SILANTRO FLIGHT SIMULATOR

UPDATE LOG

v 3.5.02

ADDITIONS

- Added a cell configuration system which enables each subdivision of the aerofoils to be configured and adjusted to form complex shapes.
- The control surface coverage of the aerofoil can also be adjusted to compensate for the main aerofoil shape.
- Added a 2-axis stability augmentation system with leveler, rate limiter, and attitude rate limiter functionality. This will make the aircraft easier to control and stabilize.
- Improved the stability of the autonomous control system and added new behaviors on the lateral and longitudinal axes e.g. Radius hold and Turn rate hold which can be strung together to form even more complex aircraft behaviors.
- Added a floating origin shift solution into the aircraft controller which can be turned on and off with ease
- Added support for the new input system with samples and default configs for the;
- a. Airbus T320 stick
- b. Thrustmaster CHT yoke
- c. Thrustmaster HOTAS throttle

CHANGES

- The system is now in its final form and things are where they need to be :) Namespaces for each system and notable components, combined/nested secondary components to reduce script count and complexity.
- Improved the aerofoil performance by removing redundant "reshape" calls from the update cycle. The required shape variables and vectors will now be calculated on start, stored as local variables/vectors and filtered when needed.
- The aircraft components are now updated (in addition to being initialized) from the controller component, this allows you to run the whole aircraft at custom frame rates, perform sub stepping (if you're crazy enough) and monitor the aircraft performance as a single "fixed update thread".

v 3.0.3

ADDITIONS

- Added base-level autonomous control. The aircraft can now follow defined taxi paths. Conduct checks, takeoff, climb and level the flight (Requires Unity 2018+)
- Improved the input setup system. Now the keys needed for the aircraft are simply added into the input manager list instead of replacing the complete file.
- Improved VR compatibility.
- Fixed the library conflict errors with the rotary-wing system.

v 3.0.1

ADDITIONS

- Added a proper flight control system to handle input and command processing on the aircraft. The FCS can operate in Command Augmentation, Stability Augmentation, Autonomous or Manual mode.
- The flight computer can now handle full Autopilot control with Altitude hold, speed hold, heading hold and vertical speed limiter options.
- Added more numerical corrections for the aircraft control implementation to improve the maneuverability on affected aircrafts.
- Added a new 'Stabilator" type selection for the aerofoils to enable roll-coupling for the horizontal stabilizers. Normal horizontal stabilizers can now also be selected as "Trimmable".
- Added a simpler force analysis mode to improve performance if high force accuracy is not required e.g., on mobile. Will be improved further in coming updates.
- Added direct support for Mobile and VR controls to the aircraft controller. i.e., The aircraft input system can now collect your mobile and VR inputs instead of using an external script supply.
- Added vortex lift and drag analysis on the wings (must be selected). This improves the realism on unstable airframe/aircrafts. Setup: https://youtu.be/cwLsm8w8tGg
- Added full support for animated components (in fact it is now the recommended method) to handle hydraulic actuators and aircraft moving parts (even flap and slat control surfaces).
- The engine can now be start sequentially depending on their position and engine number or started collectively as before.
- Added support for manual tensor vector input (just like on the rotary wing). So now you can manually configure the rotation inertias on each aircraft axis.
- Added support for a surround engine sound system where the volume and the engine sound depend on the camera position relative to the aircraft center.
- Added multi-edit functionality to the component editors

CHANGES

- Reduced operational scripts down even more with more combined functionality to reduce complexity, redundancy and save performance.
- The redraw and repaint function for the aerofoils has been moved to OnGizmoSelected to improve performance.
- The aircraft input collection and processing function has been moved to a dedicated Input class. This way everything about input and control of the aircraft is done in one location.
- The engine core (for each engine type) now derives from a custom Engine Core class, so the engines now have a common core class with a Thermodynamic extension for each type.
- The light system has been improved further and light bulbs can now be configured to work with Unity post processing. The light flash curve offset and blink rate on each bulb can also be adjusted.

- You can now select your missile to have either static (the maximum speed will be maintained if engine is running) or free (you will have to supply the base drag coefficient and the rest will be estimated) estimation methods.
- The engine thrust vectoring functionality has been moved into the engine core and can now be configured from the individual engine inspector.

v 2.35

ADDITIONS

- Added a control stiffening system to the control surfaces. The control surface effectiveness will now be a function of the actuator properties (actuator speed and torque) and the aircraft speed.
- Added an actuator system to handle animated components such as gears and engine nozzles.
- Added a Flight Control System to handle input filtering and control and in future updates will provide full autonomous/assisted control.
- Reintroduced the Piston engine negative G choking effect coupled with the new G calculating system.
- Added Rollout Altimeter and Airspeed MFD displays,

CHANGES

- Fixed the particle system error in the engine components after compiler update. So code can be updated while the simulation is running.
- The airfoil components now derive from the scriptable Object class
- You can now select the control dampening method on the aircraft controller. Move towards is more accurate but Lerp is smoother.
- You can now add a central body wing to improve the yaw performance of the aircraft.

v 2.32 BETA

ADDITIONS

- Redesign of the propulsion system: Engines are now accurately modeled based on thermodynamic principles with proper analysis of each section of the engine. Things like temperature, pressure, flow rate e.t.c. can be collected and recorded at each stage/section

  Structural rebuild of the Aerofoil to improve performance and control
- The geometric properties of the wing now have a more profound effect on the aerodynamic performance e.g. Leading-edge sweep reduces drag and lift based on new

assumptions, wingtip design reduces Lift-Induced drag and drag factor varies with aspect ratio.

- Lift is now truly applied at the center of pressure to improve flight characteristics. