

DCG 2019 PROJECT / L MACBRIDE

Drones

Secondary Research



01

DJI Phantom 4

Consumer/Amateur Drone
Curved body
3 Axis camera gimbal
Fixed Arms
High profile



02

DJI Mavic 2

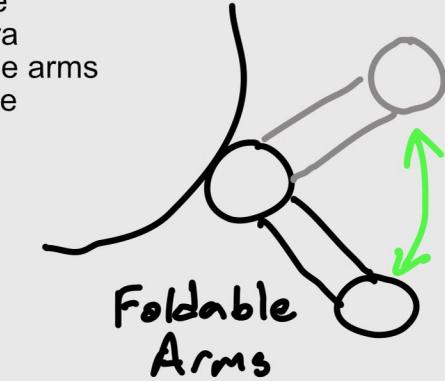
High end consumer drone
Angular body
3 Axis camera gimbal
Collapsible arms
Low profile



04

Miniature Drone

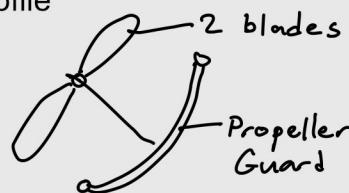
Toy drone
Small size
No camera
Collapsible arms
Tiny profile



03

Kaiser Baas Theta

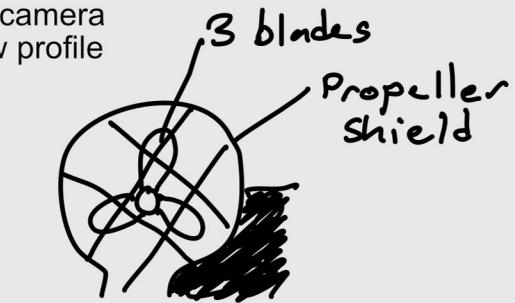
Racing drone
Slightly rounded body
No gimbal
Propeller guards
Fixed camera
Fixed arms
Incredibly low profile



05

Snaptain Quadcopter

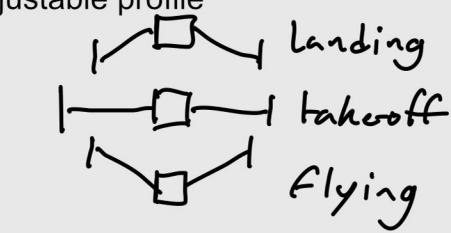
Toy drone
Angular body
Encased propellers
No camera
Low profile



06

DJI Inspire

Professional drone
Angular body
Collapsible arms
Arms/landing legs can adjust mid flight
3 axis gimbal
Adjustable profile

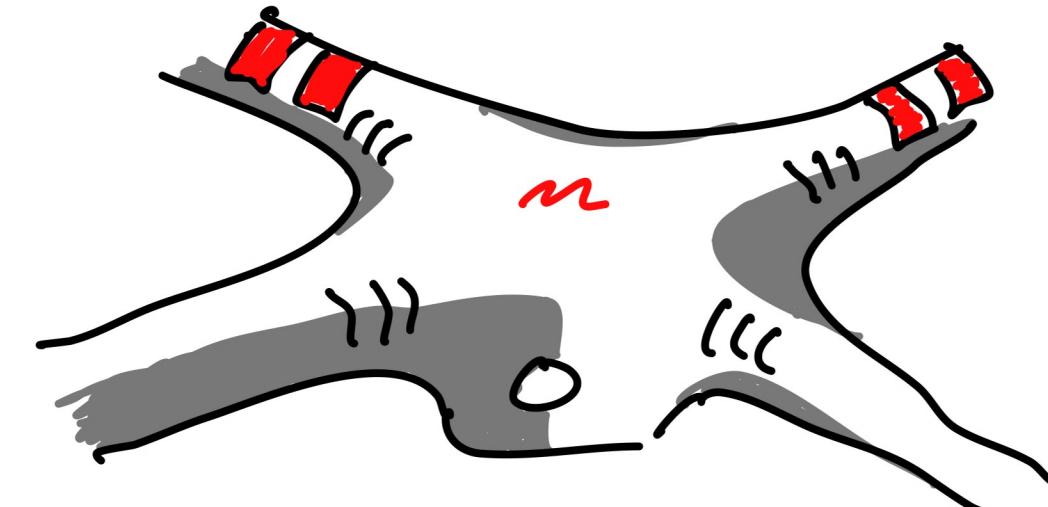


Primary Research



Front View

Curved design
2 blade propellers
Cooling vents
Motors fixed in place
Landing legs fixed in place
Infra-red sensor



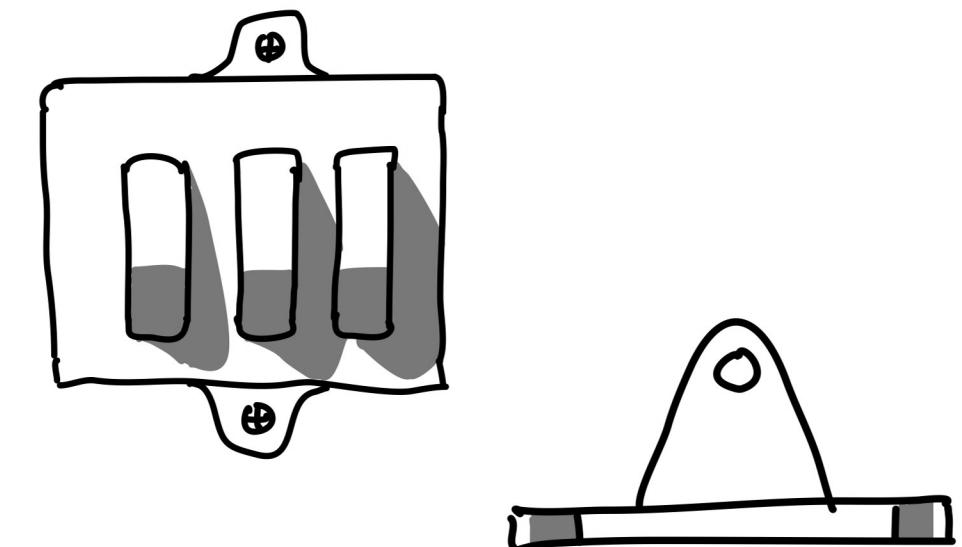
Rear View

Battery compartment
Company logo (DJI)
Red stripes distinguish the front of the drone from the back
Action camera mount visible



Underside

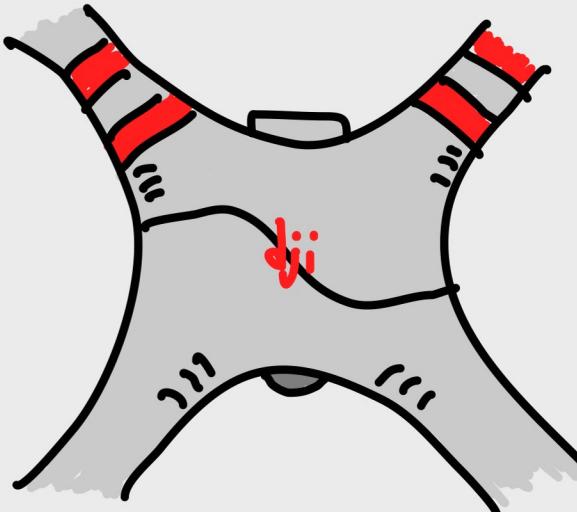
Camera mount
Safety label
Underside lights (for night time flying)
Antenna (runs along upper leg)



Compare & Contrast

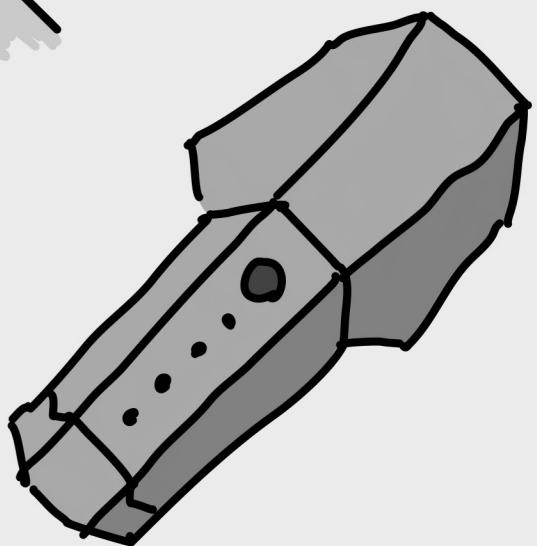
While researching my project I frequently came across two different drones produced by the company DJI. These were the the Phantom and the Mavic respectively. Both drones take very different design approaches. The Phantom features a solid design with few moving parts, whilst the mavic features folding arms, allowing it to be folded up for easy transport. Newer models of the Phantom feature a built in camera similar to the one depicted on the Mavic, however I am more familiar with the older models which featured a removable mount for an external action camera. Ultimately I chose to base my final design around that of the Phantom.

Body



► DJI Phantom:
Curved Body
Fixed Parts
Red and grey

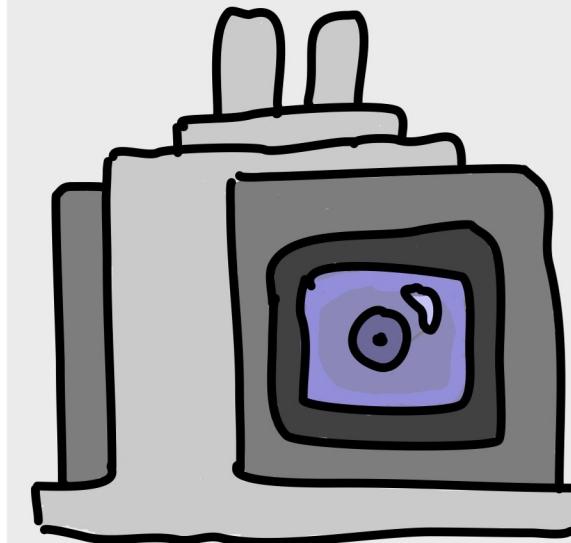
Materials: Plastic, metal (screws)



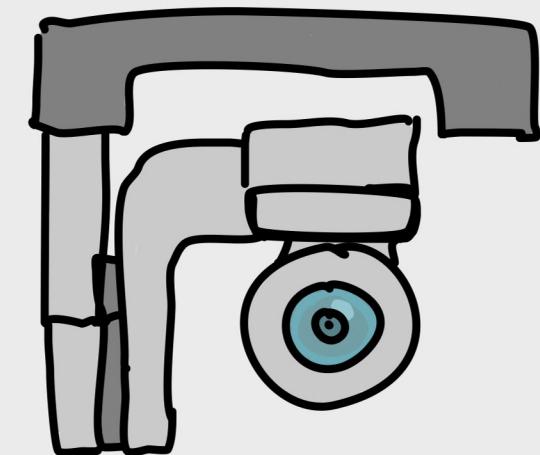
► DJI Mavic:
Angular body
Moving parts
Dark grey

Materials: Plastic, Rubber
Metal (screws)

Camera



▼ DJI Mavic:
Non-removable Camera
