

SILANTRO FLIGHT SIMULATOR

USER MANUAL

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SIMULATOR COMPONENTS

1. **PROPULSION SYSTEM:** these components provide horizontal or vertical (lift) thrust to any aircraft they're attached to. Comprises of;

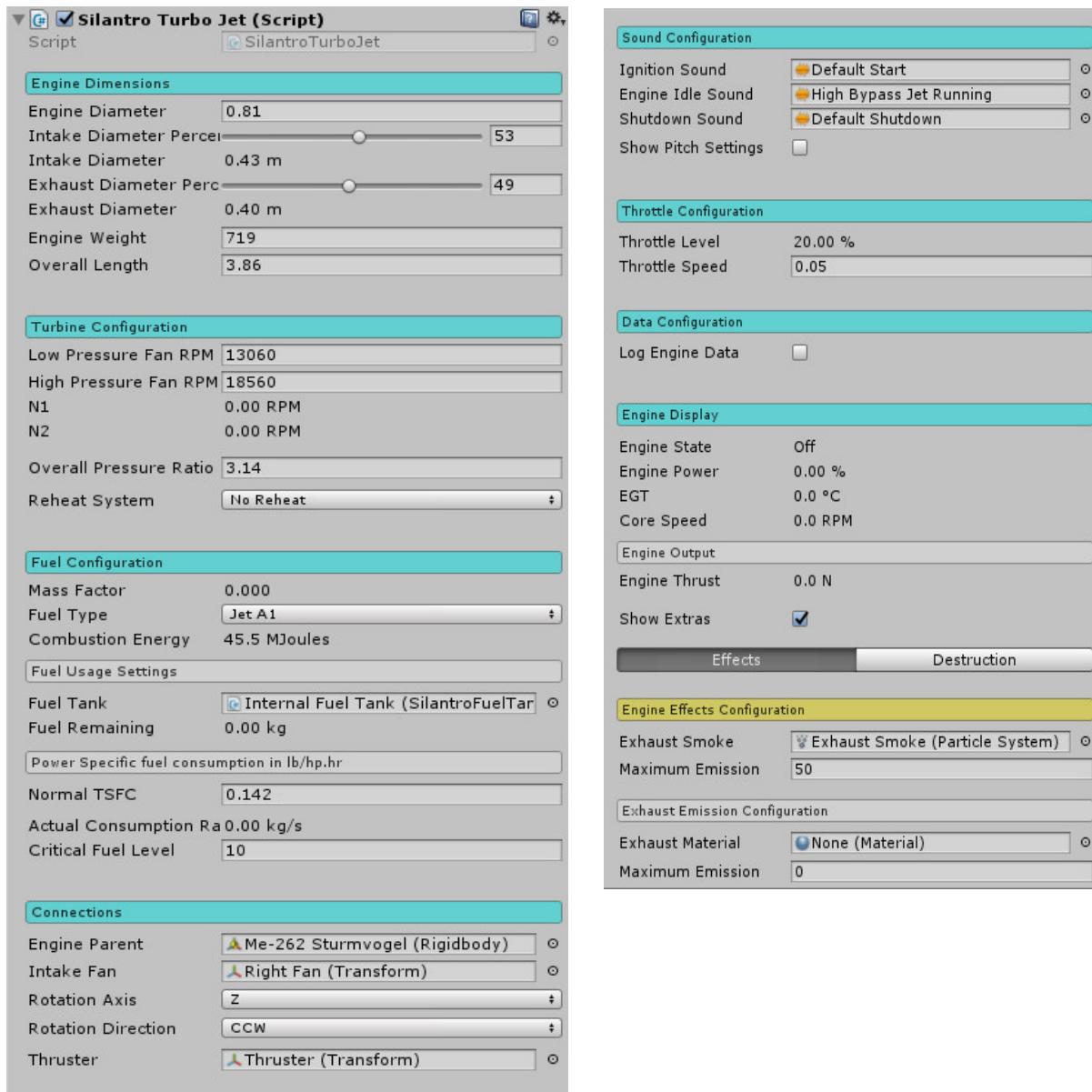
- Engines
- Fuel Tanks
- Fuel Distributor
- Blade System

ENGINES

- **REACTION ENGINES:**

- **TURBOJET ENGINE**

The *Turbojet Engine* provides horizontal thrust to the aircraft. The component should only be added to a new gameObject in the scene from the toolbar and must be parented to a rigidbody to function properly.



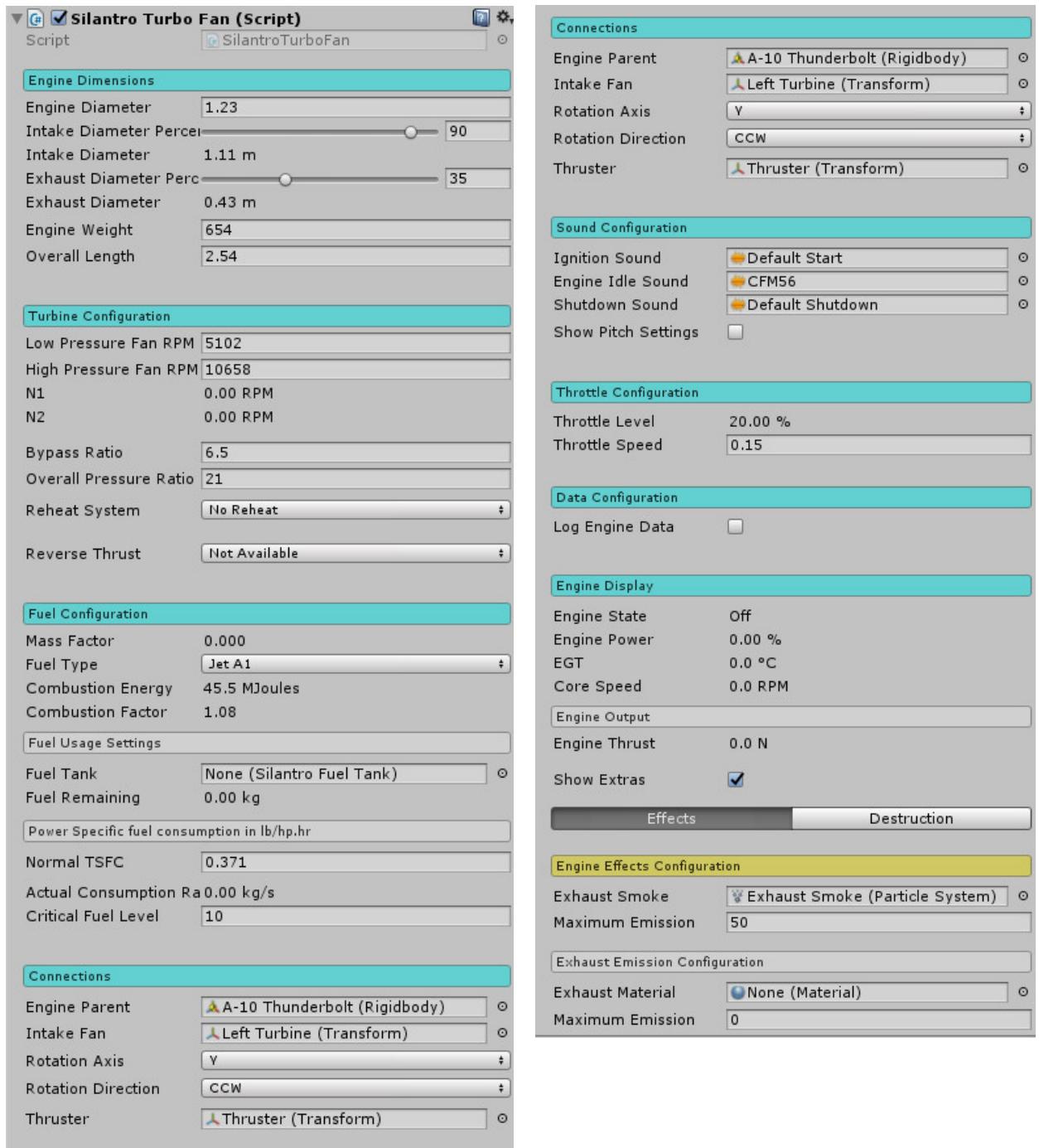
PROPERTIES

Property:	Function:
<u>Engine Dimensions</u>	
Engine Diameter	This is the total diameter of the engine in meters
Intake Diameter Percentage	This is the diameter of the engine intake relative to the total engine diameter expressed as a percentage. It is depicted by a blue circle in front of the engine to aid adjustment. <i>Note: This should closely match the intake fan model if available.</i>
Exhaust Diameter Percentage	This is the diameter of the engine exhaust relative to the total engine diameter. Depicted by a red circle at the back of the engine. <i>Note: This value would be adjustable for variable nozzle engines in coming update.</i>
Weight	Weight of the engine in kg. <i>Note: this value is only used if engine model is detachable.</i>
Overall Length	Length of the engine in meters.
<u>Turbine Configuration</u>	
Low Pressure fan RPM	RPM of the intake or low-pressure fan
High Pressure fan RPM	RPM of the turbine or high-pressure fan
N1	Current speed of the Entry fan Blade
N2	Current speed of the Turbine fan Blade
Overall Pressure Ratio	Difference in the pressure after the compressor relative to the pressure before the engine i.e. basic aeronautical pressure ratio. E.g. 26 for the GE F404 used in the F117 Nighthawk.
Reheat System	Determines whether the engine uses reheat i.e. afterburners
<u>Fuel Configuration</u>	
Mass factor	Internal float used for calculations
Fuel Type	Type of fuel used by the engine. Available options: Jet B, Jet A1, JP6, JP8.
Combustion Energy	Specific energy of combustion of the selected fuel in MJ/kg.

<u><i>Fuel Usage Settings</i></u>	
Fuel Tank	Fuel tank connected to the engine
TSFC	Thrust specific fuel consumption of the engine during normal operation in lb/lbf.hr
Afterburner TSFC	Thrust specific fuel consumption in lb/lbf.hr when afterburner is active.
Current tank fuel	Amount of fuel left in the attached fuel tank
Critical fuel level	Minimum fuel required for normal operation, the engine starts behaving erratically if the fuel is lower than this value. <i>Note: Engine shutdown automatically when fuel reaches 0 kg.</i>
Actual fuel Consumption	Fuel consumption in kg/s
<u><i>Engine Sounds</i></u>	
Ignition Sound	Audioclip to be played when engine is starting.
Shutdown Sound	Audioclip to play when the engine is stopped.
Engine Idle Sound	Audioclip played while engine is active.
Engine Afterburner Pitch	Audiosource pitch when afterburner is activated.
<u><i>Connections</i></u>	
Parent	Rigidbody airplane which the engine is attached to. <i>Note: Highly required for the engine to function.</i>
Intake fan point	Point along the engine where the intake fan is located.
Rotation Axis	Axis of rotation of the intake fan transform
Rotation Direction	Direction of rotation of the intake fan i.e. Counter Clockwise or Clockwise.
Thruster	Transform at point where the engine thrust is applied to the aircraft.
<u><i>Throttle Control</i></u>	
Fuel input	Throttle position of the engine
Throttle speed	How fast the fuel input moves from 0-1 and back.
<u><i>Engine Display</i></u>	
Current Engine State	Current State of the engine {Off, Starting, Running}

Air Density	Density of air at current altitude and speed.
Engine Thrust	Total thrust Generated by the engine in Newton.
<i>Extra Settings</i>	
<i>Effects</i>	
Exhaust Smoke	Exhaust particle system
Maximum Emission	Rate of emission of the exhaust particle over time at full throttle.
Exhaust Material	Material used for the engine core. Note: it must contain an Illumination map.
<i>Destruction</i>	

- **TURBOFAN ENGINE:** Based on the turbofan engine, with the proper adjustments. Should also be added to a new gameobject from the toolbar.



PROPERTIES

Property:	Function:
<u>Engine Dimensions</u>	
Engine Diameter	This is the total diameter of the engine in meters
Intake Diameter Percentage	This is the diameter of the engine intake relative to the total engine diameter expressed as a percentage. It is depicted by a blue circle in front of the engine to aid adjustment. <i>Note: This should closely match the intake fan model if available.</i>
Exhaust Diameter Percentage	This is the diameter of the engine exhaust relative to the total engine diameter. Depicted by a red circle at the back of the engine. <i>Note: This value would be adjustable for variable nozzle engines in coming update.</i>
Weight	Weight of the engine in kg. <i>Note: this value is only used if engine model is detachable.</i>
Overall Length	Length of the engine in meters.
<u>Turbine Configuration</u>	
Low Pressure fan RPM	RPM of the intake or low-pressure fan
High Pressure fan RPM	RPM of the turbine or high-pressure fan
N1	Current speed of the Entry fan Blade
N2	Current speed of the Turbine fan Blade
Overall Pressure Ratio	Difference in the pressure after the compressor relative to the pressure before the engine i.e. basic aeronautical pressure ratio. E.g. 26 for the GE F404 used in the F117 Nighthawk.
Bypass Ratio	Ratio between the mass flow rate of the bypass stream to the mass flow entering the engine core e.g. 0.34 for the GE F404.
Reheat system	Whether or not the engine uses afterburners. No reheat means no afterburner.
Afterburner Operative	On when the afterburner is activated.
Reverse Thrust	Whether reverse thrust is available or not
<u>Fuel Type and Combustion System</u>	

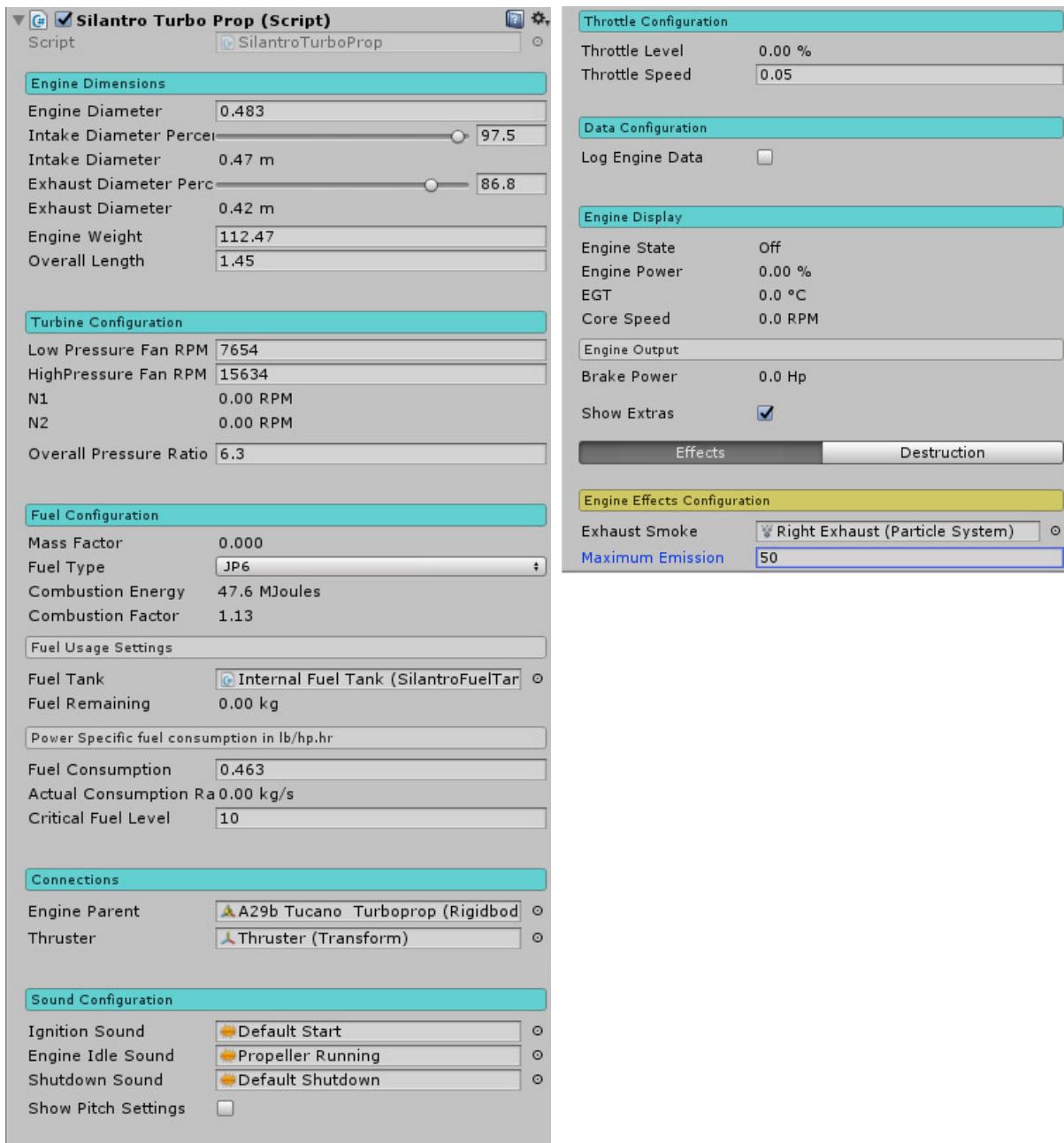
Mass factor	Internal float used for calculations
Fuel Type	Type of fuel used by the engine. Available options: Jet B, Jet A1, JP6, JP8.
Combustion Energy	Specific energy of combustion of the selected fuel in MJ/kg.
<u>Fuel Configuration</u>	
Fuel Tank	Fuel tank connected to the engine
Normal TSFC	Thrust specific fuel consumption of the engine during normal operation in lb/lbf.hr
Afterburner TSFC	Thrust specific fuel consumption in lb/lbf.hr when afterburner is active.
Current tank fuel	Amount of fuel left in the attached fuel tank
Critical fuel level	Minimum fuel required for normal operation, the engine starts behaving erratically if the fuel is lower than this value. <i>Note: Engine shutdown automatically when fuel reaches 0 kg.</i>
Actual fuel Consumption	Fuel consumption in kg/s
Low fuel	Low fuel warning
<u>Engine Sounds</u>	
Ignition Sound	Audioclip to be played when engine is starting.
Shutdown Sound	Audioclip to play when the engine is stopped.
Engine Idle Sound	Audioclip played while engine is active.
Engine Afterburner Pitch	Audiosource pitch when afterburner is activated.
<u>Connections</u>	
Parent	Rigidbody airplane which the engine is attached to. <i>Note: Highly required for the engine to function.</i>
Fan	Transform of the engine fan model.
Fan Rotation Axis	Rotation axis of the fan model, depending on selection the model can rotate along the x-axis, y-axis or z-axis
Rotation Direction	Direction of rotation of the fan model. Either clockwise (cw) or counter-clockwise (ccw).
Thruster	Transform at point where the engine thrust is applied to the aircraft.

<u>Throttle Control</u>	
Fuel input	Throttle position of the engine
Throttle speed	How fast the fuel input moves from 0-1 and back.
<u>Engine Display</u>	
Current Engine State	Current State of the engine {Off, Starting, Running}
Air Density	Density of air at current altitude and speed.
Engine Thrust	Total thrust Generated by the engine in Newton.
<u>Extra Settings</u>	
<u>Effects</u>	
Exhaust Smoke	Exhaust particle system
Maximum Emission	Rate of emission of the exhaust particle over time at full throttle.
Exhaust Material	Material used for the engine core. Note: it must contain an Illumination map.
<u>Destruction</u>	

- **ROCKET MOTOR:**

- **DRIVE ENGINES**

- **TURBOPROP ENGINE:** Used to power propeller planes and can also be added from the engine section on the toolbar.



