found at **www.airgineers.co.uk**

If you are new to CAD, learn how to use Fusion 360 or TinkerCAD to design your drone frame. Our tutorials also show you how to assemble a Micro Drone, use BetaFlight to configure your flight controller and help you understand the principles behind how a drone flies.

You'll also find a wealth of information regarding the safe use of different types of drones, including Micro Drones

Starter kits

Airgineers Starter Kits contain everything you need to build a Micro Drone.
The only thing that is not included is the frame as this is designed and manufactured by the students.

Airgineers Micro Drone Starter Kit

This kit contains all the electronics, controller and FPV goggles required to build a Micro Class drone for the Airgineers competition.

Kit includes:
- Airgineers FS-i6S transmitter
- Set of 4 propellers
- Set of 4 motors
- Flight controller
- FPV camera and video transmitter
- 5 drone batteries and charger
- VR-007pro FPV goggles and battery

Transmitter requires 4xAA batteries, not included

£119.99
Order code
70-1201

Airgineers Micro Drone Squadron Set

The Squadron Kit contains all the parts needed to build a Squadron of four Airgineers Micro Class Drones, allowing you to design, build and practice flying with four FPV Micro Drones in the air at the same time.

Kit includes:
- 4x Airgineers FS-i6S transmitter
- 4x set of 4 propellers
- 4x set of 4 motors
- 4x Flight controller
- 4x FPV camera and video transmitter
- 15 drone batteries and suitable chargers
- 4x VR-007pro FPV goggles and batteries

Transmitter requires 4xAA batteries, not included

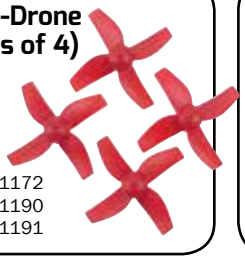
£459.96
Order code
70-1202

Airgineers FPV Micro-Drone Component Kit

£49.99
Order code 70-1200

Includes:
• Flight controller • FPV camera and transmitter
• 4 motors • 5 batteries and charger

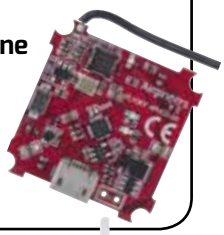
Airgineers Micro-Drone Propellers (packs of 4)



£1.50

Red	Order code 70-1172
Blue	Order code 70-1190
Green	Order code 70-1191

Airgineers Micro-Drone FlySky Compatible Flight Controller

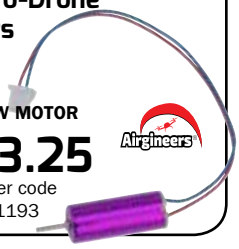


£19.99
Order code 70-1173

Airgineers Micro-Drone Motors 59,000RPM

CW MOTOR	CCW MOTOR
£2.50	**£2.50**
Order code 70-1175	Order code 70-1192

Airgineers Micro-Drone Upgrade Motors 67,000RPM

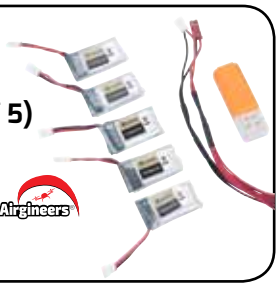


CW MOTOR	CCW MOTOR
£3.25	**£3.25**
Order code 70-1194	Order code 70-1193

Airgineers Micro-Drone FPV Camera and Transmitter

£10.99
Order code 70-1174

Airgineers Micro-Drone Batteries (set of 5) and charger



£14.99
Order code 70-1176

Airgineers E010 RC Quadcopter Spares Part Frame

£1.89
Order code 70-1080

Reely LiPo Battery Safety Bag

£9.99
Order code 70-1178

Airgineers FS-i6S Transmitter with FS-A8S Receiver

£44.95
Order code 70-1160

Airgineers VR-007 FPV Goggles

£39.99
Order code 70-1177

Airgineers VR007 Pro 3.7V 1600mAh LiPO Battery

£5.99
Order code 70-1079

UP mini 2

The UP Mini 2 printer builds on the reliability and ease-of-use of the original UP mini and, with a sleek, portable and eye-catching design, incorporates several ground-breaking features like touch screen control, Wifi Connectivity, built-in HEPA Air Filtration and improved print quality.