3 Axis gimbal automatically stabilises
camera mid-flight.

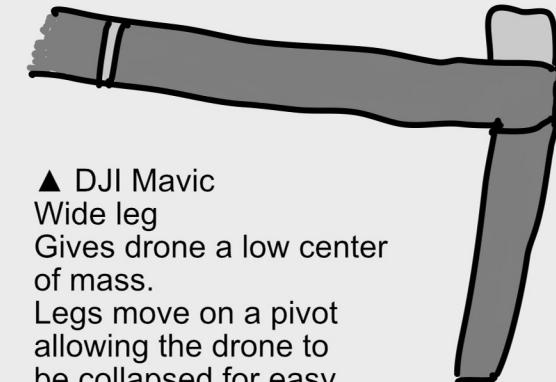


▲ DJI Phantom:
Detachable Camera
Hinged joint
Can be adjusted mid-flight.

Landing Legs



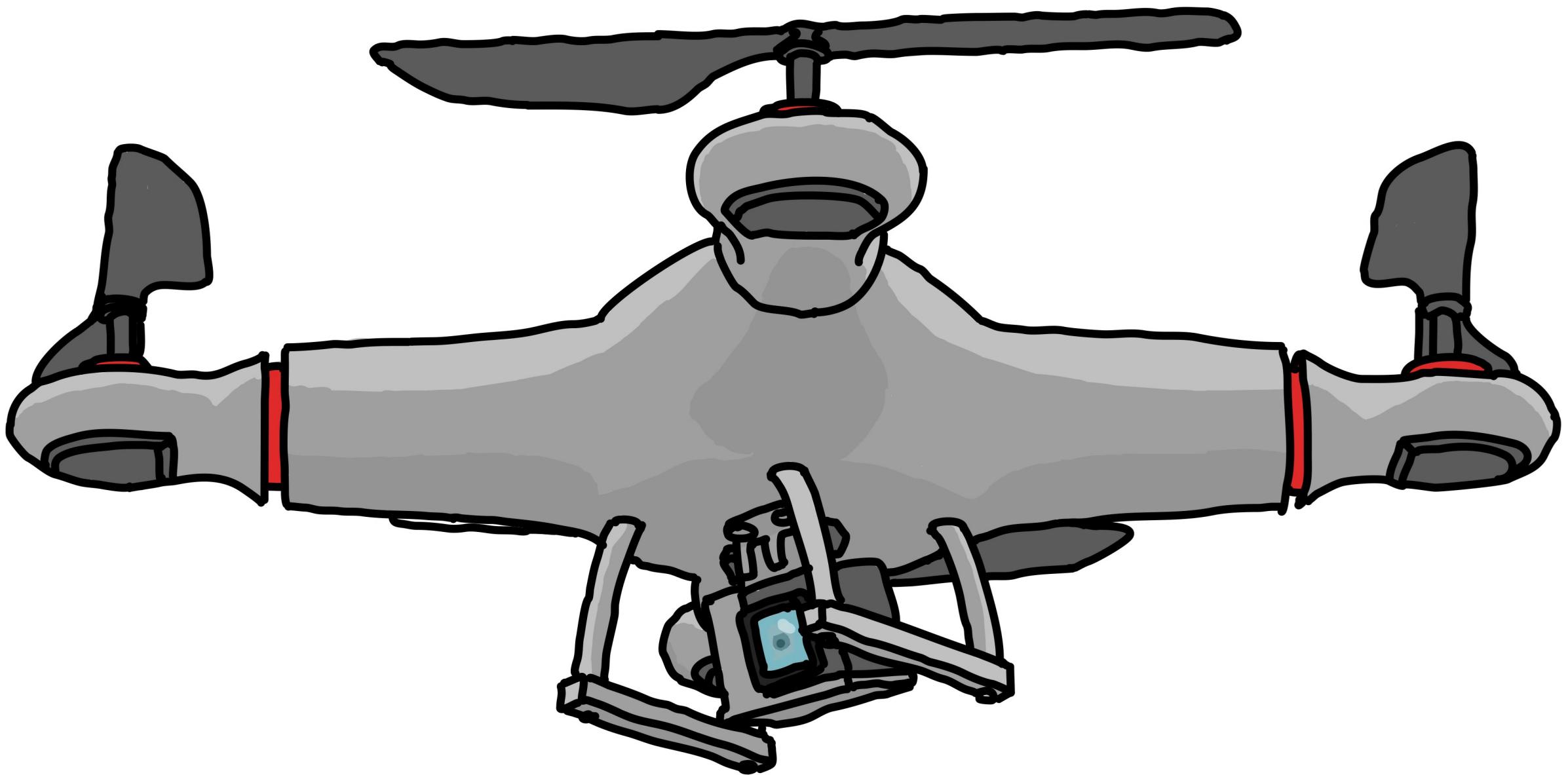
◀ DJI Phantom:
Upright leg
Gives drone a high center
of mass.
Antenna runs down leg.
Fixed to drone body with
screws.