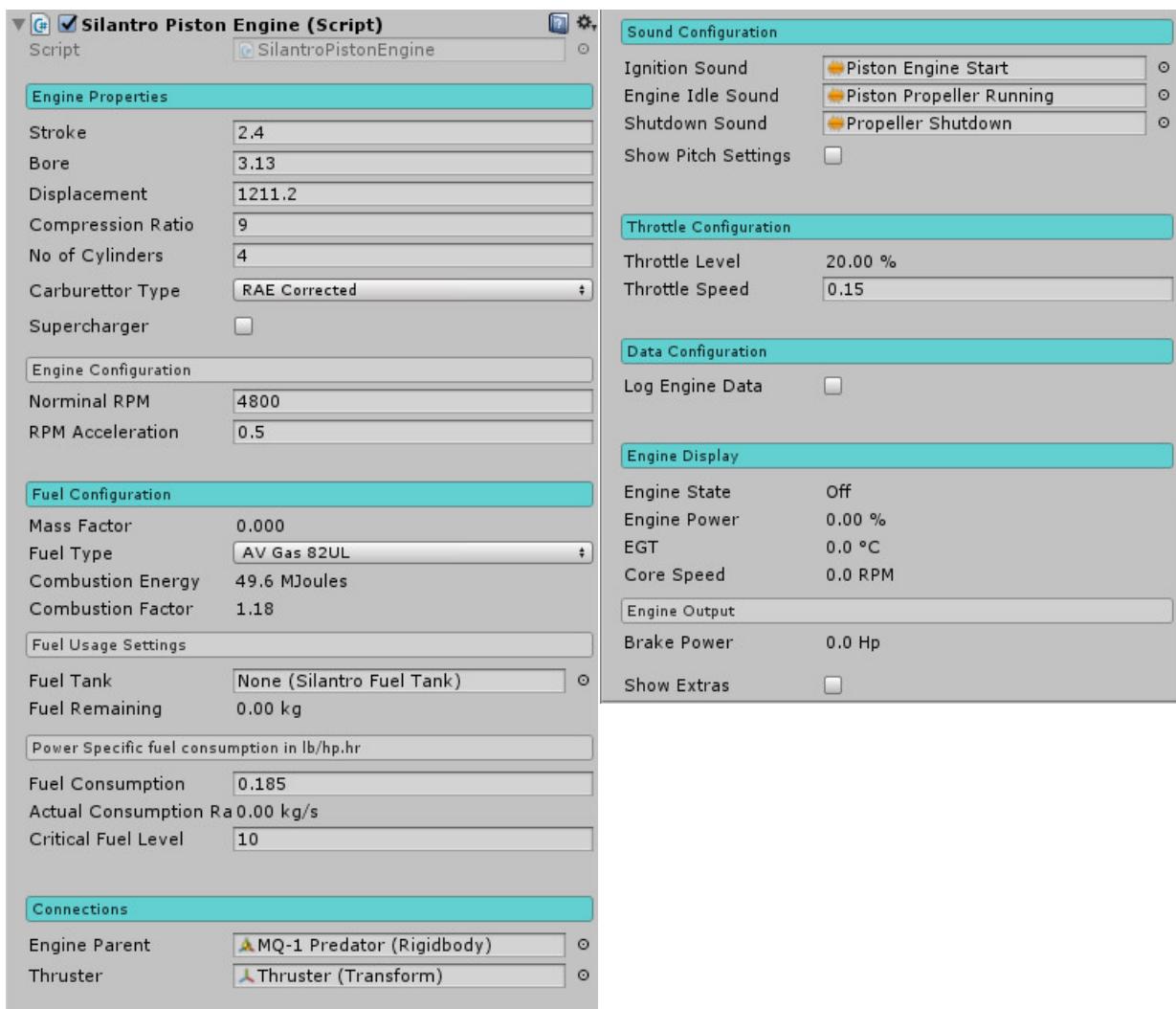
PROPERTIES

Property:	Function:
<u><i>Engine Dimensions</i></u>	
Engine Diameter	This is the total diameter of the engine in meters
Intake Diameter Percentage	This is the diameter of the engine intake relative to the total engine diameter expressed as a percentage. It is depicted by a blue circle in front of the engine to aid adjustment. <i>Note: This should closely match the intake fan model if available.</i>
Exhaust Diameter Percentage	This is the diameter of the engine exhaust relative to the total engine diameter. Depicted by a red circle at the back of the engine. <i>Note: This value would be adjustable for variable nozzle engines in coming update.</i>
Weight	Weight of the engine in kg. <i>Note: this value is only used if engine model is detachable.</i>
Overall Length	Length of the engine in meters.
<u><i>Turbine Configuration</i></u>	
Low Pressure fan RPM	RPM of the intake or low-pressure fan
High Pressure fan RPM	RPM of the turbine or high-pressure fan
N1	Current speed of the Entry fan Blade
N2	Current speed of the Turbine fan Blade
Overall Pressure Ratio	Difference in the pressure after the compressor relative to the pressure before the engine i.e. basic aeronautical pressure ratio. E.g. 26 for the GE F404 used in the F117 Nighthawk.
<u><i>Fuel Configuration</i></u>	
Mass factor	Internal float used for calculations
Fuel Type	Type of fuel used by the engine. Available options: Jet B, Jet A1, JP6, JP8.
Combustion Energy	Specific energy of combustion of the selected fuel in MJ/kg.
<u><i>Fuel Usage Settings</i></u>	

Fuel Tank	Fuel tank connected to the engine
TSFC	Thrust specific fuel consumption of the engine during normal operation in lb/lbf.hr
Afterburner TSFC	Thrust specific fuel consumption in lb/lbf.hr when afterburner is active.
Current tank fuel	Amount of fuel left in the attached fuel tank
Critical fuel level	Minimum fuel required for normal operation, the engine starts behaving erratically if the fuel is lower than this value. <i>Note: Engine shutdown automatically when fuel reaches 0 kg.</i>
Actual fuel Consumption	Fuel consumption in kg/s
<u><i>Engine Sounds</i></u>	
Ignition Sound	Audio clip to be played when engine is starting.
Shutdown Sound	Audio clip to play when the engine is stopped.
Engine Idle Sound	Audio clip played while engine is active.
Engine Afterburner Pitch	Audio source pitch when afterburner is activated.
<u><i>Connections</i></u>	
Parent	Rigidbody airplane which the engine is attached to. <i>Note: Highly required for the engine to function.</i>
Intake fan point	Point along the engine where the intake fan is located.
Rotation Axis	Axis of rotation of the intake fan transform
Rotation Direction	Direction of rotation of the intake fan i.e. Counter Clockwise or Clockwise.
Thruster	Transform at point where the engine thrust is applied to the aircraft.
<u><i>Throttle Control</i></u>	
Throttle Level	Throttle position of the engine
Throttle speed	How fast the fuel input moves from 0-1 and back.
<u><i>Engine Display</i></u>	
Engine State	Current State of the engine {Off, Starting, Running}
Engine Power	Current Percentage of the engine power

EGT	Exhaust Gas Temperature (will be used for infra-red radar signature in the future)
Core Speed	Current RPM of the engine core
Brake Power	Power output of the engine in Horsepower
<u>Extra Settings</u>	
<u>Effects</u>	
Exhaust Smoke	Exhaust particle system
Maximum Emission	Rate of emission of the exhaust particle over time at full throttle.
<u>Destruction</u>	

- **PISTON ENGINE**



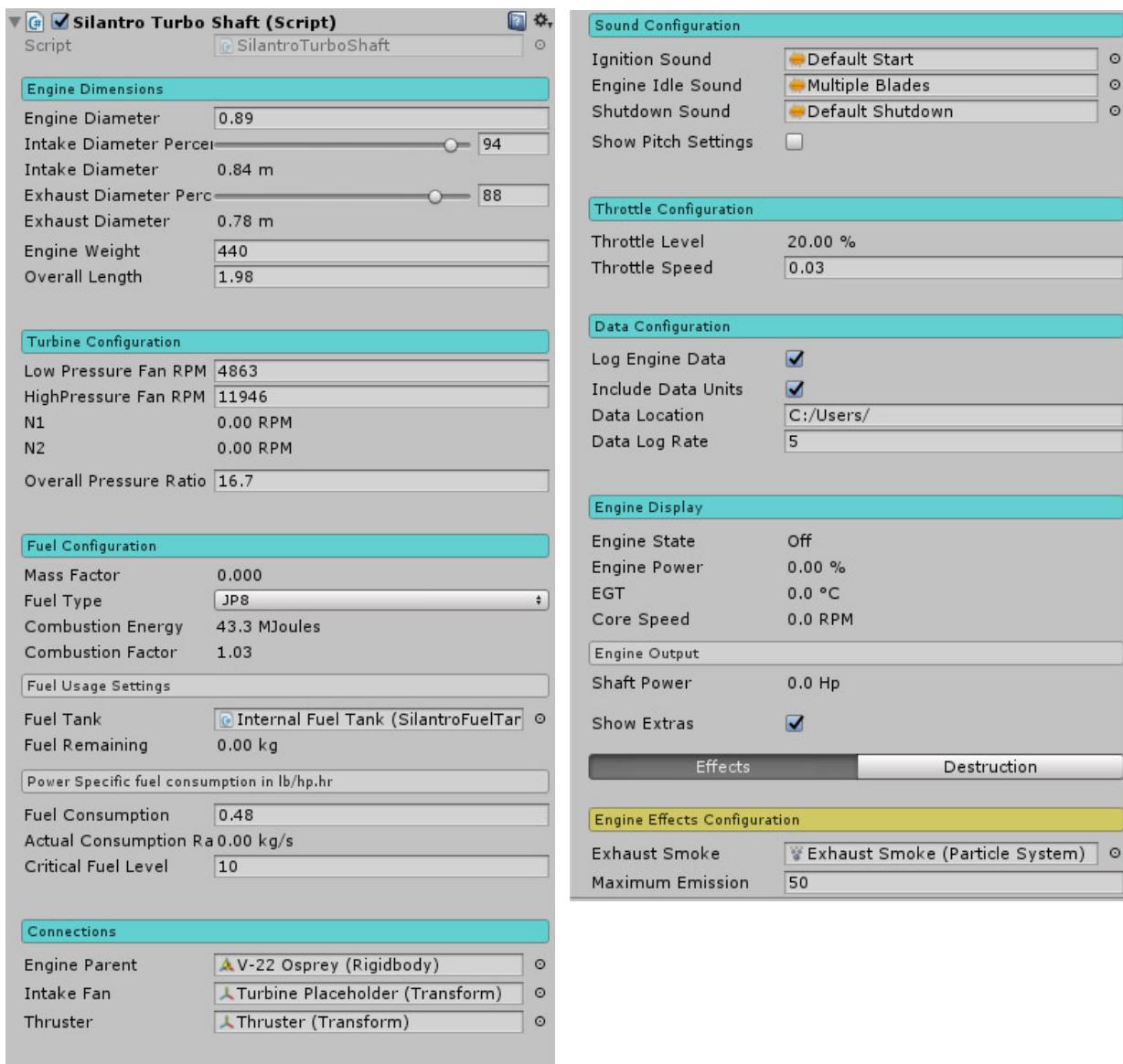
PROPERTIES

Property:	Function:
<u>Engine Properties</u>	
Stroke	Stroke of the engine in inches
Bore	Diameter of each cylinder (bore) in inches
Displacement	Volume of the engine cylinder in cubic centimetres
Compression Ratio	Amount to which air is compressed in the engine before being ignited.

No of Cylinders	No of available engine cylinders
Carburettor Type	Select which Carburettor to use. Note: The SU carburettor is driven by gravitational force and will lose power or shutdown in negative G manoeuvres, while the RAE Corrected carburettor corrects this defect.
Supercharger	Select if and which supercharger to use
<u>Engine Configuration</u>	
Nominal RPM	Base RPM of the piston engine
RPM Acceleration	Speed of increase or decrease of the engine RPM
<u>Fuel Configuration</u>	
Mass factor	Internal float used for calculations
Fuel Type	Type of fuel used by the engine. Available options: AV Gas 82UL, AV Gas 100LL and AV Gas 100.
Combustion Energy	Specific energy of combustion of the selected fuel in MJ/kg.
<u>Fuel Usage Settings</u>	
Fuel Tank	Fuel tank connected to the engine
TSFC	Thrust specific fuel consumption of the engine during normal operation in lb/lbf.hr
Current tank fuel	Amount of fuel left in the attached fuel tank
Critical fuel level	Minimum fuel required for normal operation, the engine starts behaving erratically if the fuel is lower than this value. <i>Note: Engine shutdown automatically when fuel reaches 0 kg.</i>
Actual fuel Consumption	Fuel consumption in kg/s
<u>Engine Sounds</u>	
Ignition Sound	Audio clip to be played when engine is starting.
Shutdown Sound	Audio clip to play when the engine is stopped.
Engine Idle Sound	Audio clip played while engine is active.
<u>Connections</u>	

Parent	Rigidbody airplane which the engine is attached to. <i>Note: Highly required for the engine to function.</i>
Thruster	Transform at point where the engine thrust is applied to the aircraft.
<i><u>Throttle Control</u></i>	
Throttle Level	Throttle position of the engine
Throttle speed	How fast the fuel input moves from 0-1 and back.
<i><u>Engine Display</u></i>	
Engine State	Current State of the engine {Off, Starting, Running}
Engine Power	Current Percentage of the engine power
EGT	Exhaust Gas Temperature (will be used for infra-red radar signature in the future)
Core Speed	Current RPM of the engine core
Brake Power	Power output of the engine in Horsepower
<i><u>Extra Settings</u></i>	
<i><u>Effects</u></i>	
Exhaust Smoke	Exhaust particle system
Maximum Emission	Rate of emission of the exhaust particle over time at full throttle.
<i><u>Destruction</u></i>	

- TURBOSHAFT ENGINE



PROPERTIES

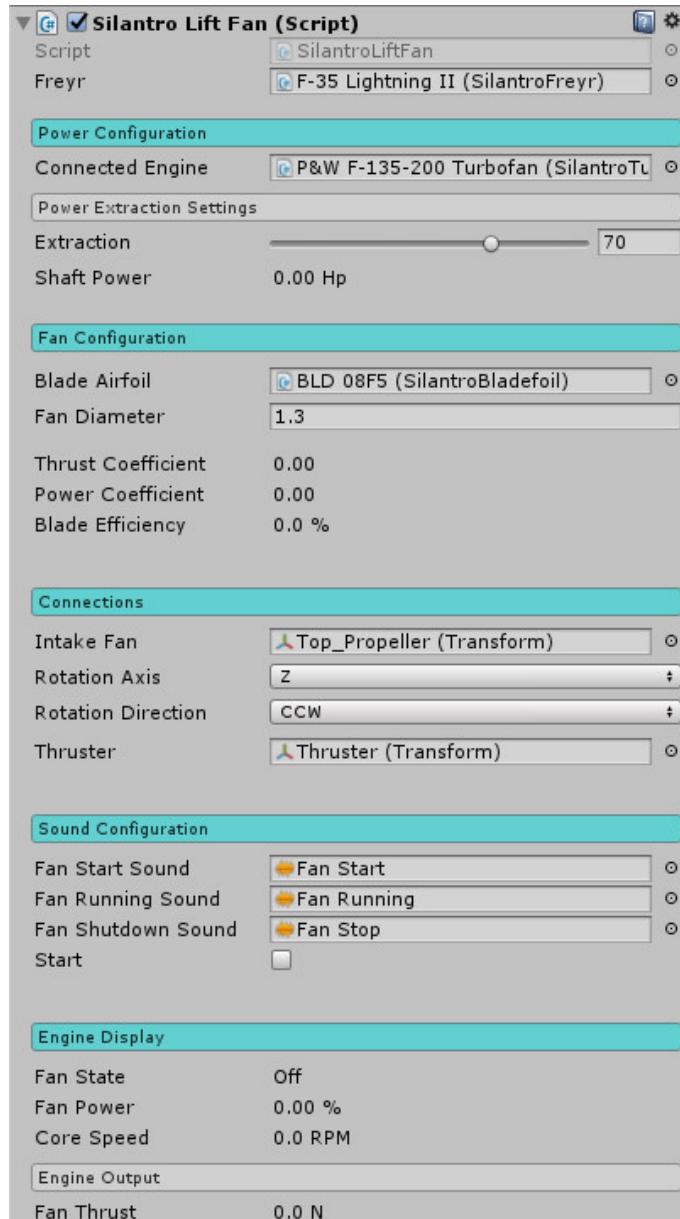
Property:	Function:
<u>Engine Dimensions</u>	
Engine Diameter	This is the total diameter of the engine in meters
Intake Diameter Percentage	This is the diameter of the engine intake relative to the total engine diameter expressed as a percentage. It is depicted by a blue circle in front of the engine to aid

	adjustment. <i>Note: This should closely match the intake fan model if available.</i>
Exhaust Diameter Percentage	This is the diameter of the engine exhaust relative to the total engine diameter. Depicted by a red circle at the back of the engine. <i>Note: This value would be adjustable for variable nozzle engines in coming update.</i>
Weight	Weight of the engine in kg. <i>Note: this value is only used if engine model is detachable.</i>
Overall Length	Length of the engine in meters.
<u>Turbine Configuration</u>	
Low Pressure fan RPM	RPM of the intake or low-pressure fan
High Pressure fan RPM	RPM of the turbine or high-pressure fan
N1	Current speed of the Entry fan Blade
N2	Current speed of the Turbine fan Blade
Overall Pressure Ratio	Difference in the pressure after the compressor relative to the pressure before the engine i.e. basic aeronautical pressure ratio. E.g. 26 for the GE F404 used in the F117 Nighthawk.
<u>Fuel Configuration</u>	
Mass factor	Internal float used for calculations
Fuel Type	Type of fuel used by the engine. Available options: Jet B, Jet A1, JP6, JP8.
Combustion Energy	Specific energy of combustion of the selected fuel in MJ/kg.
<u>Fuel Usage Settings</u>	
Fuel Tank	Fuel tank connected to the engine
TSFC	Thrust specific fuel consumption of the engine during normal operation in lb/lbf.hr
Afterburner TSFC	Thrust specific fuel consumption in lb/lbf.hr when afterburner is active.
Current tank fuel	Amount of fuel left in the attached fuel tank
Critical fuel level	Minimum fuel required for normal operation, the engine starts behaving erratically if the fuel is lower

	than this value. <i>Note: Engine shutdown automatically when fuel reaches 0 kg.</i>
Actual fuel Consumption	Fuel consumption in kg/s
<u>Engine Sounds</u>	
Ignition Sound	Audio clip to be played when engine is starting.
Shutdown Sound	Audio clip to play when the engine is stopped.
Engine Idle Sound	Audio clip played while engine is active.
Engine Afterburner Pitch	Audio source pitch when afterburner is activated.
<u>Connections</u>	
Parent	Rigidbody airplane which the engine is attached to. <i>Note: Highly required for the engine to function.</i>
Intake fan point	Point along the engine where the intake fan is located.
Rotation Axis	Axis of rotation of the intake fan transform
Rotation Direction	Direction of rotation of the intake fan i.e. Counter Clockwise or Clockwise.
Thruster	Transform at point where the engine thrust is applied to the aircraft.
<u>Throttle Control</u>	
Throttle Level	Throttle position of the engine
Throttle speed	How fast the fuel input moves from 0-1 and back.
<u>Engine Display</u>	
Engine State	Current State of the engine {Off, Starting, Running}
Engine Power	Current Percentage of the engine power
EGT	Exhaust Gas Temperature (will be used for infra-red radar signature in the future)
Core Speed	Current RPM of the engine core
Shaft Power	Power output of the engine in Horsepower
<u>Extra Settings</u>	
<u>Effects</u>	
Exhaust Smoke	Exhaust particle system

Maximum Emission	Rate of emission of the exhaust particle over time at full throttle.
<u>Destruction</u>	

- **LIFTFAN ENGINE:** Generates vertical thrust (lift) when connected to a Turbofan engine. Actually developed for my STOVL system.

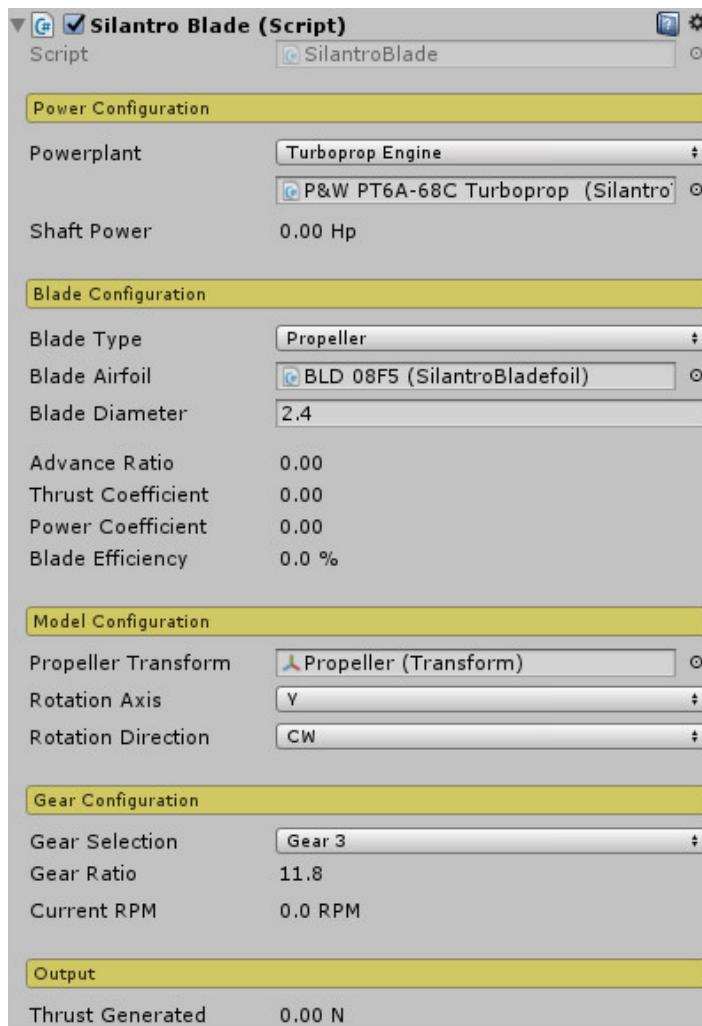


PROPERTIES

Property:	Function:
<u>Power Configuration</u>	
Attached Engine	Engine from which the Liffan draws power.

Power Extraction	Percentage of total power shared with the main engine i.e. level to which the main engine power will drop when the LiftFan is at full speed.
Shaft Power	Amount of power in Hp actually reaching the fan from the main engine.
<i>Fan Configuration</i>	
Blade Airfoil	Airfoil used by the fan blades
Fan Diameter	Diameter of the lift fan propeller
<i>Fan Sounds</i>	
Fan Start Sound	audioclip to be played when fan is starting.
Fan Shutdown Sound	audioclip to play when the fan is stopped.
Fan Run Sound	audioclip played while fan is active.
<i>Connections</i>	
Intake Fan	Transform of the engine Liftfan propeller model.
Fan Rotation Axis	Rotation axis of the Liftfan propeller model, depending on selection the model can rotate along the x-axis, y-axis or z-axis
Rotation Direction	Direction of rotation of the Liftfan propeller model. Either clockwise (cw) or counter-clockwise (ccw).
Thruster	Transform at point where the engine thrust is applied to the aircraft.
<i>Engine Display</i>	
Fan State	Current state of operation of the fan
Fan Thrust	Total thrust/Lift Generated by the liftfan in Newton.

- **BLADE SYSTEM:**



PROPERTIES

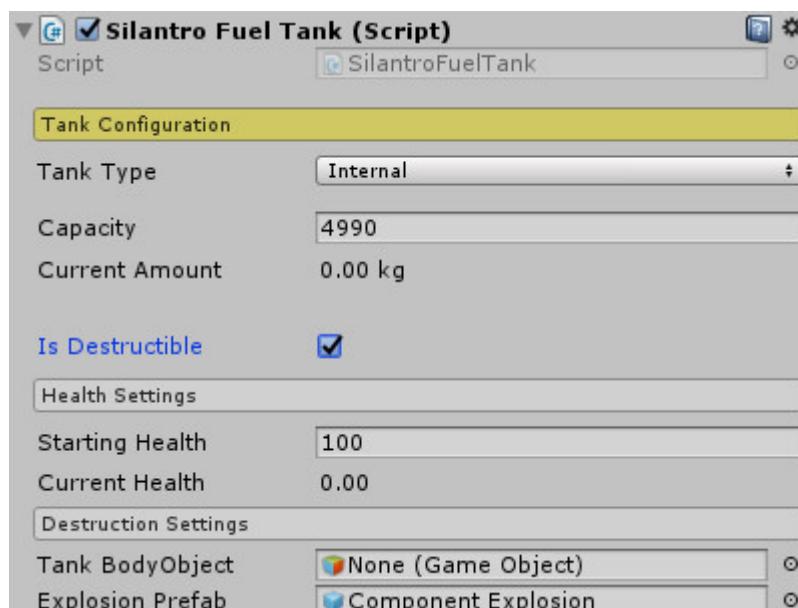
Property:	Function:
<u>Power Configuration</u>	
Power Plant	Type of engine from which the blade draws power, Turboprop, Turboshaft, Piston or an Electrical Motor.
Shaft Power	Total power in Hp reaching the blade
Blade Configuration	
Blade Type	Function of the blade either Propeller or Rotor
Blade Airfoil	Airfoil used by the blades

Blade Diameter	Diameter of the blade in meters
Model Configuration	
Blade Transform	Transform of the Propeller or Rotor
Rotation Axis	Axis of rotation of the selected transform
Rotation Direction	Direction of rotation of the blade transform
Gear Configuration	
Gear Selection	Current selected gear
Gear Ratio	RPM reduction ratio of the selected gear. <i>Note: always select a gear to keep blade tip speed subsonic,</i>
Current RPM	Current RPM of the blade
Thrust Generated	Total amount of thrust generated by the blade.

- **FUEL TANKS**

The fuel tanks are designed to be independent of each other and can be individually attached to each engine (Not advised though). The fuel tanks can either be **internal** or **external**. External tanks can have a model attached to it and can be detached from the aircraft.

Finally, with another component **Fuel Distributor**, fuel from the tank can be dumped to reduce aircraft weight and can also be refilled. *Note: Only the internal tank can be refilled, but fuel can be dumped from the external and internal tank.*

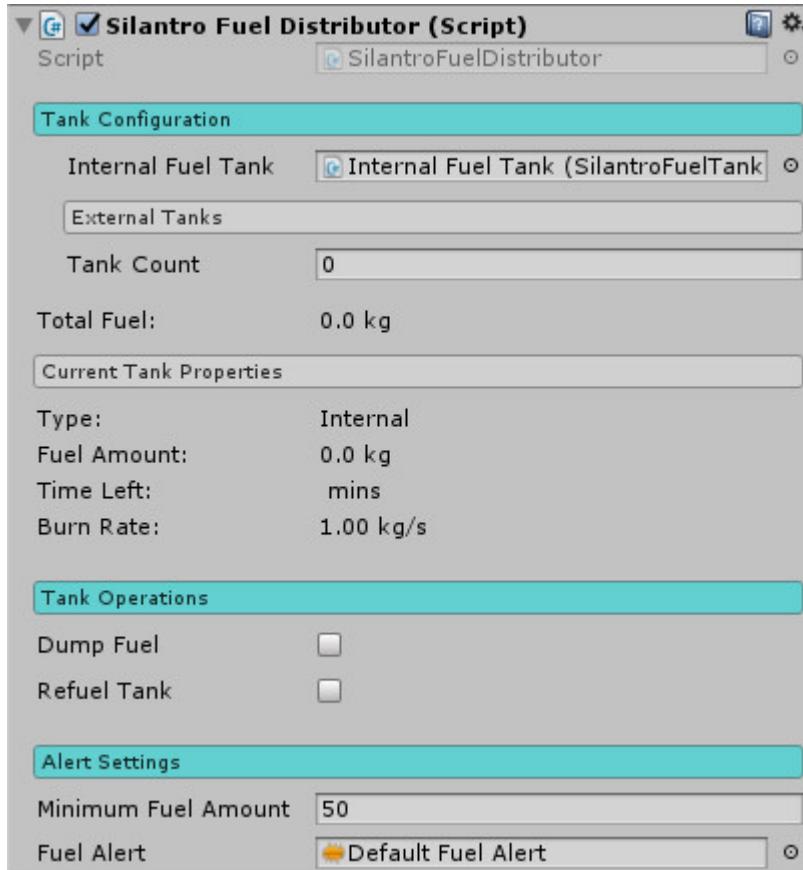


PROPERTIES

Property:	Function:
<u>Tank Settings</u>	
Capacity	Maximum amount of fuel the tank can contain in kg.
Current Amount	Amount of fuel currently in the tank
Attached	Bool to control if tank is attached to the aircraft.
<u>Health Values</u>	
Starting Health	Health value of the tank at start
Current Health	Current health value of the tank
<u>Effects</u>	
Tank Gameobject	Model of the external tank.
Explosion Prefab	Explosion gameobject to be instantiated when tank health is destroyed.

- **FUEL DISTRIBUTOR**

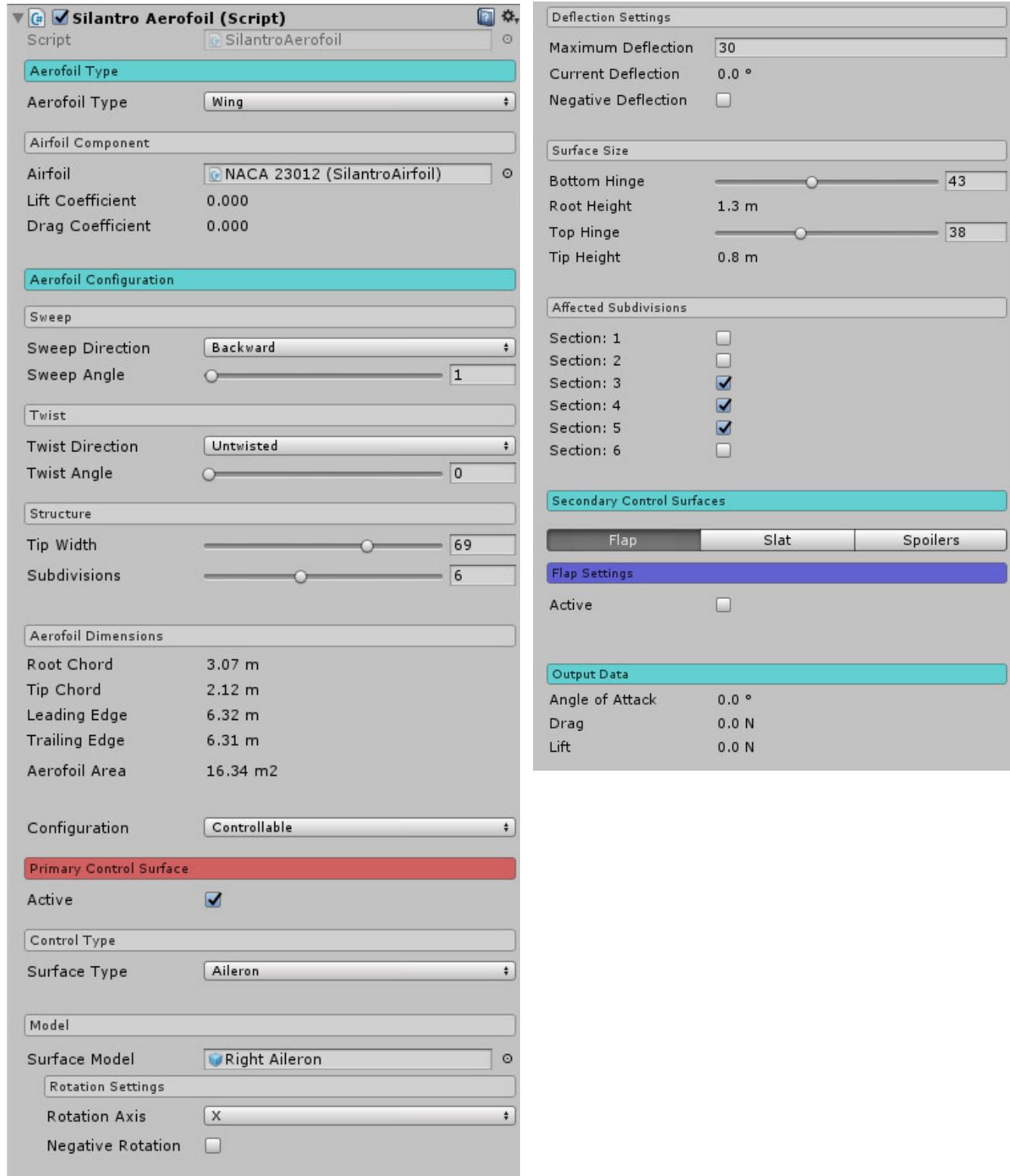
This component is used to control fuel distribution in the aircraft and allow it to use multiple tanks. It is designed in such a way that the fuel in the internal tank is used first before that in the external tanks. It can also be used to dump and refill the tanks.



PROPERTIES

Property:	Function:
<u>Fuel Tanks</u>	
Internal Fuel Tank	Internal tank located inside the aircraft body. <i>Note: it is used first even if external tanks are attached.</i>
External Tanks	List of external tanks attached to the aircraft.
Total Fuel Remaining	Total amount of fuel remaining in all the attached fuel tanks combined.
<u>Tank Selection Display</u>	
Current Tank	Current tank selected for use by the distributor
Tank Type	Indicates whether the selected tank is internal or external .
Current tank Fuel	Amount of fuel remaining in the selected tank
Time left	Amount of time left before the fuel in the selected tank is completely depleted.
Burn Rate	Total consumption rate of all the engines combined.
<u>Fuel Dump System</u>	
Dump Fuel	Switch to activate and deactivate fuel dump
Fuel Dump Rate	Rate at which fuel is released from the tank in kg/s
<u>Tank Refill System</u>	
Refill Tank	Switch to activate and deactivate tank refill
Refuel Rate	Rate at which fuel enters the tank in kg/s. <i>Note Only the internal fuel tank can be refilled.</i>
<u>Warning System</u>	
Low Fuel	Indicates if the total fuel remaining is lower than the specified minimum amount.
Minimum Fuel Amount	Least amount of total fuel permissible for normal flight. Warning system is activated when the fuel amount goes beyond this amount.
Fuel Alert	Audioclip to be played by the warning system

2. AEROFOIL SYSTEM: Component which generates lift and control for the aircraft. Can either be controllable or stationary; Controllable surfaces can have controls attached to them while stationary surfaces can't. Controls can either be primary: Aileron, Elevator, Rudder or Secondary: Flap, Slat and Spoiler.



PROPERTIES

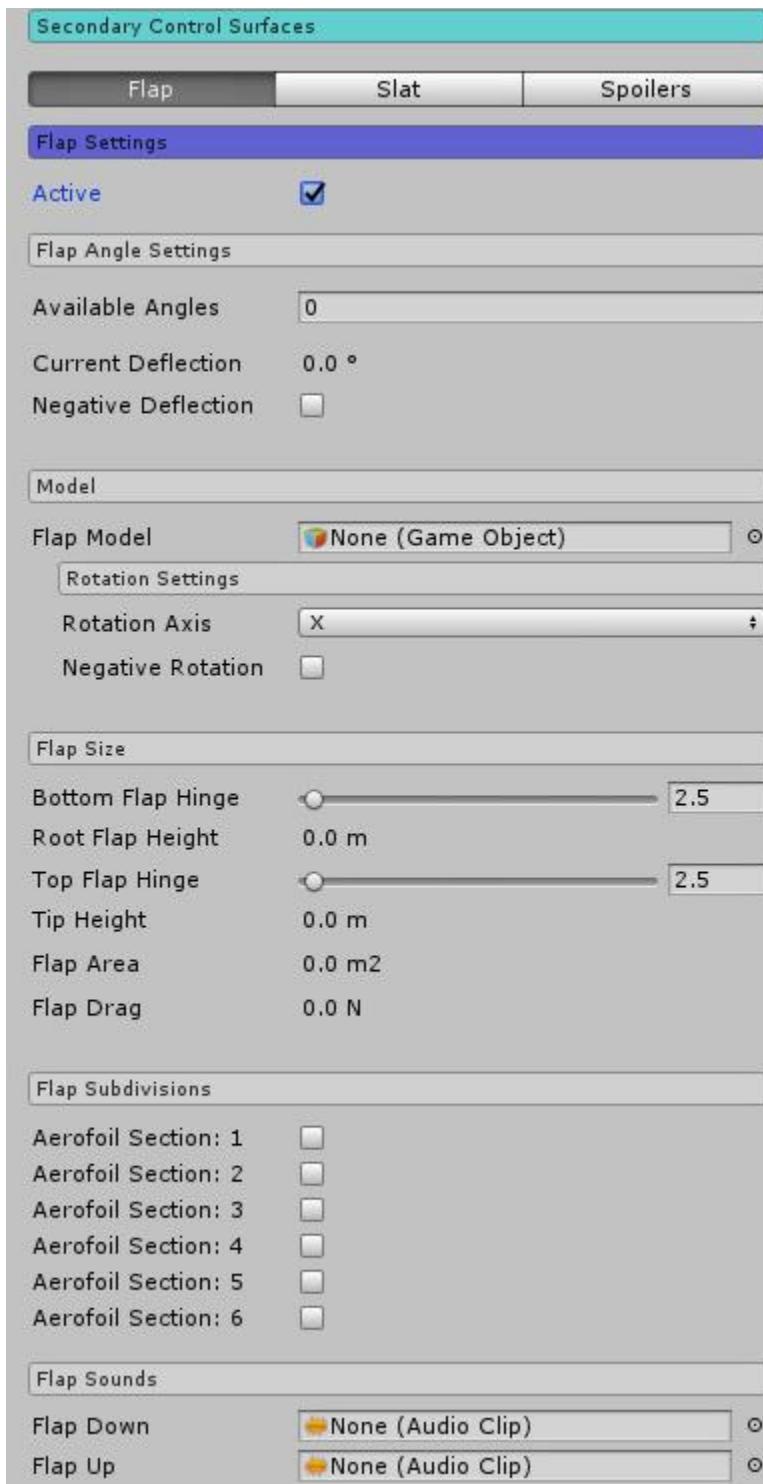
Property:	Function:
<u>Aerofoil Properties</u>	
Aerofoil Type	Type determinant of the aerofoil either Wing or Stabilizer.
<u>Airfoil Component</u>	
Airfoil	Component containing lift and drag coefficient at different angles of attack.
Lift Coefficient	Coefficient of lift at current angle of attack
Drag Coefficient	Drag coefficient at current angle of attack.
<u>Aerofoil Settings</u>	
Sweep Direction	Determines if the aerofoil is swept or not. Options; Unswept, Backwards or Forward.
Sweep Angle	Angle to which the aerofoil is swept.
Twist Direction	Determines if the aerofoil is twisted or not. Aerofoil can be untwisted, twisted upwards or downwards.
Twist Angle	Amount of twist applied to the aerofoil
Aerofoil Tip Width	Ratio of aerofoil tip to root expressed as a percentage. 100% means root width and tip width are equal which gives a completely rectangular aerofoil.
Aerofoil Subdivisions	No of sections which the aerofoil is divided and determines how smooth the lift generation system is. <i>Note: Higher values reduces performance, therefore values between 3-6 is advisable. High Performance systems can definitely go higher.</i>
<u>Aerofoil Dimensions</u>	
Root Chord	Length of aerofoil root.
Tip Chord	Length of aerofoil tip.
Leading edge length	Length of the aerofoil along the leading edge.

Trailing edge length	Length of the aerofoil along the trailing edge
<i><u>Output Data</u></i>	
Angle of Attack	Current angle of attack of the aerofoil
Drag	Current drag force generated by the aerofoil
Lift	Total Lift generated by the aerofoil
<i><u>Destruction</u></i>	
Attached Engines	Determine if and which engines are attached to the aerofoil i.e. for aircrafts with engines on the wing or tail
Attached Aerofoil	Determines if and which an extra aerofoil is attached to this aerofoil e.g. a complex wing composed of two aerofoils.
Attached Weapons	If and which weapons are attached to the aerofoil
Attached Models	If and which GameObject attached to the aerofoil
Primary Control Surface	
Active	Switch to determine if the control surface is active or not
Surface Type	Type of the primary control surface; Aileron, Elevator or Rudder.
Surface Model	Control surface gameObject
Rotation Axis	Rotation axis of the selected control surface gameObject
Negative Rotation	Determines if the model rotates in the opposite direction
Maximum Deflection	Maximum angle to which the surface can deflect in both directions
Current Deflection	Current angle of the control surface
Negative Deflection	Determines if the control surface rotates in the opposite direction.
Bottom Hinge	Position of the control surface root along the aerofoil chord

Top Hinge	Position of the control surface tip along the aerofoil chord
Affected Subdivisions	Sections of the aerofoil covered by the control surface

SECONDARY CONTROL SURFACES

1. FLAP

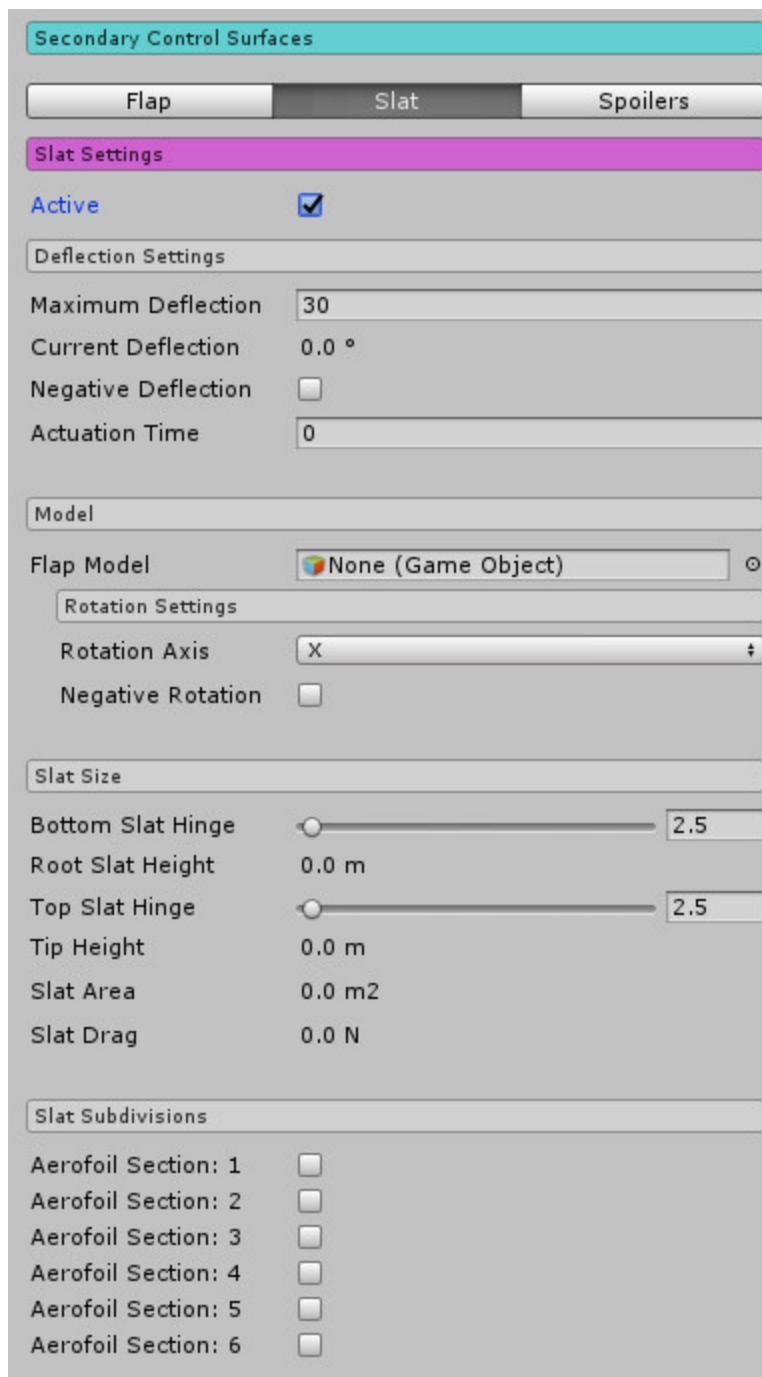


Property:

Function:

<i>Flap Settings</i>	
Available Angles	List of angles the flap can be set to i.e. Flap angle presets
Current Deflection	Current angle of the flap
Negative Deflection	Causes the flap to rotate in the opposite direction
Flap Model	Control surface gameObject
Rotation Axis	Rotation axis of the selected control surface gameObject
Negative Rotation	Determines if the model rotates in the opposite direction
Bottom Flap Hinge	Position of the control surface root along the aerofoil chord
Top Flap Hinge	Position of the control surface tip along the aerofoil chord
Flap Area	Total surface area of the flap
Flap Drag	Drag force generated by the flap
Flap Subdivisions	Sections of the aerofoil covered by the Flap surface
Flap Down	Audio clip to be played when flap is lowered
Flap Up	Audio clip to be played when flap is raised

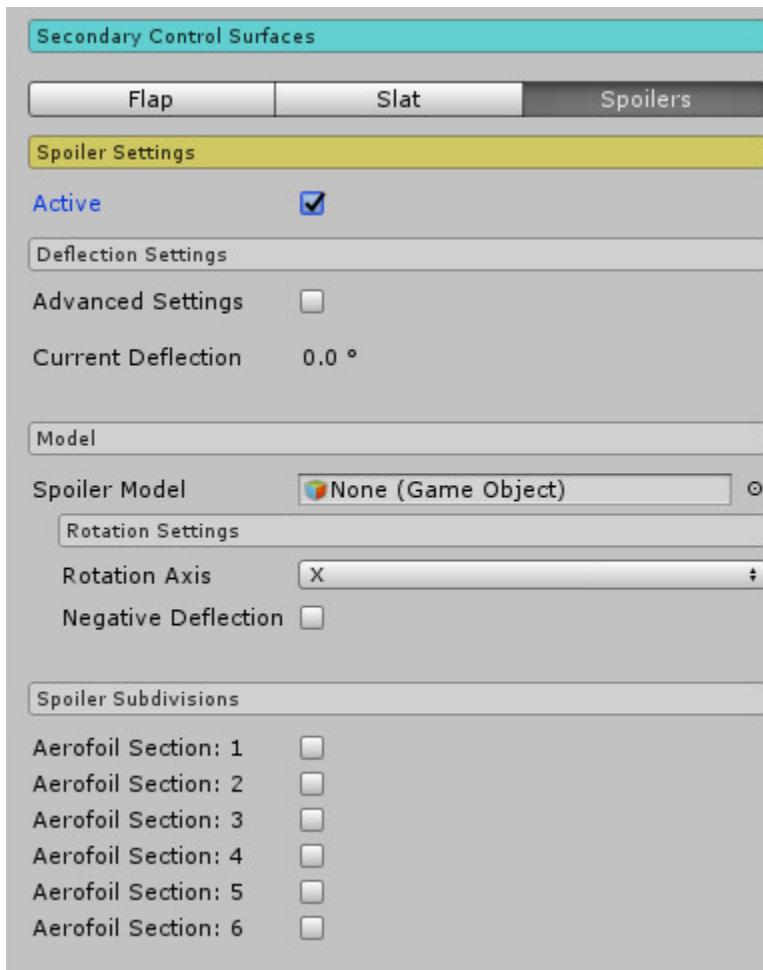
2. SLAT



Property:	Function:
<u>Slat Settings</u>	
Maximum Deflection	Maximum angle to which the slat can be deflected
Current Deflection	Current angle of the slat
Negative Deflection	Causes the slat to rotate in the opposite direction

Flap Model	Control surface gameObject
Rotation Axis	Rotation axis of the selected control surface gameObject
Negative Rotation	Determines if the model rotates in the opposite direction
Bottom Slat Hinge	Position of the control surface root along the aerofoil chord
Top Slat Hinge	Position of the control surface tip along the aerofoil chord
Slat Area	Total surface area of the slat
Slat Drag	Drag force generated by the slat
Slat Subdivisions	Sections of the aerofoil covered by the Slat surface

3. SPOILER



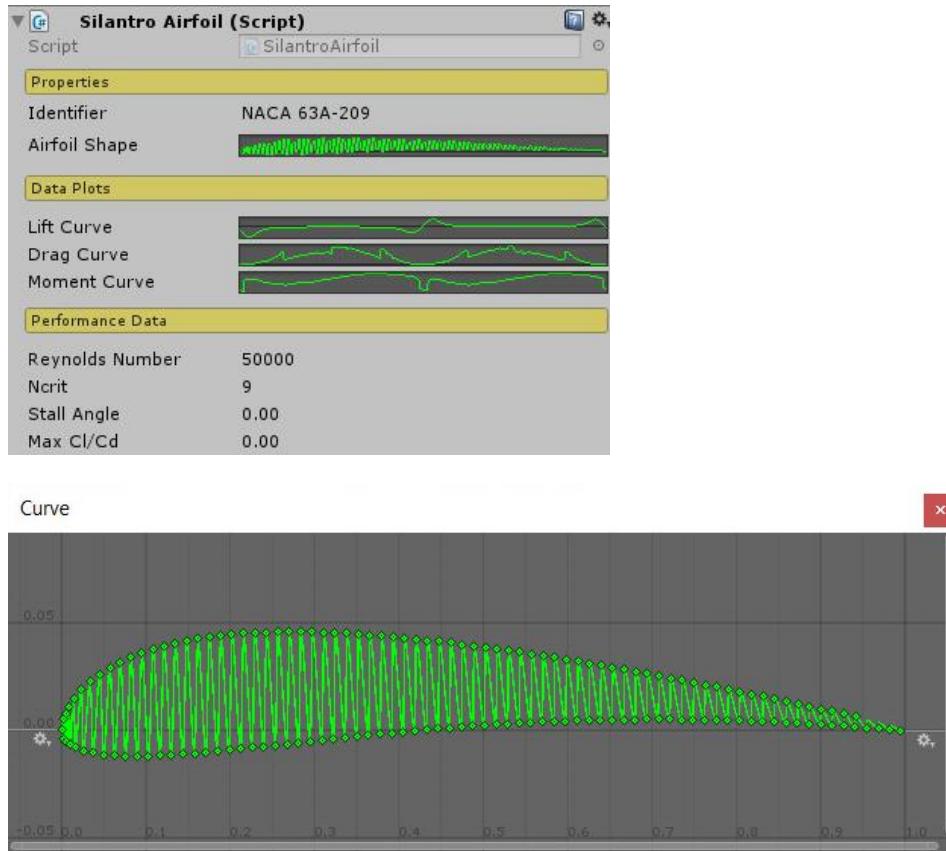
Property:	Function:
<u>Spoiler Settings</u>	
Maximum Deflection	Maximum angle to which the spoiler can be deflected
Current Deflection	Current angle of the spoiler
Spoiler Model	Control surface gameObject
Rotation Axis	Rotation axis of the selected control surface gameObject
Negative Deflection	Determines if the spoiler rotates in the opposite direction
Spoiler Subdivisions	Sections of the aerofoil affected by the spoiler surface

- **LEFT STRUCTURE:** To reduce complexity of setup, this component can be used to create left Aerofoils (default aerofoils created from the toolbar are right sided). The component allows two options Bound and Unbound. The bound option creates a left aerofoil where the position and rotation in every update frame is based on the selected right aerofoil, whereby the unbound option allows for total freedom and creates a left aerofoil completely independent of the selected right aerofoil.

Note: A right aerofoil must be selected to create a left structure.

3. AIRFOIL SYSTEM:

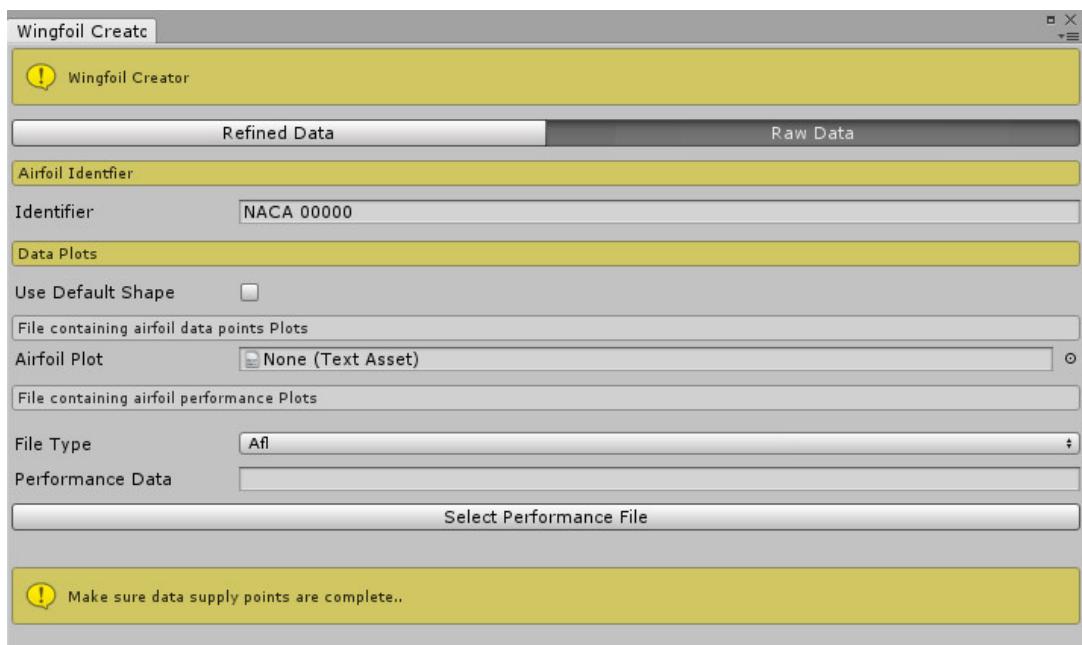
- **WINGFOIL:** Contains data to calculate properties for aircraft surface airfoils



PROPERTIES

Property:	Function:
<i>Wingfoil Properties</i>	
Identifier	Name or ID of the Wingfoil
Airfoil Shape	Curve plot of the selected Wingfoil
Lift Curve	Curve of the lift coefficient against angle of attack
Drag Curve	Curve of the drag coefficient against angle of attack
Moment Curve	Curve of the moment coefficient against angle of attack

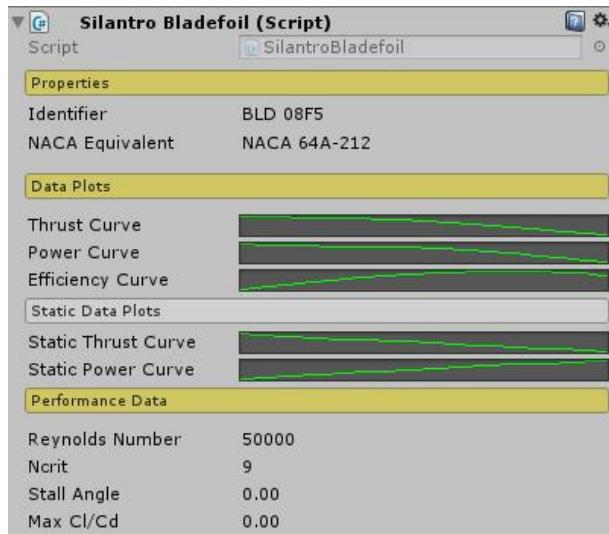
- **WINDOW**



PROPERTIES

Property:	Function:
<u><i>Creator Fields</i></u>	
Identifier	Name or ID to be used for the Airfoil
Use default shape	Used the default A18 airfoil shape
Airfoil Plot	Csv file containing the coordinates of the airfoil shape. <i>Note: the values must be comma decimated.</i>
File Type	Type of file containing the airfoil performance data
Data	File containing the performance data from Javafoil

- **BLADEFOIL:** Contains data to calculate the performance and properties of rotors or propellers



PROPERTIES

Property:	Function:
<u>Bladefoil Properties</u>	
Identifier	Name or ID to be used by the Bladefoil
NACA Equivalent	The airfoil shape by NACA standards
Thrust curve	Plot of the Thrust coefficient against advance ratio
Power curve	Plot of the Power coefficient against advance ratio
Efficiency curve	Plot of the efficiency against advance ratio
Static Thrust curve	Plot of the Thrust coefficient against RPM
Static Power curve	Plot of the Power coefficient against RPM

- **WINDOW**

Bladefoil

Bladefoil Identifier

Identifier	BLD 0000
NACA Equivalent	NACA 0000

Data Plots

File containing Propeller performance Plots	
Dynamic Plot	<input type="radio"/> None (Text Asset)
File containing static propeller performance Plots	
Static Plot	<input type="radio"/> None (Text Asset)

 Make sure data supply points are complete..

Create Bladefoil

PROPERTIES

Property:	Function:
Identifier	Name or ID to be used for the Airfoil
NACA Equivalent	Shape of the airfoil in NACA standards
Dynamic Plot	Csv file containing the performance of the blade against advance ratio.
Static Plot	Csv file contain the performance of the blade against RPM

4. **WEAPON SYSTEM:** Bombs currently in the early development stages and missiles and bombs will be added in the next update.

- **DROP BOMB**

- a. **UNGUIDED:**

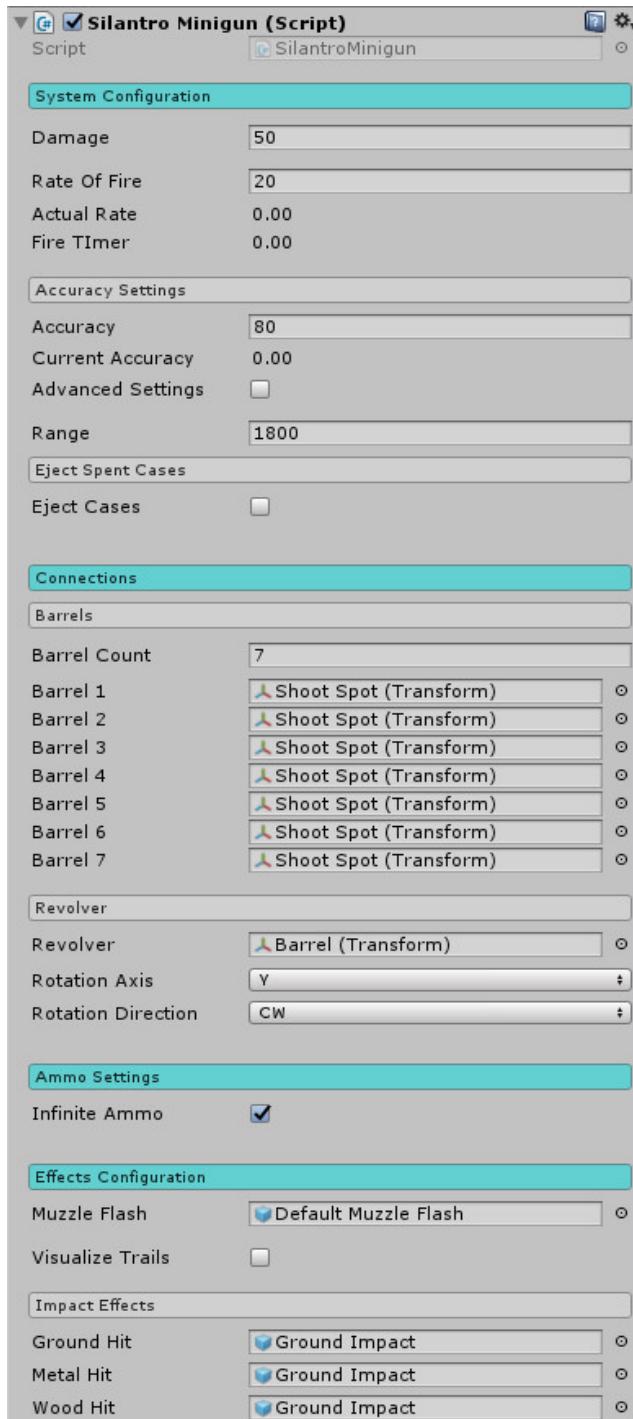


PROPERTIES

Property:	Function:
Identifier	Name or ID to be used for the bomb
Bomb type	Guided or Unguided

Weight	Total weight of the bomb
Length	Length of the bomb from nose to tail
Diameter	Maximum external diameter of the bomb
Skinning	Amount of pointiness of the bomb nose
Filling	Explosive or warhead carried by the bomb
Filling weight	Total amount of explosives in Kg
Fuze	Type of fuze or trigger mechanism used by the bomb

- **MINIGUN:** Designed after the normal Gatling guns used in attack aircrafts and helicopters.



PROPERTIES

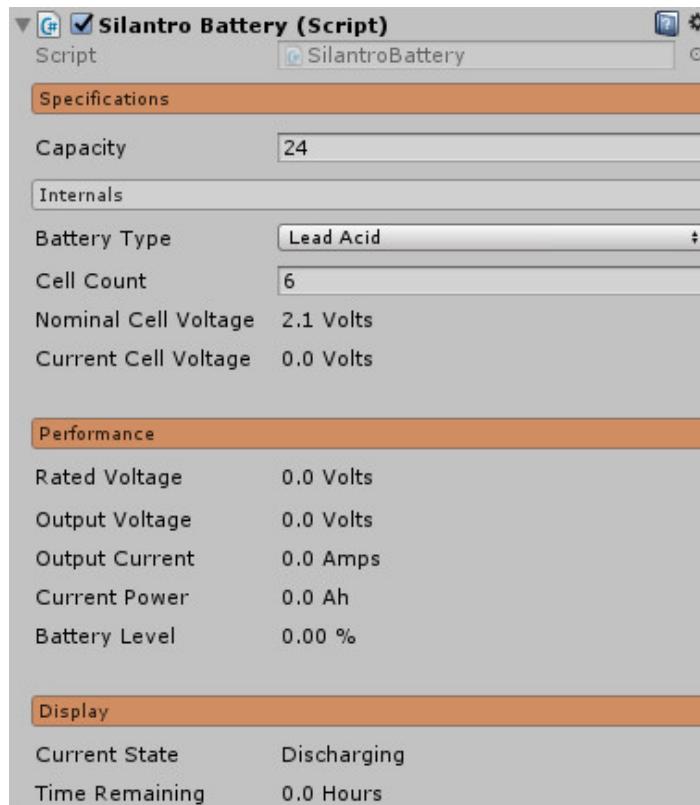
Property:	Function:
<u>Weapon Properties</u>	

Damage	Amount of health subtracted when a component is hit
Rate of Fire	Rate of fire of the minigun. <i>Note: 1 Unit = 15 Rounds per minute.</i>
Accuracy	How accurate the raycast shot is. 100 means the raycast lands on exactly the point selected
Range	How far the weapon can shoot to hit a component.
Range Ratio	Only used if your default distance scale is not in meters.
Ammo Capacity	Amount of bullets which the aircraft is loaded with on start.
Unlimited Ammo	If selected, available bullet is unlimited and is not depleted.
<u><i>Connections</i></u>	
Barrels	List of transforms from which bullets can be ejected from. <i>Note: The weapon cycles through each transform one after the other in a circular fashion.</i>
Revolver	Rotating barrel of the minigun
Rotation Axis	Axis of rotation of the barrel
Rotation Direction	Direction of rotation of the barrel
Shell Eject Point	Transform point from which bullet shell prefabs are ejected from.
<u><i>Effects</i></u>	
Muzzle Flash	Flash prefab when bullet is ejected.
Bullet Case	Prefab of bullet shell to be ejected.
<u><i>Impact Effects</i></u>	
Ground Hit	Prefab to be instantiated when bullet hits a gameobject with "Ground" tag.
Metal Hit	Prefab to be instantiated when bullet hits a gameobject with "Metal" tag.
Wood Hit	Prefab to be instantiated when bullet hits a gameobject with "Wood" tag.
Fire Sound	Audioclip to be played when weapon is fired

5. ELECTRICAL SYSTEM

- POWER

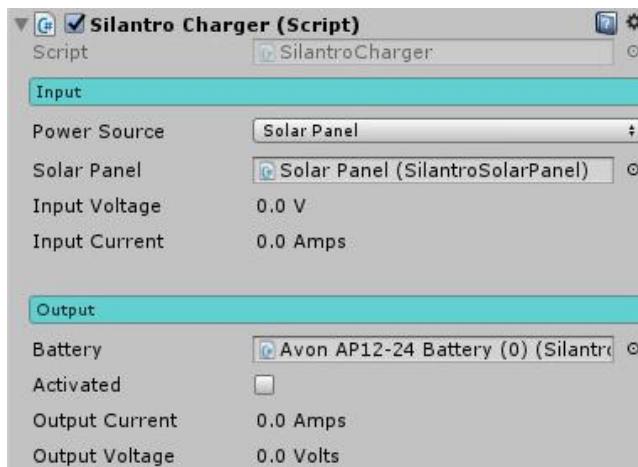
- BATTERY



PROPERTIES

Property:	Function:
<u>Specifications</u>	
Capacity	Total amount of energy stored in the battery in Ampere hours (Ah)
Battery Type	Type of configuration used by the battery
Cell Count	Number of cells contained in the battery