With its simple usability, connectivity and portability, the UP Mini 2 provides unrivalled value for money.

- 120x120x120 build volume
- Heated bed
- Automatic nozzle height detection
- 0.15mm layer thickness
- ABS and PLA printing
- Colour touch-screen
- USB and WiFi connectivity
- Includes roll of ABS filament, tools and cables

£464.99
Order code 25-0055

The UP mini 2 is a fully enclosed designs with integrated HEPA filters which are strongly recommended for use in a classroom environment.

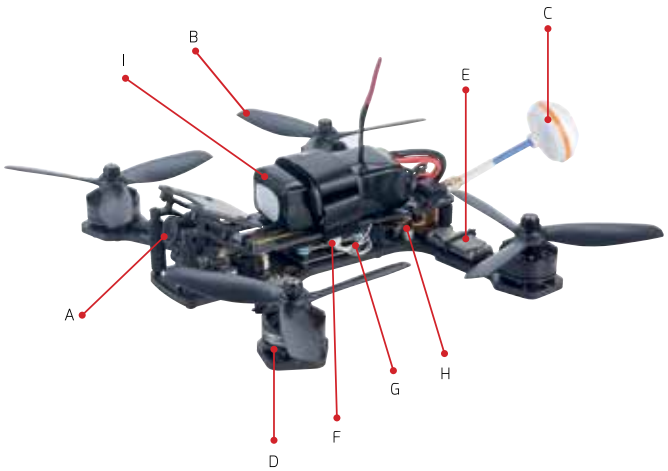
Airgineers 3S

Airgineers 3S Class is an adrenaline-fuelled ride that is all about learning to fly fast and to fly safely. Students will need to build the drone before learning to fly and as their piloting skills progress, they will need to understand how to tune their drone to get the best performance. Pilots will need to control their drone from First Person View (FPV) which means they will wear goggles that have a video feed directly from their drone – to the pilot, it feels like they are sat right in the cockpit.

A 3S Drone is a high-speed, high performance racing quadcopter designed for outdoor use. The 3S part of the name comes from the battery that is used in Airgineers which is a 3-cell lithium polymer battery rated at 11.1v. The Tyrant-S that Airgineers supply is a 215-sized chassis which is the optimal size for ease of build and performance. This means it is 215mm diagonally across the frame between the motor centres.

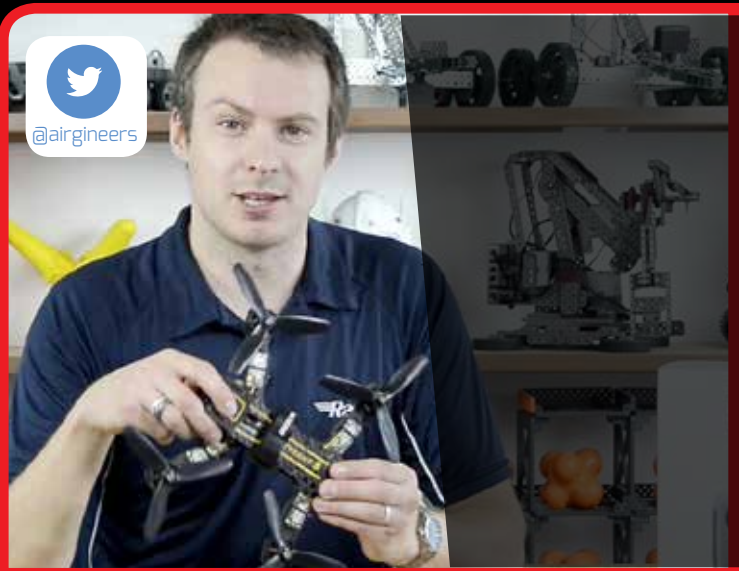
A 3S drone is made up from a number of key components:

Ref.	Component	Description
A	Camera	A small video camera that is used to see the First Person View (FPV), as if the pilot was on board the drone
B	Propeller	4 propellers are used to provide thrust which moves the drone
C	Video Transmitter Antenna	Used by the Video Transmitter to broadcast a 5.8GHz video signal to the FPV goggles
D	Motor	4 motors are used and are connected directly to each of the propellers
E	Electronic Speed Controller (ESC)	The ESC takes a signal from the Flight Controller and converts it to voltage to control the speed of the motors
F	Flight Controller (FC)	The brain of the drone. It has accelerometer and gyroscope sensors that detect the movement of the quad. This data is combined with the inputs from the pilot and the flight controller will then work out what signals need to be sent to each motor
G	Video Transmitter (VTX)	Takes a signal from the camera and converts it to a suitable 5.8GHz signal to send to the FPV goggles worn by the pilot
H	Receiver (RX)	Receives data from the pilot's transmitter using the 2.4GHz frequency. This data is then passed to the flight controller for processing
I	Battery	A lithium polymer battery used to power the electronics and motors on the drone



Tutorials and safety

Visit **www.airgineers.co.uk** to see video tutorials on how to assemble and configure the Tyrant-S drone as well as information about how drones fly. You'll also find a wealth of information regarding the safe use of different types of drones, including the Airgineers 3S and Micro Drones



www.airgineers.co.uk

Starter kits

The Starter Kits contain almost everything you need to get your drone in the sky. The only thing you'll need to add is 4x AA batteries for the transmitter.

Airgineers Tyrant-S FPV Starter Kit

This kit contains all the parts, electronics, controller and FPV goggles required to build a 3S Class drone.
Assembly requires basic tools such as hex keys, soldering iron, screwdrivers and wire cutters and strippers.

Kit includes:
· Airgineers FS-i6S transmitter
· Tyrant-S kit
· Drone battery and charger
· VR-007pro FPV goggles and battery

Transmitter requires 4xAA batteries, not included

£259.99
Order code
70-1203

Airgineers All-In Starter Kit

A kit that contains almost everything required to build a 3S and a Micro Class drone.

Assembly requires basic tools such as hex keys, soldering iron, screwdrivers and wire cutters and strippers and students will need to design and manufacture their own frame for the Micro drone.

Kit includes:
· Airgineers FS-i6S transmitter · Tyrant-S kit
· 3S battery and charger · 4x micro drone motors
· Micro drone flight controller · Micro drone propellers
· 5x micro drone batteries and suitable charger
· VR-007pro FPV goggles and battery

Transmitter requires 4xAA batteries, not included

£299.99
Order code
70-1204

3-Blade Propellers Set of 4

DIATONE INNOVATIONS

£2.50
Order code
70-1170

Fury F3S Flight Controller

DIATONE INNOVATIONS

£24.99
Order code
70-1197

LiPo Battery Safety Bag

REELY

£9.99
Order code 70-1178

M2205 2300KV Motor

DIATONE INNOVATIONS

£9.99
Order code
70-1166

Circular Polarized VTX Antenna

DIATONE INNOVATIONS

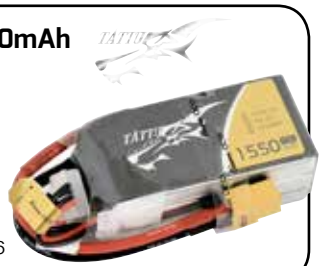
£5.99
Order code
70-1169

Tyrant S Replacement Frame

DIATONE INNOVATIONS

£39.99
Order code 70-1163

Tattu 11.V 1550mAh 3-cell 75C LiPo Battery



£15.99
Order code 70-1186

LiPo Battery Charger

VOLTCRAFT

£19.99
Order code 70-1187

Anti-Slip Hook and Loop Battery Strap (Single)

DIATONE INNOVATIONS

£2.50
Order code
70-1171

More 3S spares and accessories available at **www.rapidonline.com**

Airgineers®

Become the Airgineers 2019 Racing Champion!

Airgineers is a STEM challenge for secondary school aged students who will need to design, build and learn to fly their own radio controlled quadcopter, often referred to as a drone.

In their quest to become Airgineers UK Champions, teams compete in two different classes, **Micro** and **3S**.

To enter, visit
www.airgineers.co.uk