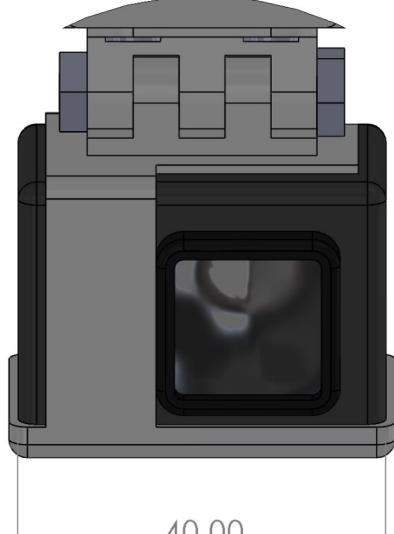
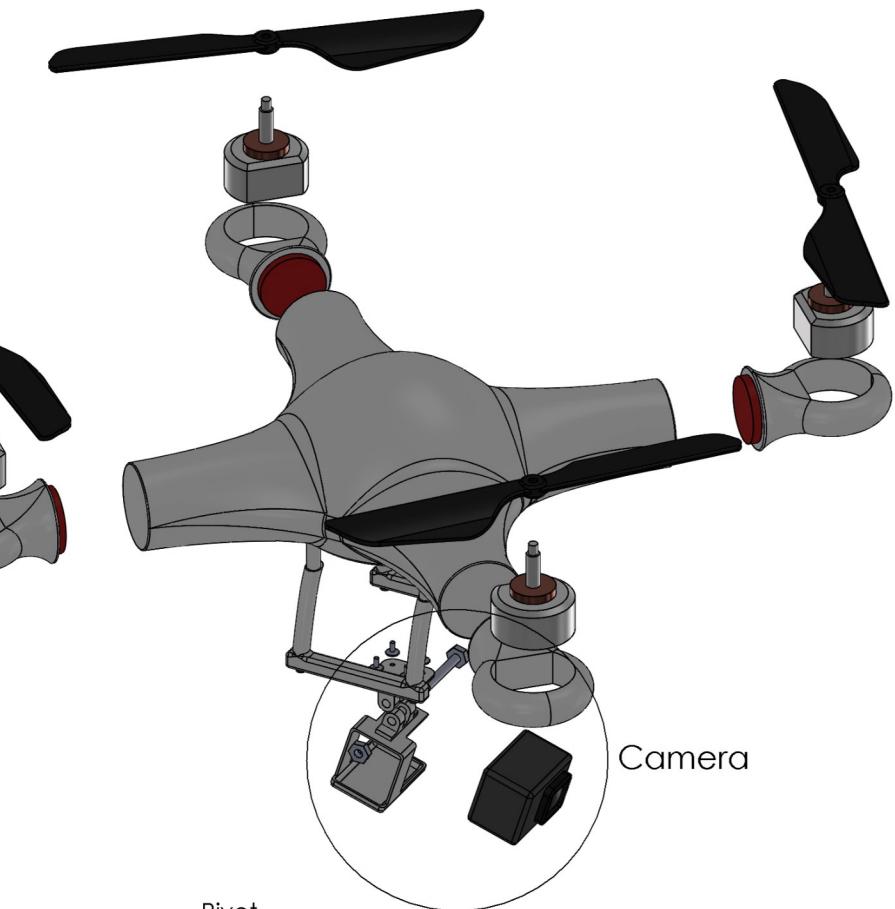
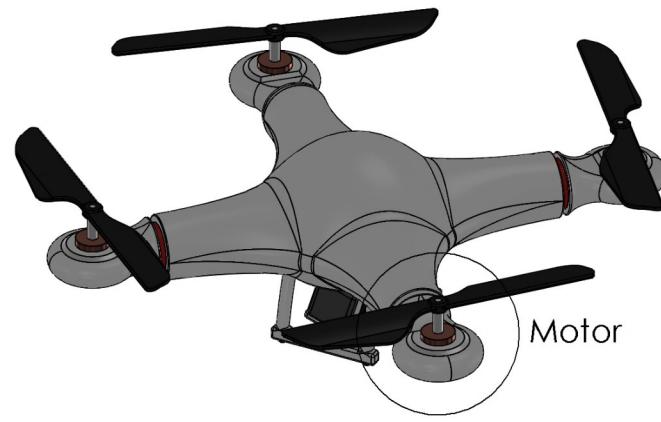
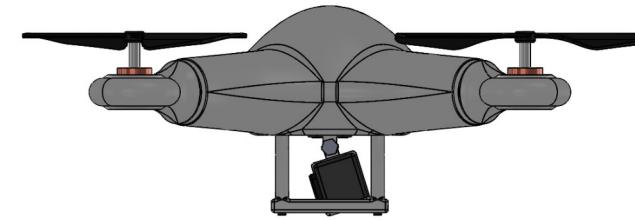
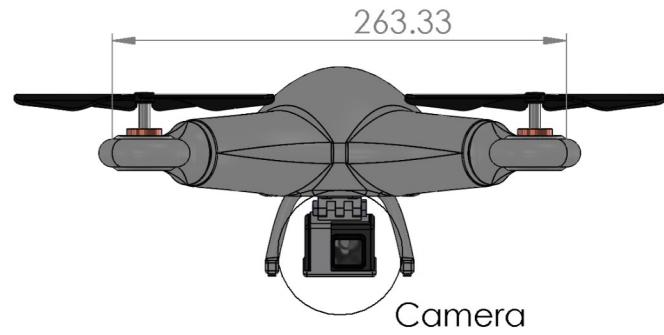
▲ DJI Mavic
Wide leg
Gives drone a low center
of mass.
Legs move on a pivot
allowing the drone to
be collapsed for easy
transport.