- BATTERY CHARGER



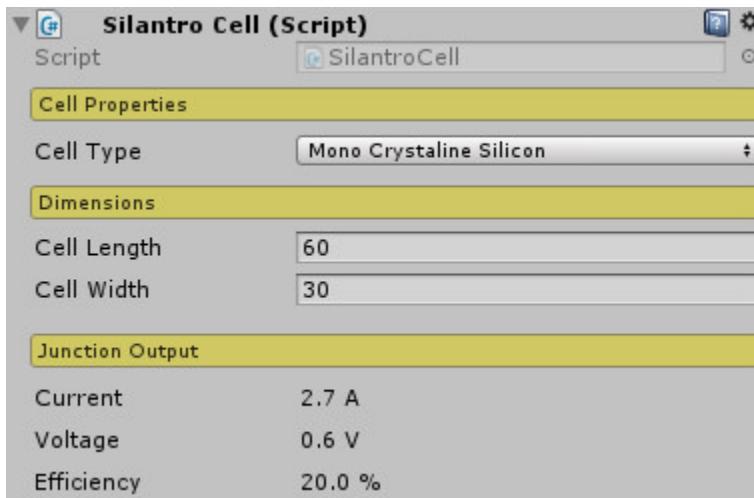
PROPERTIES

Property:	Function:
<i>Properties</i>	
Power Source	Source of power to the charger
Activated	Power transfer switch
Battery	Current battery attached or connected to the charger

- **BATTERY PACK**

- **SOLAR ENERGY**

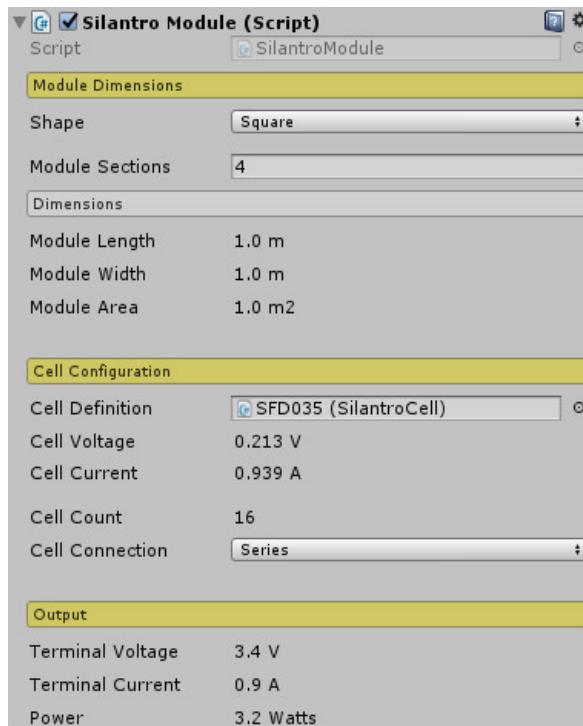
- **SOLAR CELL**



PROPERTIES

Property:	Function:
<i>Properties</i>	
Cell Type	Type of the solar cell
Cell Length	Length of the cell body
Cell Width	Width of the cell body
Current	Nominal Current of the cell
Voltage	Nominal Voltage of the cell
Efficiency	Efficiency of the cell

o SOLAR MODULE

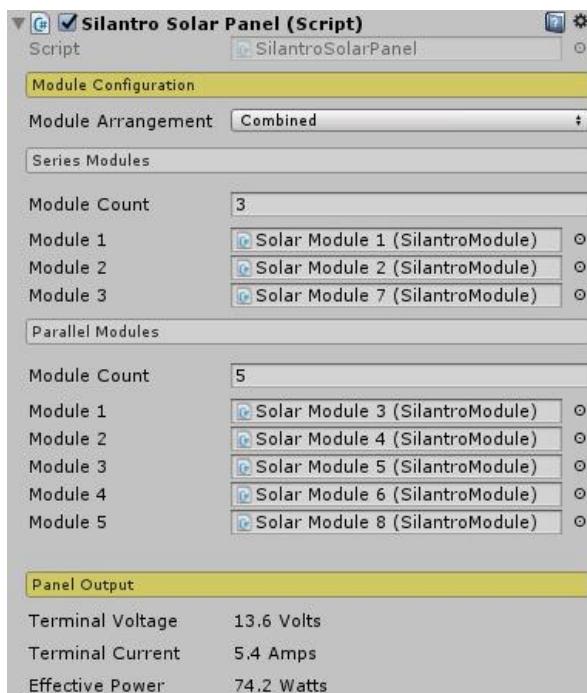


PROPERTIES

Property:	Function:
<i>Properties</i>	

Shape	Shape of the solar module i.e square or rectangular
Module Sections	Subdivisions of the module
Cell Definition	Type of cell composed in the module
Cell Count	Total number of cells in the module
Cell Connection	Type of connection used by the module cells

- o **Solar Panel**

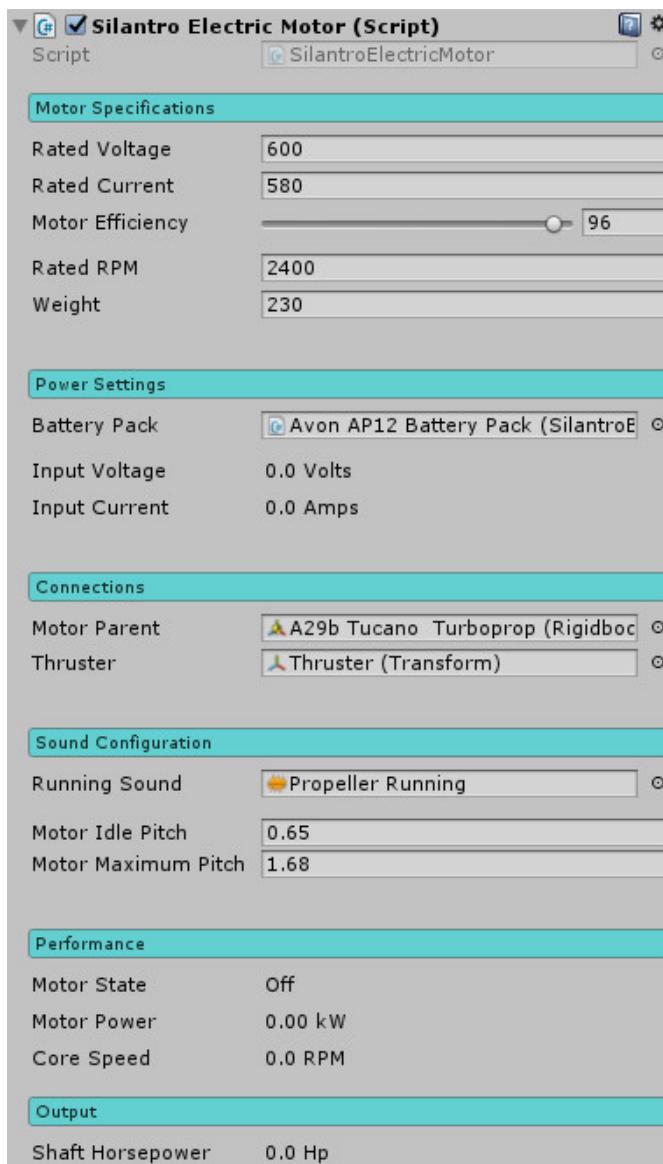


PROPERTIES

Property:	Function:
<u>Properties</u>	
Module Arrangement	Type of connection used by the modules i.e Series, parallel or Combined (Series-Parallel)

- **ENGINES**

- ELECTRIC MOTOR



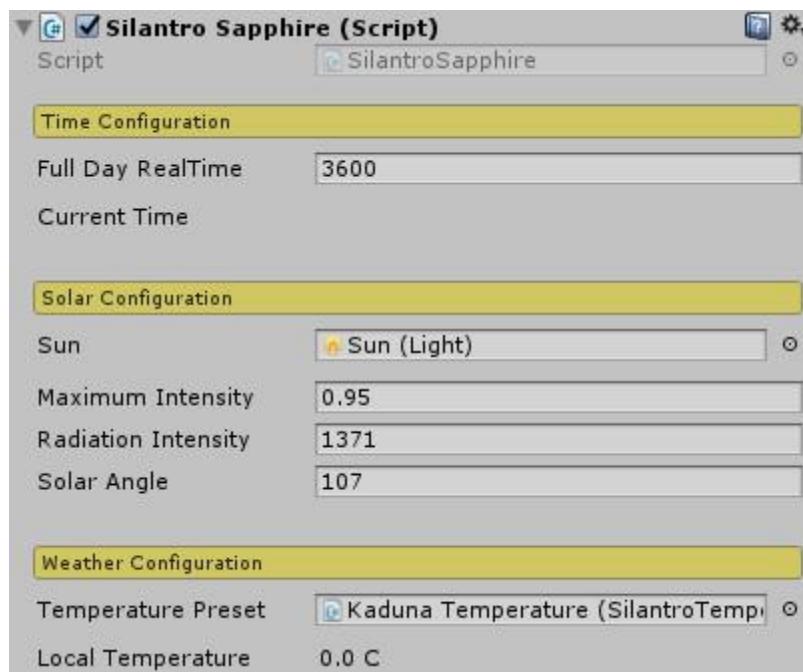
PROPERTIES

Property:	Function:
<u><i>Motor Specification</i></u>	
Rated Voltage	Maximum Voltage allowed by the motor
Rated Current	Current Rating of the motor
Motor Efficiency	
Rated RPM	Nominal RPM of the motor

Weight	Total weight of the motor
Battery Pack	Battery pack connected to the motor
Input voltage	Total voltage reaching the motor from the input source
Input Current	Total Current reaching the motor
Motor Parent	Rigidbody to which the motor is connected to
Thruster	Transform at point where the engine thrust is applied to the aircraft.
Running Sound	Audio Clip to be played while the motor is in operation
Motor Idle Pitch	Sound pitch when motor is idle
Motor Maximum Pitch	Maximum pitch allowed for the motor sound
Performance	
Motor State	Current state of operation of the motor
Motor Power	Electrical power of the motor in Kw
Core Speed	Current RPM of the motor core
Shaft Horsepower	Total useful power generated by the motor

6. WEATHER SYSTEM:

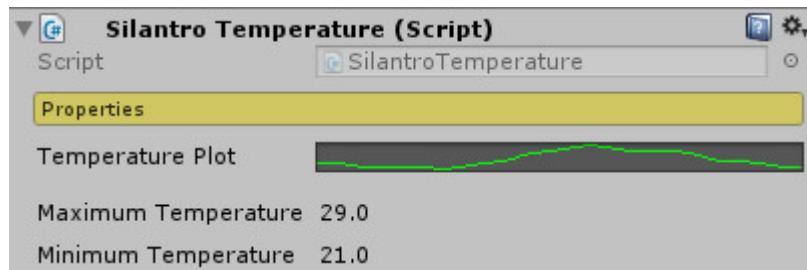
CONTROLLER



PROPERTIES

Property:	Function:
<u>Time Configuration</u>	
Full Day Realtime	Length of a full simulation day in real world seconds
Current Time	
Sun	Directional Light to be used as the Sun
Maximum Intensity	Maximum light intensity of the Directional Sun light
Radiation Intensity	Maximum solar energy intensity in W/m ²
Solar Angle	Current tilt of the sun with respect to climate and seasons
Temperature Preset	Preset of the current location

LOCALE PRESET

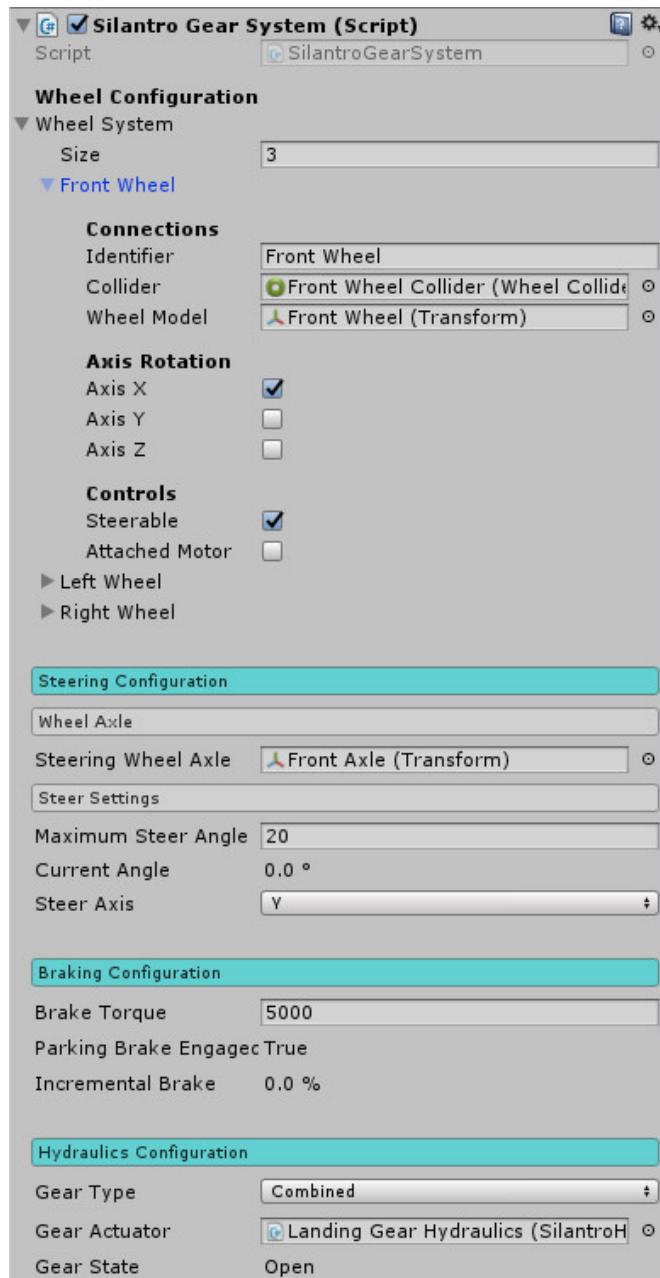


PROPERTIES

Property:	Function:
<u>Properties</u>	
Temperature Plot	Plot Curve of the current temperature against time

7. HYDRAULIC AND GEAR SYSTEM:

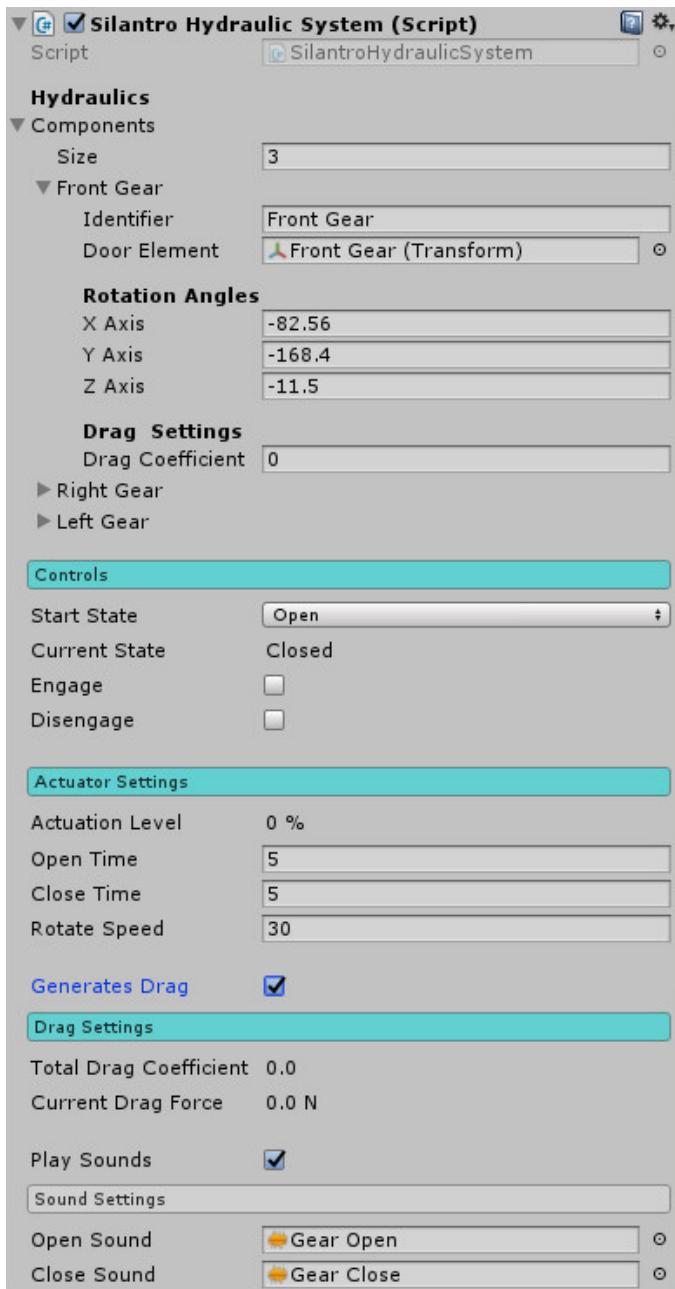
GEAR SYSTEM: Controls the operation of the gear wheels. It makes sure that the wheel model is correctly positioned with the wheel collider and it rotates correctly. *Note: The gear system is provided with a tricycle gear system by default.*



PROPERTIES

Property:	Function:
<u>Wheel Settings</u>	
Identifier	Name of this current wheel e.g. Front, Left-Back etc.
Collider	Wheel Collider of this wheel.
Wheel Model	Transform component of this wheel.
Axis Rotation	Rotation axis of the wheel.
Steerable	If activated, this wheel can be steered on the ground with the rudder pedals.
Attached Motor	Used to mark rear wheels with brake attached.
<u>Wheel Data Config</u>	
Maximum Steer angle	Maximum angle to which the front wheel can be steered.
Front Wheel Axle	Axle of the front wheel which turns when the wheel is rotated.
Steer Axis	Axis of rotation of the front axle.
<u>Brake Settings</u>	
Brake Torque	Torque applied to the wheel when brake I activated.
Parking Brake Engaged	
Incremental Brake	Current amount of torque being applied to the wheels
<u>Hydraulic Configuration</u>	
Gear Type	Type of hydraulics used by the landing gear i.e. Combined or separate hydraulics
Gear Actuator	Reference of the Hydraulic system
Gear State	Current state of the landing gear

- **HYDRAULIC SYSTEM:** This component can be used to open and close any door or element on the aircraft such as canopies, vents, speed brakes etc.

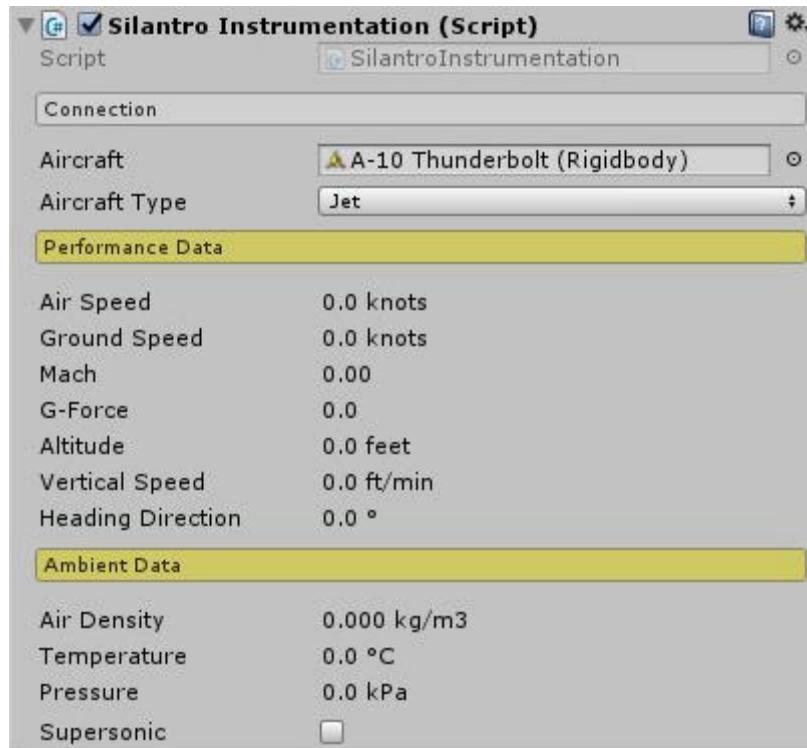


PROPERTIES

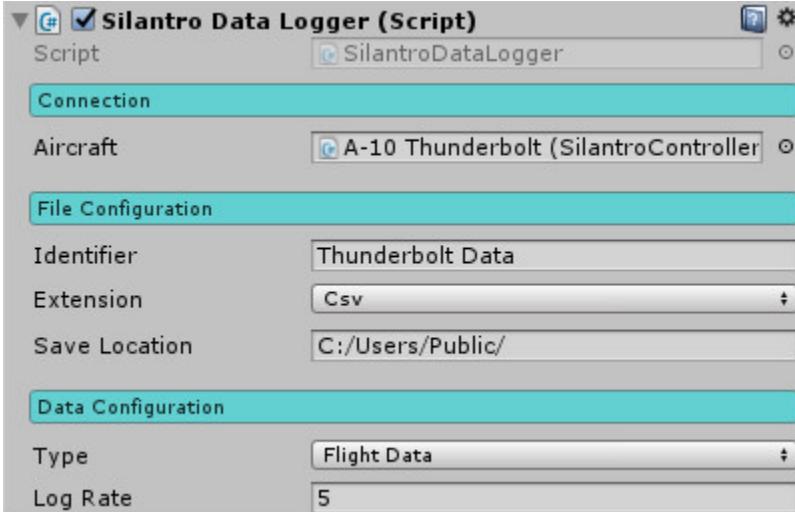
Property:	Function:
<u><i>Door Elements</i></u>	
Identifier	Name of the element e.g. Top Vent
Components	Transform of the element to be opened and closed
Rotation Angles	
X Axis	Amount of rotation of the component in the X-Axis
Y Axis	Amount of rotation of the component in the Y-Axis
Z Axis	Amount of rotation of the component in the Z-Axis
Drag Coefficient	Maximum drag coefficient of the component e.g 0.006-0.01 for a landing gear.
<u><i>Controls</i></u>	
Start State	The starting state of the component e.g open for a landing gear
Current State	Current state of the Component
Engage	Synonymous to close the component
Disengage	Synonymous to open the component
<u><i>Actuator Settings</i></u>	
Open Time	Time to open the component
Close Time	Time to rotate and close the component
Rotate Speed	Speed of rotation or movement of the component
<u><i>Sounds Effect</i></u>	
Open Sound	Audioclip to play when the door or element opens
Close Sound	Audioclip to play when the door is closed.