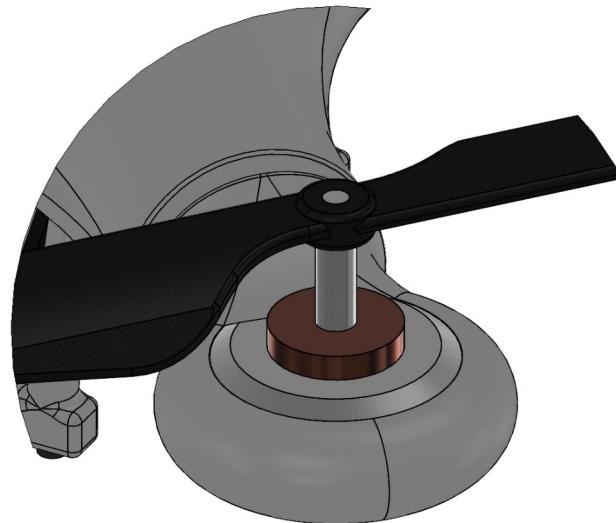
Freehand Graphical Representation



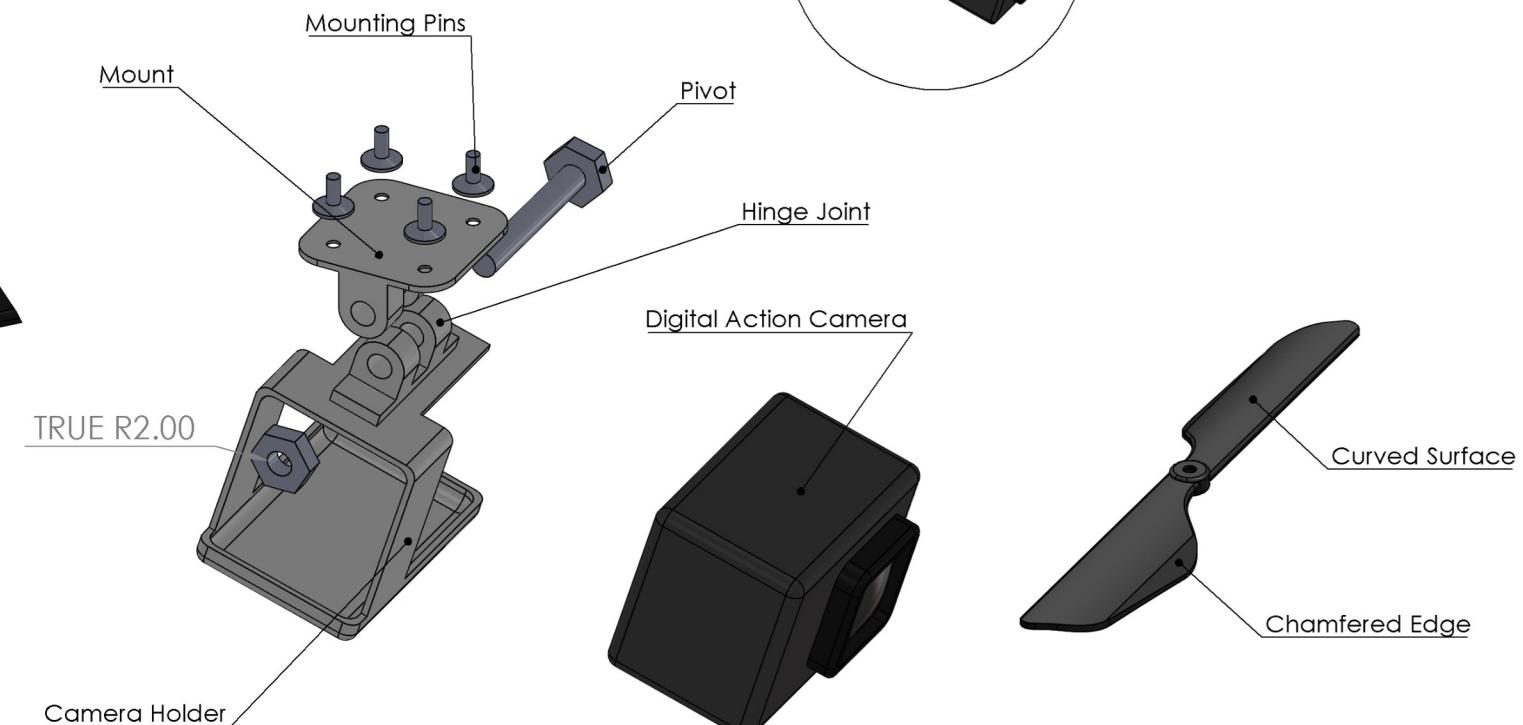
Drawing



Camera
SCALE 1 : 0.75



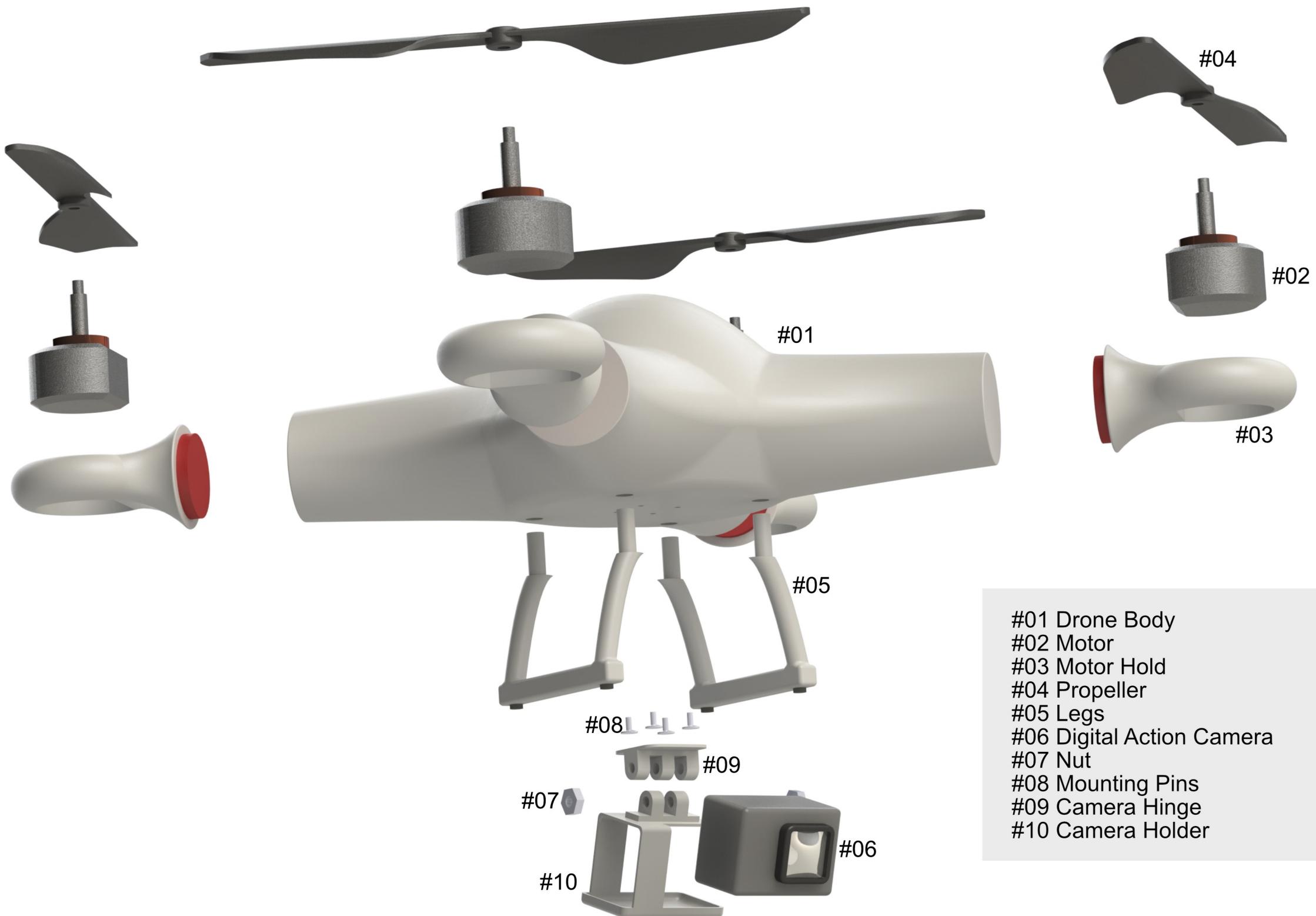
Motor
SCALE 1 : 1



Camera



Exploded View



- #01 Drone Body
- #02 Motor
- #03 Motor Hold
- #04 Propeller
- #05 Legs
- #06 Digital Action Camera
- #07 Nut
- #08 Mounting Pins
- #09 Camera Hinge
- #10 Camera Holder



Photo-realistic Renders



Concept Design Comparison