8. COMPONENTS:

- **COG:** determines the centre of gravity of the aircraft.
- **INSTRUMENTATION:** Displays, records and calculates different values for the aircraft such as air density, altitude, air pressure etc.



- **BLACK BOX:** Used to record and save different flight parameters into either a .txt or .csv file which can be reviewed later.

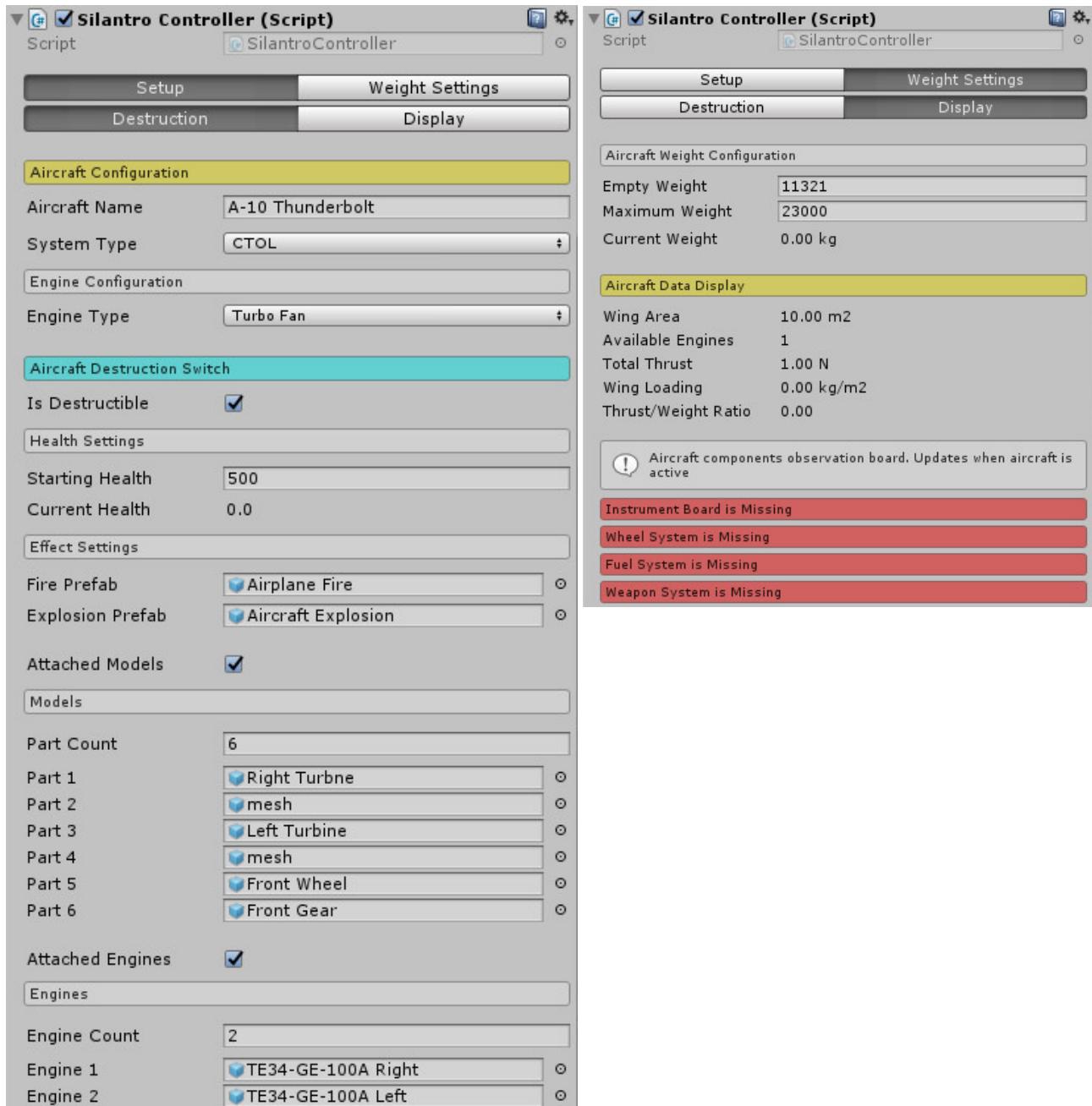


PROPERTIES

Property:	Function:
<u>Properties</u>	
Savefile name	Name of the file
Data Extension	Extension to save the file in either .txt or .csv
Save Location	Location to save the flight data at on the PC.
Log Rate	Time interval between each save or log.
Data Type	Currently only flight Data can be saved, but engine and other data would be available in future updates.
Aircraft	Aircraft to document.

- **CONTROLLER:** Practically brings all the aircraft components together.

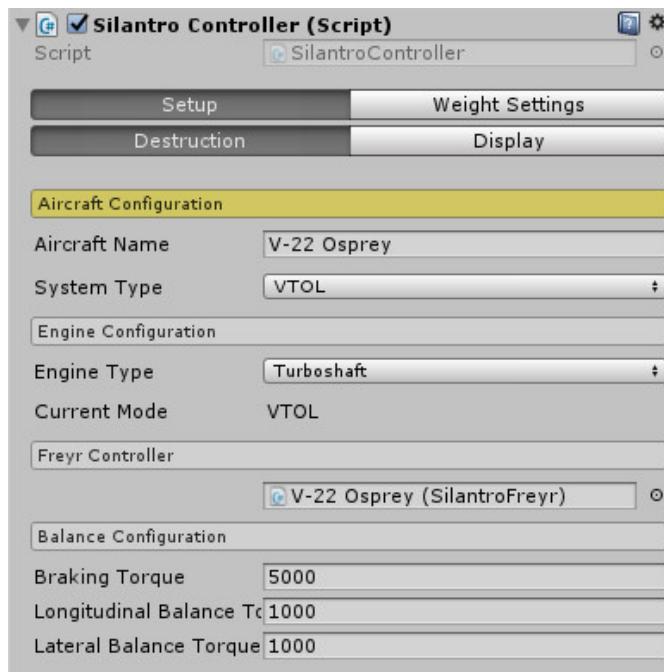
a. CONVENTIONAL:



PROPERTIES

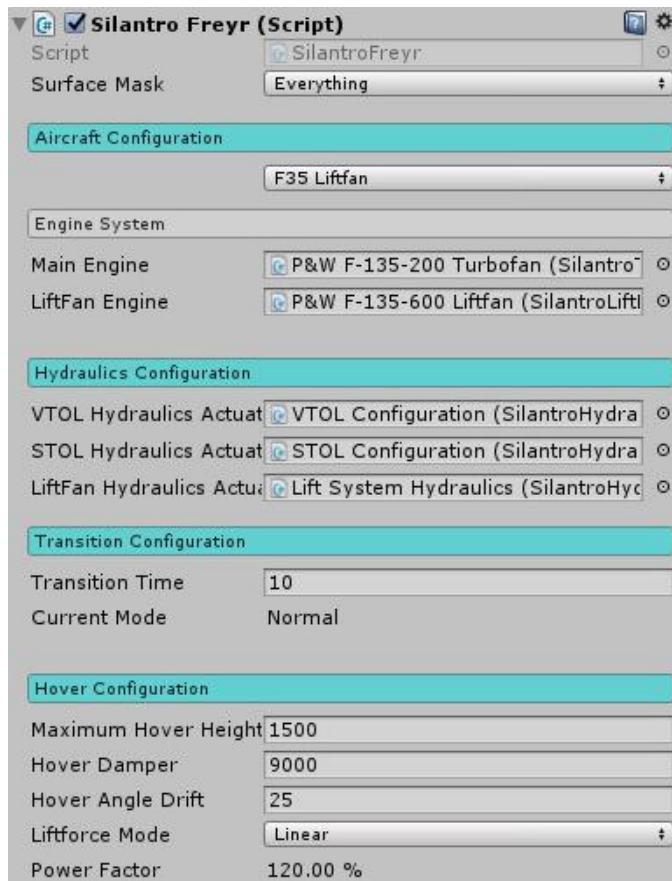
Property:	Function:
<u>Aircraft Properties</u>	
Aircraft Name	Identifier or name of this aircraft.
System Type	Configuration of the aircraft
Engine Type	Type of Engine used by the aircraft
<u>Weight System</u>	
Empty Weight	Weight of the aircraft without fuel. <i>Note: It includes the weight of the engines and other components except weapons and fuel tanks.</i>
Maximum Weight	Maximum take-off weight of the aircraft.

COMPLEX: contains control parameter for complex aircrafts, especially the STOVL system.



PROPERTIES

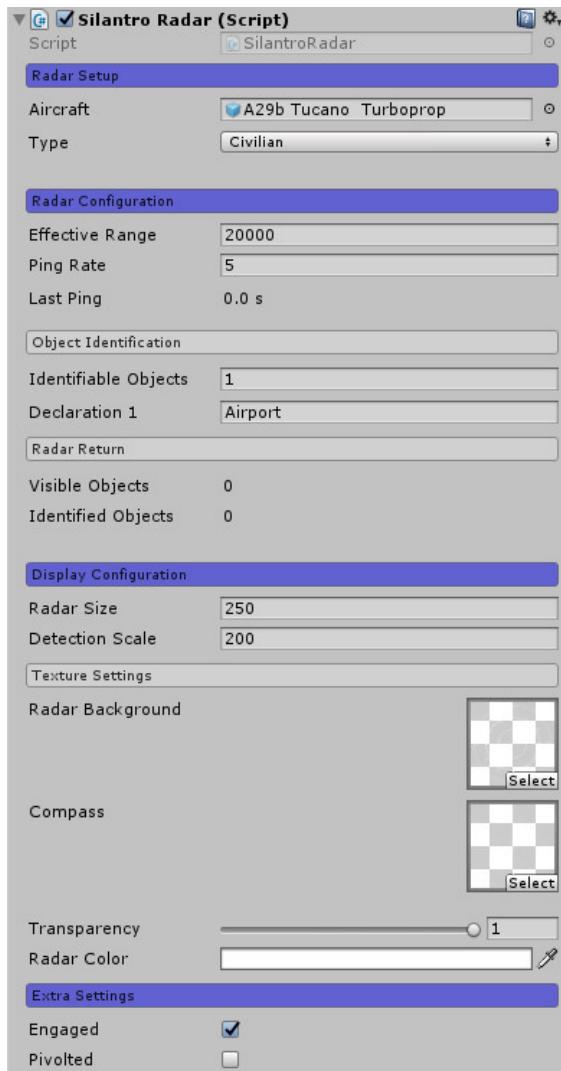
Property:	Function:
<u>Aircraft Properties</u>	
Freyr Controller	Reference to the specialized controller for VTOL enabled aircrafts
<u>Balance Configuration</u>	
Braking Torque	Torque to apply to counter a yaw
Longitudinal Balance Torque	Torque to counter a roll
Lateral Balance Torque	Torque to counter a pitch



PROPERTIES

Property:	Function:
<i>Properties</i>	
Surface Mask	List of layers affected by the generated liftforce
Aircraft Configuration	Preset of the selected aircraft
Main Engine	The main Turbofan or Turbojet Engine powering the aircraft
Liftfan Engine	Reference to the vertical LiftFan engine
Blades	Reference to the blade system generating vertical force on the aircraft
VTOL Hydraulics	Reference to the VTOL Hydraulic system
STOL Hydraulics	Reference to the STOL Hydraulics system
Transition Time	Time to transition from one mode to another
Current Mode	Current mode of the system; Normal, STOL or VTOL
Maximum Hover Height	Maximum height to which the aircraft can hover in ft
Hover Damper	Force to apply to balance vertical motion
Hover Angle Drift	Maximum angle to try and balance the aircraft
Liftforce Mode	Mode of application of the total liftforce generated
Power factor	Current percentage of total liftforce being applied on the aircraft

- **RADAR:** Helps to detect aircrafts, airfields or any specified object within a given range from the aircraft



Sample Radar Screen showing a nearby airfield.



PROPERTIES

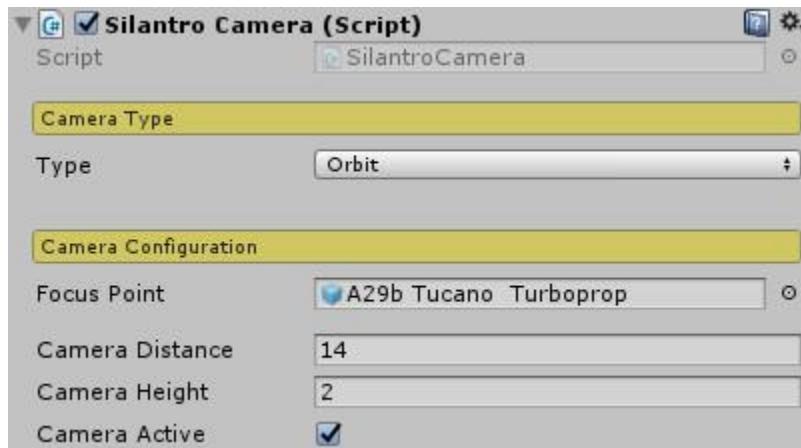
Property:	Function:
<i>Radar Properties</i>	
Aircraft	The aircraft to which the radar is attached
Type	Type of the radar either a basic (civilian) or Advanced (Military)
Effective Range	Maximum detection range of the radar in meters
Ping Rate	Time interval between each radar pings
Identifiable Objects	Number of objects that can be identified by the radar
Declaration	Name of Object to be identified. <i>Note: must correlate with that specified on the Silantro Radar Marker</i>
Radar Size	Size of the radar on the screen
Detection scale	Size of the objects identified on the radar screen
Radar Background	Radar background Texture
Compass	Radar compass needle texture
Transparency	Transparency of the radar on the screen
Radar Colour	Colour overlay of the radar
Engaged	Determines if radar is active
Pivoted	Determines if radar has a pivot to rotate around

9. MISCELLANEOUS

- **SETUP INPUT:** Here you can configure the input setup for the system. The controls can be selected from either;
 - Keyboard
 - PS3/PS4 Controller
 - Logitech X3D Joystick



10. CAMERA SYSTEM:



PROPERTIES

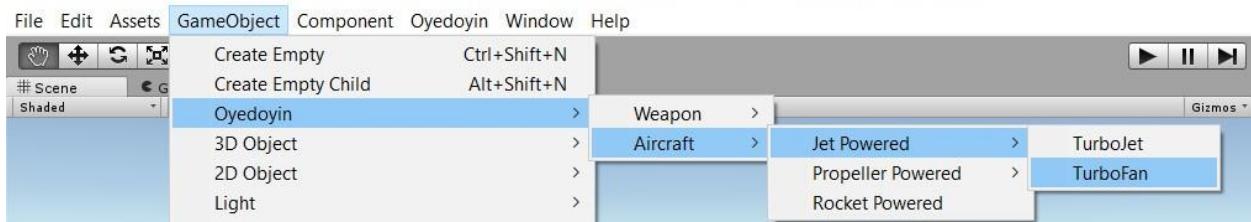
Property:	Function:
<u>Properties</u>	
Type	Configuration of the camera
Focus Point	Transform or point to use as camera reference
Camera Distance	Distance of the camera from the focus point
Camera Height	Height of the camera above the reference point

SETUP

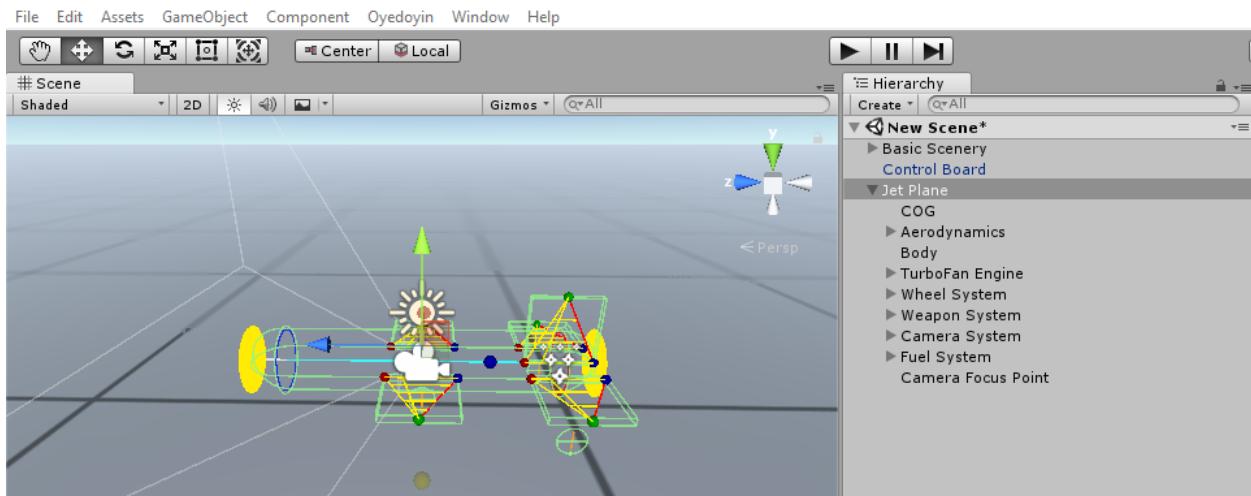
- **BASIC AIRCRAFT SETUP:** This system is designed in such a way that a new almost fully working aircraft can be created from the gameobject menu. The newly created aircraft requires just a few adjustment to complete the setup and make it fly.

STEPS:

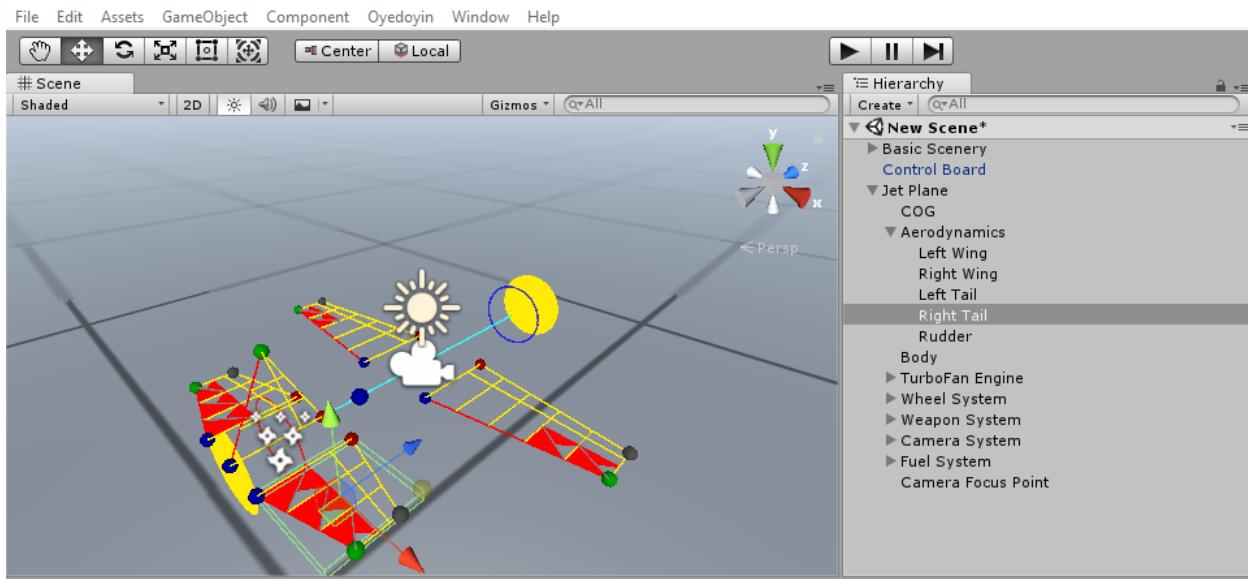
Create new aircraft from Gameobject menu



The new aircraft will have the selected engine type, the required component for normal functioning and the basic aircraft setup control.



At this point all that is left is to adjust the wing shape, size, control. Also models can be added to the setup but this is not required to make it fly. Also the engine properties can be tweaked to make it more powerful and produce more thrust.

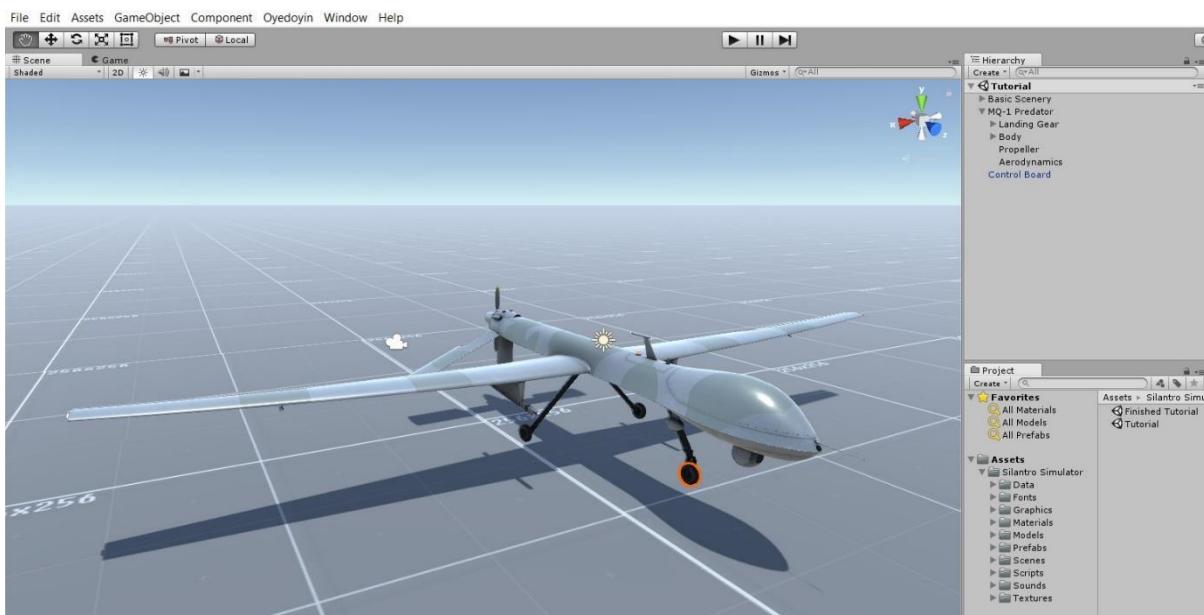


Here is the sample aircraft after the wings and controls have been adjusted. Even in its very basic state, the aircraft is ready to fly.

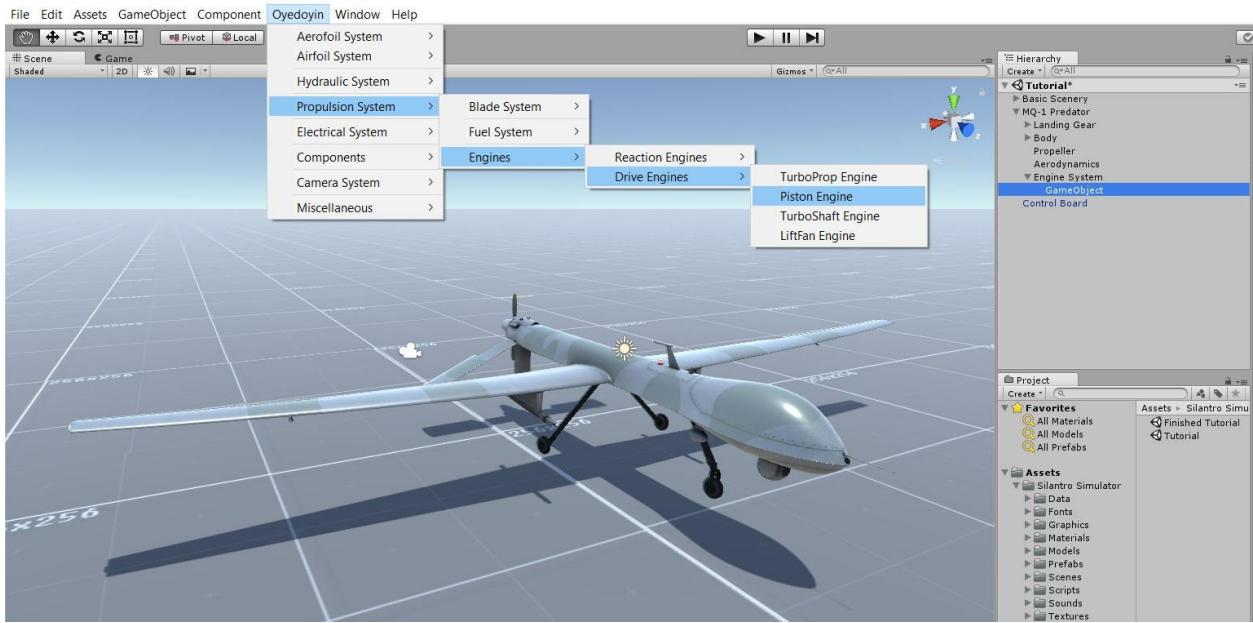
- **Advanced Aircraft Setup:** This part will show how to setup the aircraft component by component from the dedicated toolbar. Please read the component section to understand what each component does before continuing with this part.

STEPS:

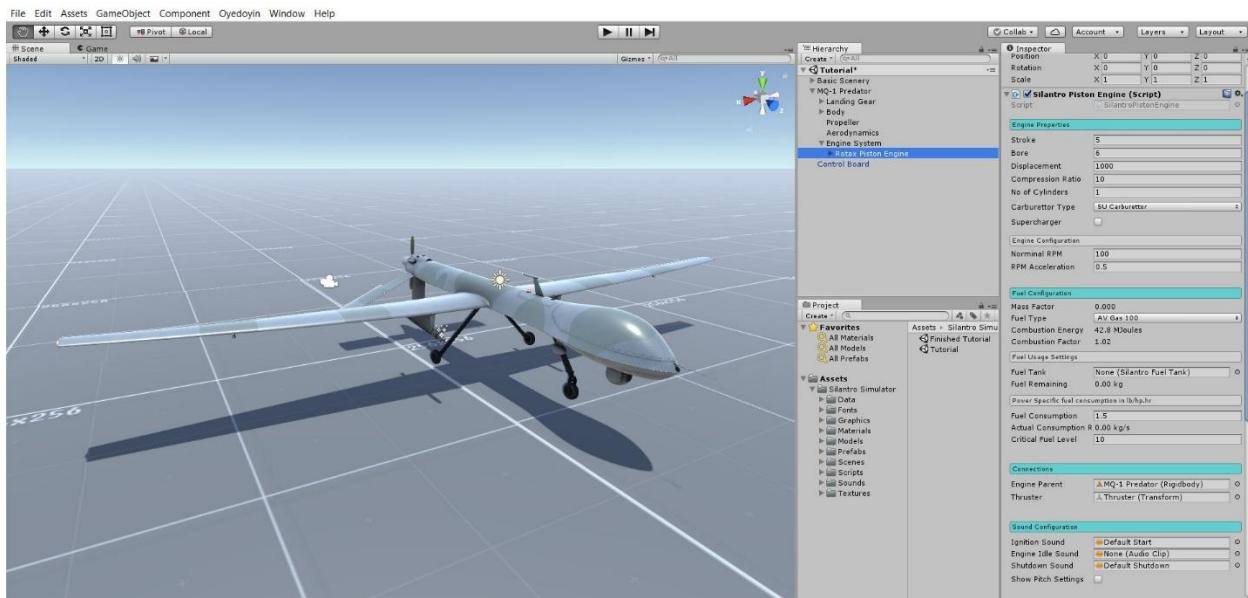
- Open Tutorial Scene:* Open the tutorial scene located in [Silantro Simulator/Assets/Scenes/Tutorial](#) which contains a MQ-1 Predator aircraft model and the necessary scene objects.



- ii. *Create Piston Engine:* To do this, you have to create a new gameobject, parent it to the aircraft and position it where the engine is supposed to be located in the airplane. After this is done, add the Turboprop engine component to the new gameobject from the dedicated toolbar.



A new fully functional Turboprop engine is then created on the gameobject. This engine can now be further improved and customized. *Note: The system is designed around real world values, therefore information required for the engines and aircraft can be gotten from external sources, such as Google or Wikipedia.*



The main values required by the engine can be gotten from Wikipedia page;

The MQ-1 Predator properties as outlined by Wikipedia;

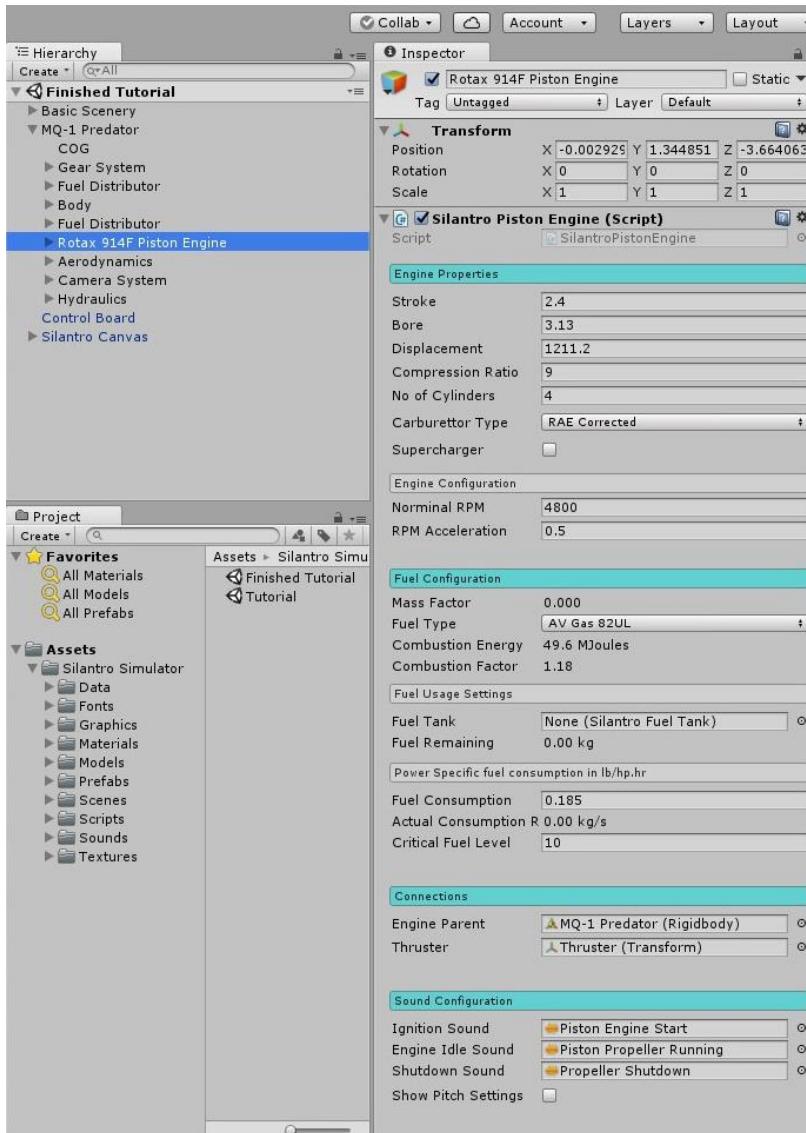
General characteristics

- **Crew:** none on-board, three on ground (pilot, sensor operator, intelligence analyst)
- **Length:** 27 ft (8.22 m)
- **Wingspan:** 48.7 ft (14.8 m); *MQ-1B Block 10/15*: 55.25 ft (16.84 m))
- **Height:** 6.9 ft (2.1 m)
- **Wing area:** 123.3 sq ft^[120] (11.5 m²)
- **Aspect ratio:** 19.0
- **Empty weight:** 1,130 lb^[119] (512 kg)
- **Loaded weight:** 2,250 lb (1,020 kg)
- **Max. takeoff weight:** 2,250 lb^[119] (1,020 kg)
- **Powerplant:** 1 × *Rotax 914F* turbocharged four-cylinder engine, 115 hp^[119] (86 kW) (4.8 kW redundant/6.4hp)

Performance

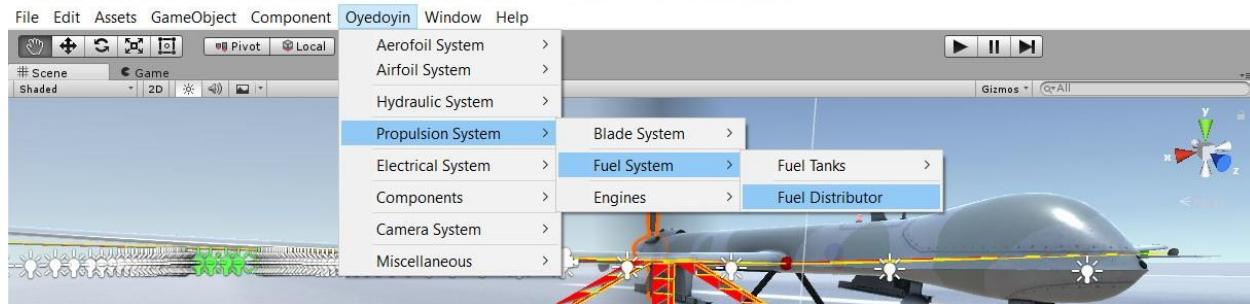
- **Maximum speed:** 135 mph (117 knots, 217 km/h)
- **Cruise speed:** 81–103 mph (70–90 knots, 130–165 km/h)
- **Stall speed:** 62 mph (54 knots, 100 km/h) dependent on aircraft weight
- **Range:** 675 nmi (675 mi or 1,100 km)^[121]
- **Endurance:** 24 hours^[2]
- **Service ceiling:** 25,000 ft^[119] (7,620 m)

The newly obtained values are then entered into their respective slots on the engine

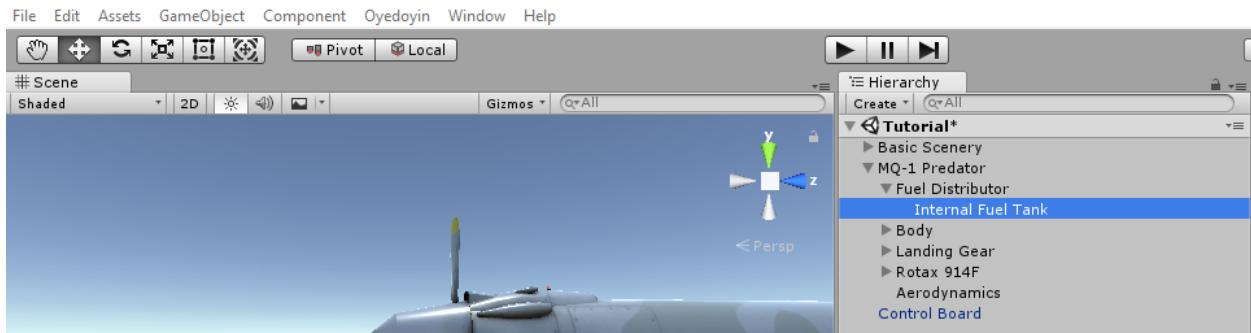


- iii. Setup Fuel System:* For the engine to function propeller it needs a fuel source. Just for testing purposes, a Fuel tank can be assigned to the engine directly but this highly unrecommended.

Firstly, create a fuel Distributor component from the dedicated toolbar. As described in the components section, this manages and organizes fuel tank usage, fuel and dump and tank refill.



New fuel tanks internal or external can now be created and parented to the distributor. But the Predator only has the Internal fuel tank, Therefore we're going to create a single tank (internal) from the toolbar.



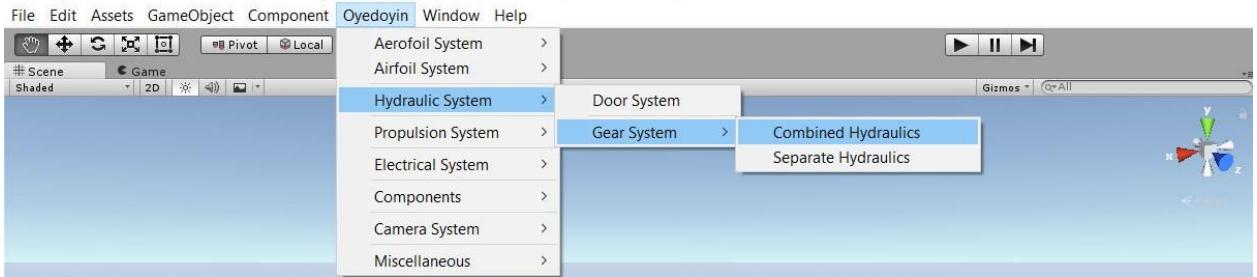
The predator internal tank capacity is 204kg. Therefore change the capacity value in the internal tank component to 204.

- iv. *Setup Gravity Center Component:* This component serves two important functions. A) Indicate the Center of Gravity of the Aircraft i.e. The Aircraft center of gravity is located in this transforms position. B) Serve as the instrumentation board which records and calculate different flight parameters for each aircraft component and in the future will carry the autopilot component.

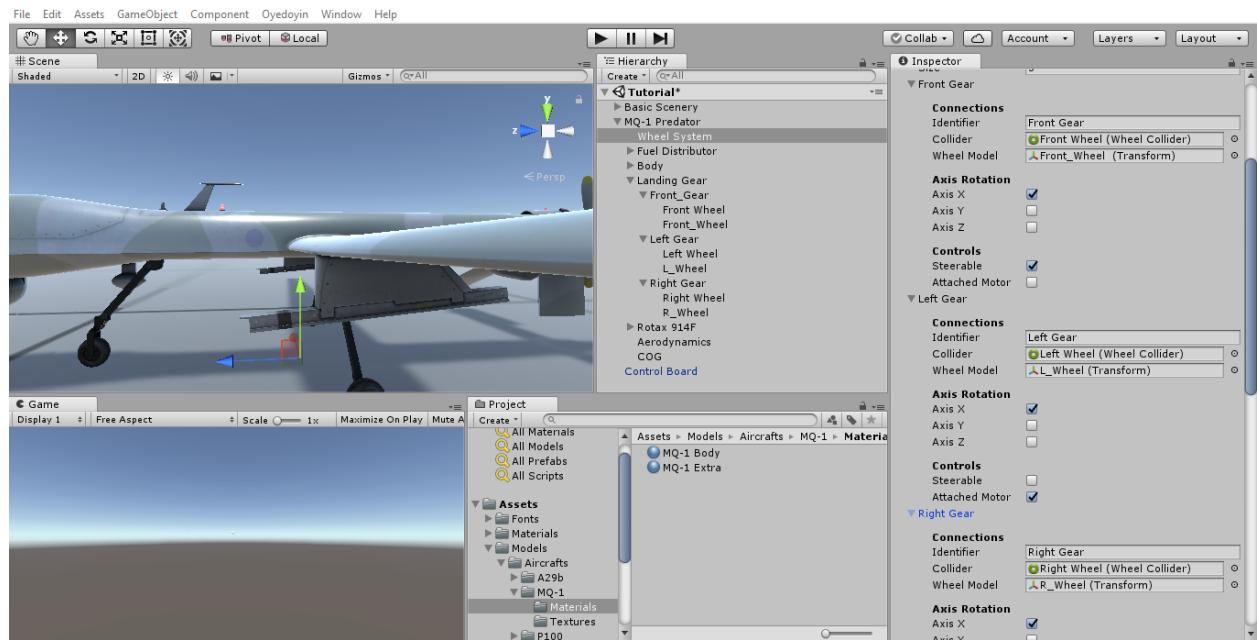
To setup the aircraft gameobject is selected, then navigate to [Oyedoyin/Components/Gravity Center](#). A COG gameobject is created and parented to the aircraft. Move this transform to where the aircraft center of gravity is supposed to be located.



- v. *Setup Gear System:* This component takes care of the normal operation of the gear wheels i.e correct rotation and position relative to the wheel collider. This component can be added from the hydraulics section of the system toolbar.

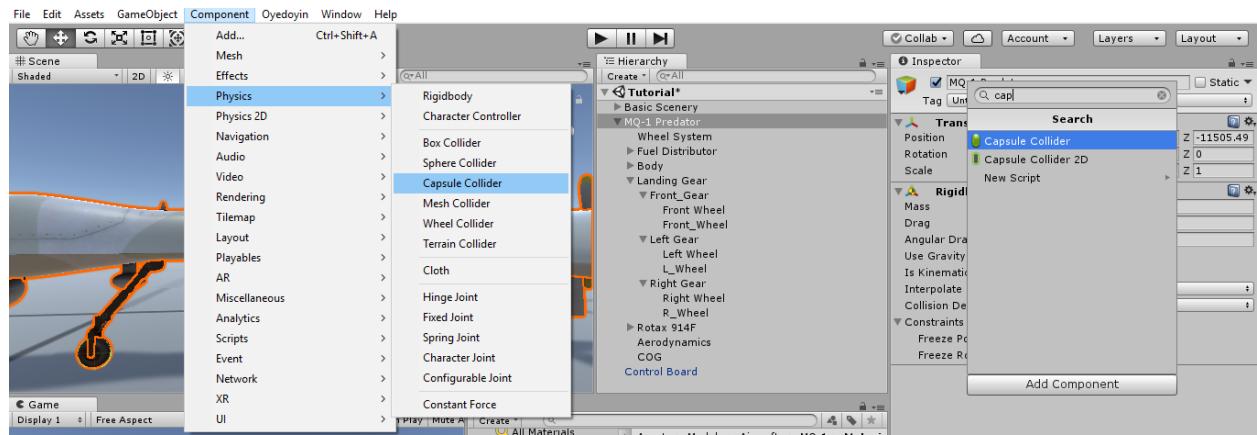


The Component is setup to provide a Tricycle gear system(3 colliders) by default. All there is to do is just to reposition the newly created wheels and adjust the radius and suspension distance of the colliders.