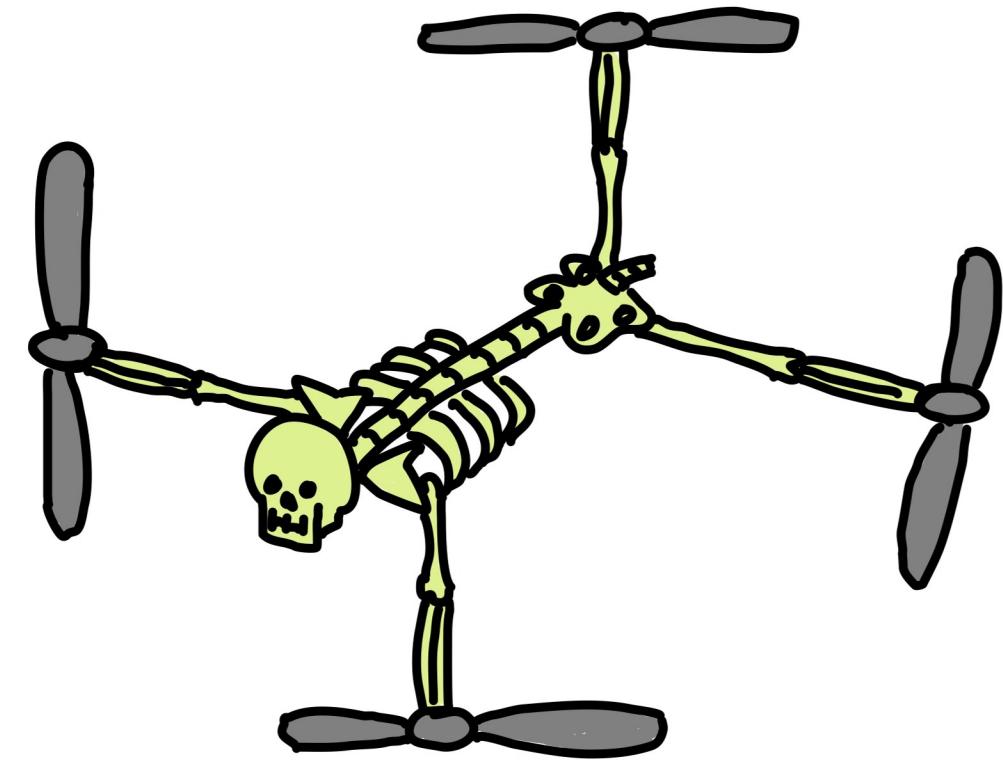
Halloween Theme



◀ Ghost Drone:
Simple design would lead to easy manufacture.
Could be marketed to video game enthusiasts.
If made with a translucent material a light could
be placed inside to make the drone glow.



► SkeleDrone:
Undoubtedly spooky.
Complicated shape would make it difficult to manufacture.
Made out of glow in the dark plastic.
Red LED lights in eyes to allow the user to know its orientation
whilst flying in the dark.