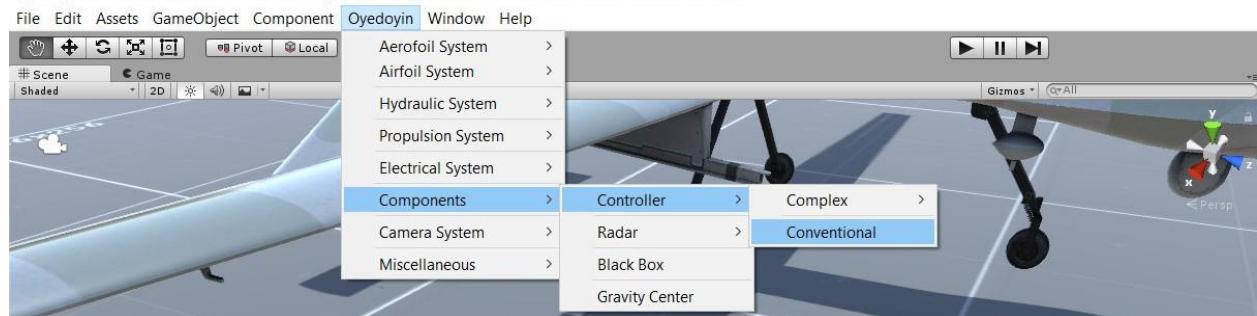


vi. **Setup Controller:** Even though each component of the system is completely independent of each other, the **Controller** component brings everything together.

To start, add a capsule controller to the main aircraft gameobject.



Then add the controller component from the toolbar to aircraft body



Set the correct engine type, since the Predator uses a Piston engine. Set the correct weight amounts, empty weight and maximum takeoff weight.

vii. **Setup Camera System:** Currently only the orbit camera is available in this current version, I'm going to develop better cameras for the next update especially high speed cameras for upersonic airplanes.

To add the camera, select the aircraft and select orbit camera from the system toolbar



Camera Settings



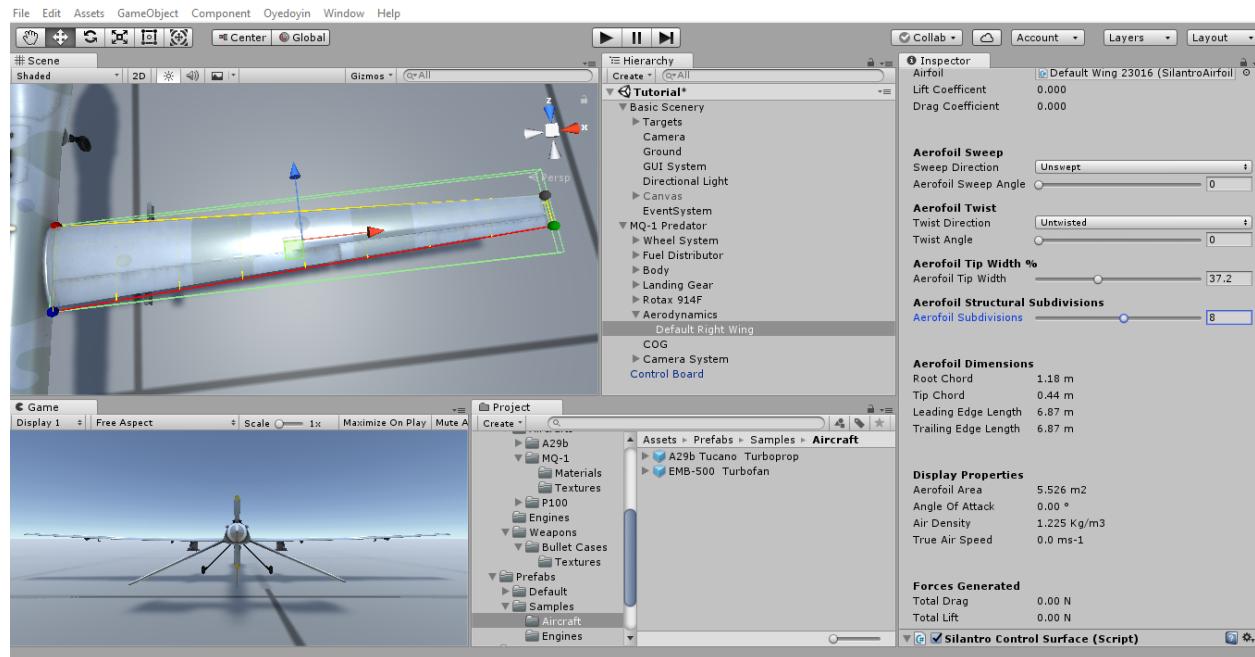
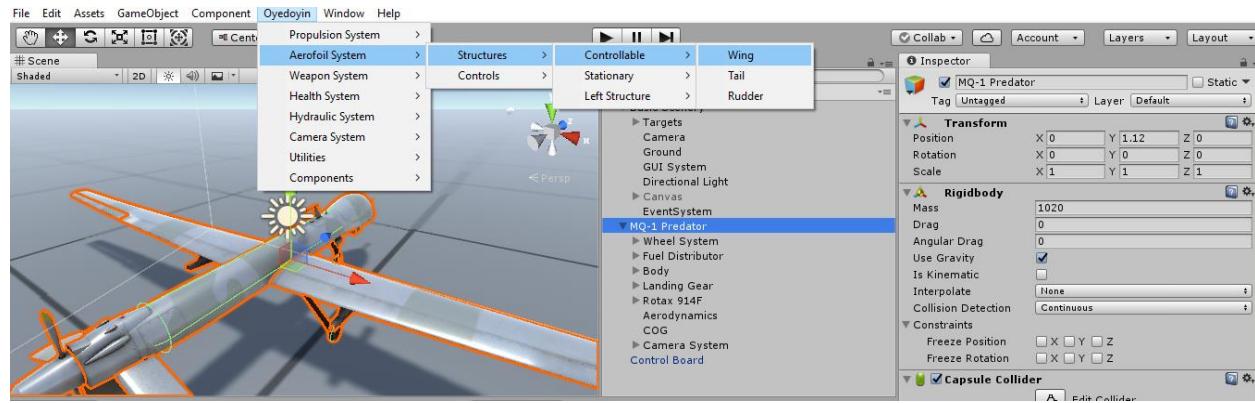
Camera Distance: how far the camera is from the aircraft.

Camera Height: how height the camera is above the aircraft.

viii. *Setup Aerofoil surfaces:* This is probably the most important part of the setup. Here you can setup the wings, tails and rudder.

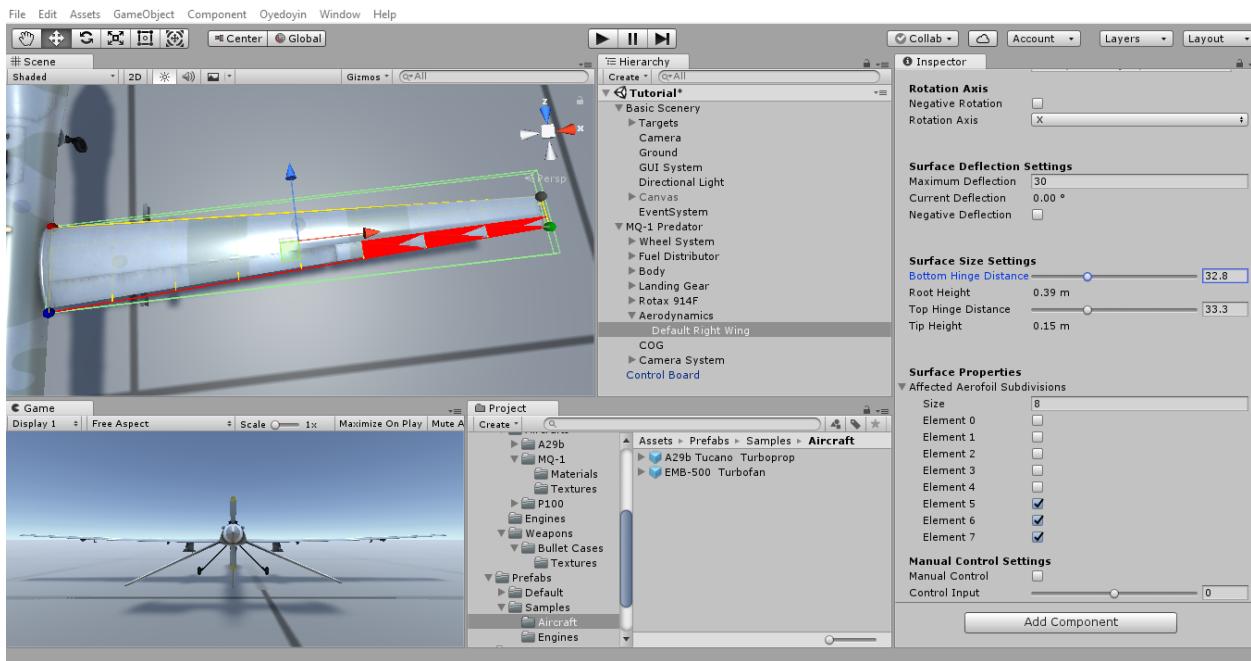
The predator has 5 aerofoil surfaces: 2 wings, 2 stabilizers and 1 rudder.

To setup the wings, Create a wing from controllable section of the system toolbar. A controllable wing is created with an aileron control already attached.



The wing needs some adjustment. First scale the aerofoil to match the length of the wing, increase the aerofoil tip width and increase the aerofoil subdivisions.

After this, the control needs adjustment too.



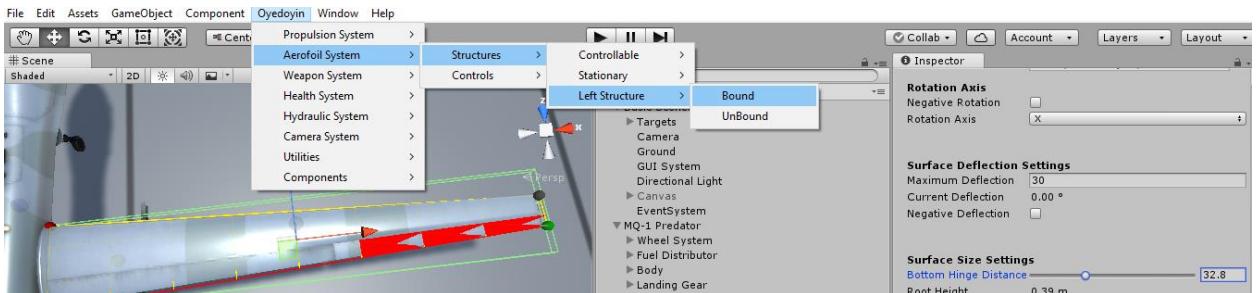
Firstly, assign the control surface model and set the correct rotation axis. Next, select the bools representing the sections affected by the control surface; as depicted in the image the control surface affects the first 3 sections.

After this adjust the control surface hinge distances to match the control surface model. Note the red marker are provided for guidance.

Setup the Left Wing

The left wing can be created in two separate ways;

- From the component toolbar: to create the left wing from here you have to first select the correponding right wing, navigate to the **Left Structure** component on the toolbar. The left structure can be of two types: Bound and Unbound.



The **Bound** Left structure creates a left wing and the position is updated based on the position of the right wing on the opposite side.

While the **Unbound** left structure create a left wing which is completely independent of the right wing. This is only advisable for asymmetric wing setups or for really advanced users.

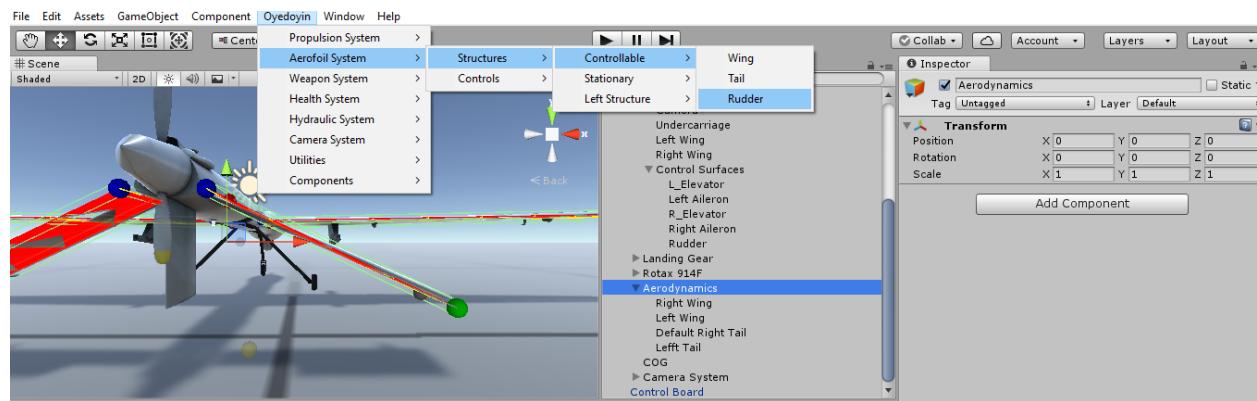
- Manually: to create the left wing manually, duplicate the already setup right wing, then assign the **Silantron Quantum** component to the duplicate wing.

Note: The left tail aerofoil should have the negative deflection bool selected. Adjust the rotation direction as desired. The left wing should have the model negative rotation bool selected.

- *Setup the Tails:* Create the tails just like the wings, and adjust the settings accordingly.

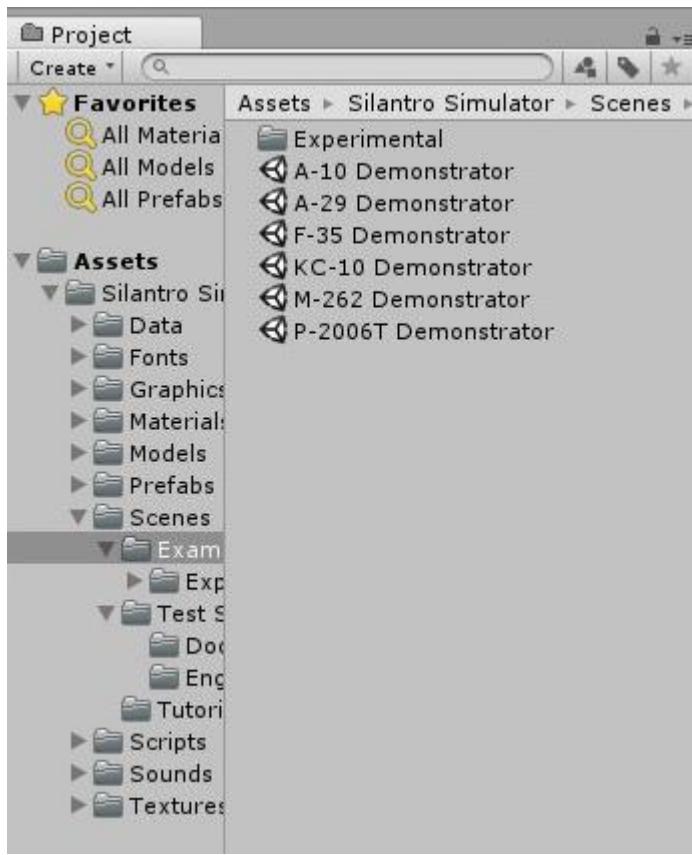


- *Setup the Rudder:* Create the rudder just like the wings, and adjust the settings accordingly.



START-UP

To start working with the simulator, it is advised you try out any of the example scenes first



2. Setup the desired control



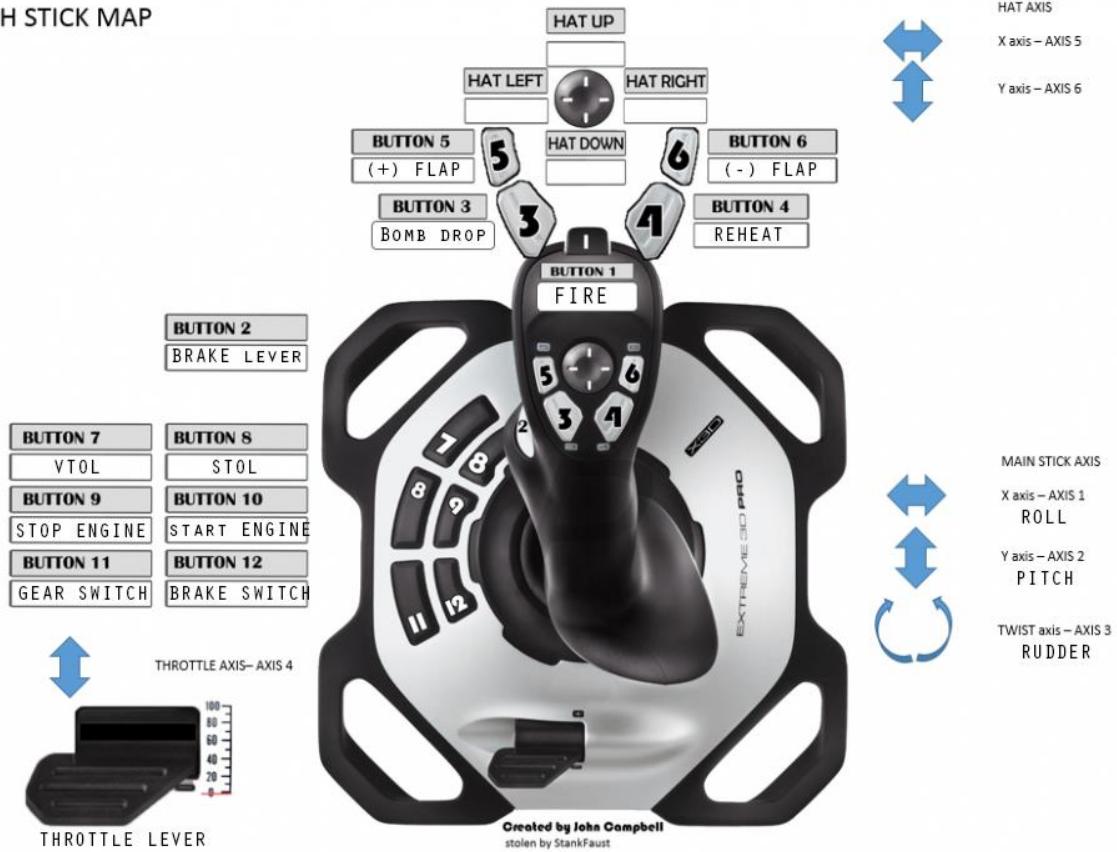
To start flying, go through the following checklist

1. Turn on the aircraft lights
2. Lower flaps and slats if available
3. Start-up the engines and wait for the startup sequence to complete
4. Throttle up the engines
5. Release parking brakes
6. Rotate once takeoff speed is reached.
7. Raise landing gear above 100ft
8. Continue with normal flight....

2. CONTROLS

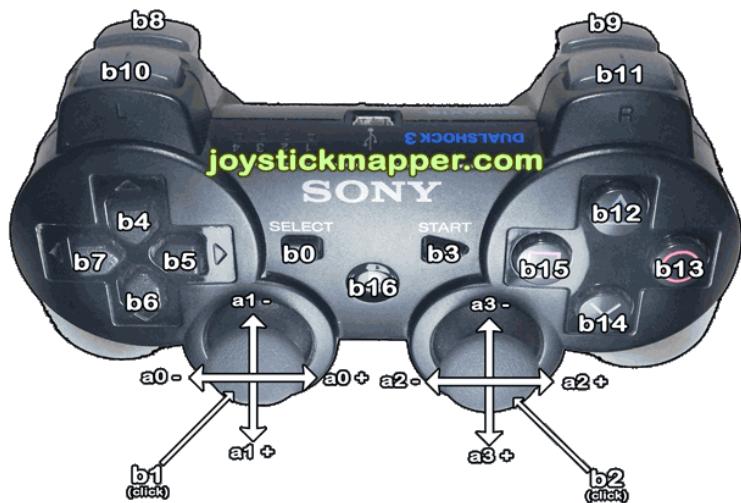
A. LOGITECH EXTREME 3D JOYSTICK

LOGITECH STICK MAP



B. PS3/PS4 CONTROLLER

PLAYSTATION CONTROLLER



BUTTONS

FIRE	-	BUTTON B12
START ENGINE	-	BUTTON B0
STOP ENGINE	-	BUTTON B3
AFTERTURNER	-	BUTTON B13
PARKING BRAKE	-	BUTTON B14
BRAKE LEVER	-	BUTTON B8
ACTUATE GEAR	-	BUTTON B9
DROP BOMB	-	BUTTON B15
EXTEND FLAP	-	BUTTON B10
RETRACT FLAP	-	BUTTON B11

LEVERS

ROLL	-	AXIS A0
PITCH	-	AXIS A1