◀ Witch Drone:
Moderately complex design would be the perfect balance
of interesting shape and ease of manufacture.
Curved propeller arms keep center of gravity low down,
keeping the drone stable mid-flight



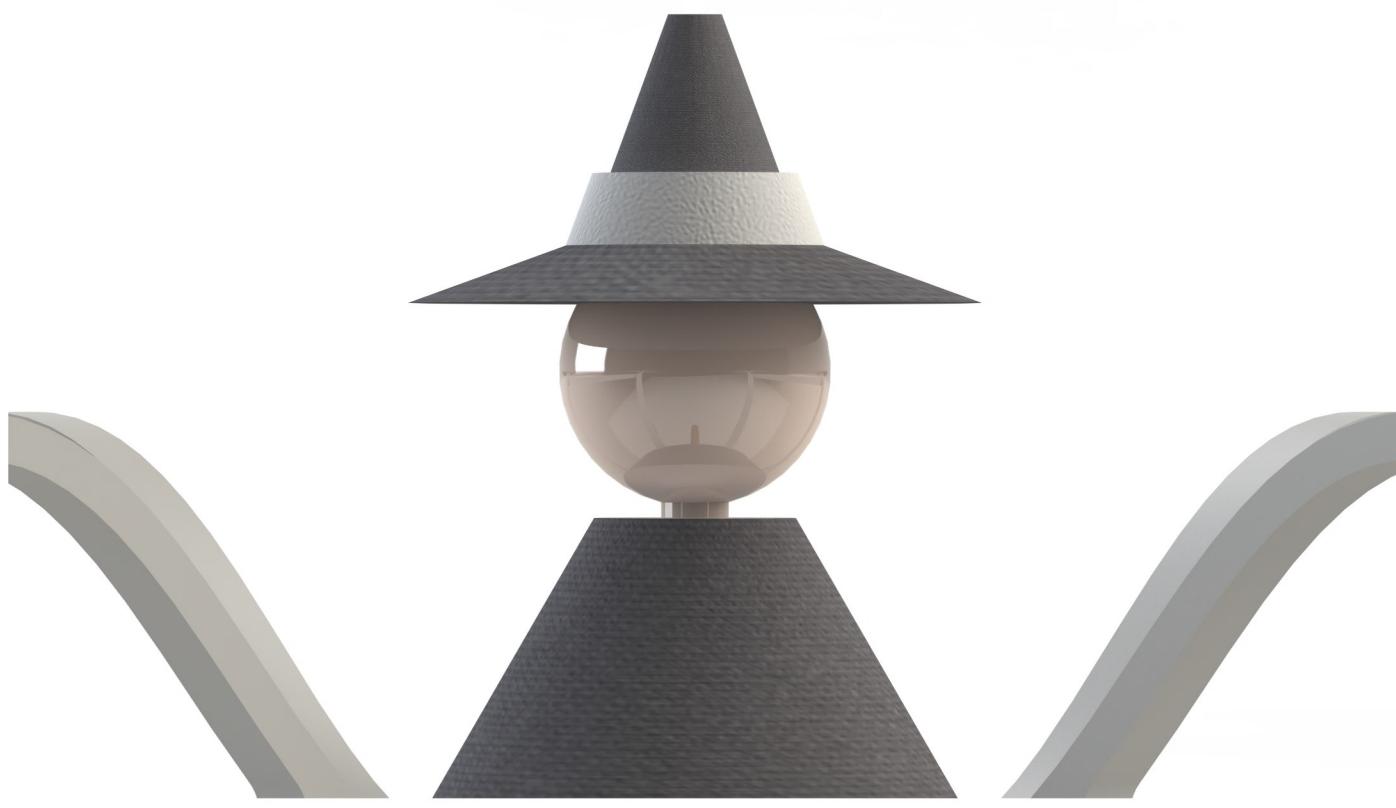
Freehand Graphical Representation



Drawing



Photo-realistic Renders



Exploded View



References

Software Used

Solidworks 2015
Solidworks 2018
Affinity Design
Affinity Photo

Hardware Used

Custom Built PC (Windows 10)
School PC (Windows 7)
iPad Pro
Apple Pencil

Images Used

- 01 <https://www.harveynorman.ie/cameras-drones/drones-ireland/all-drones/dji-phantom-4-advanced.html>
- 02 <https://www.harveynorman.ie/cameras-drones/drones-ireland/all-drones/dji-mavic-2-zoom.html>
- 03 <https://www.harveynorman.ie/cameras-drones/drones-ireland/all-drones/kaiser-baas-theta-drone.html>
- 04 <https://www.amazon.co.uk/Foldable-Beginners-Quadcopter-Altitude-Headless/dp/B07G9KNTNP>
- 05 <https://www.amazon.co.uk/SNAPTAIN-Quadcopter-Altitude-Headless-Return/dp/B07GVPHMJB>
- 06 <https://fixinazip.com/shop/dji-inspire-1-v2-quadcopter/>

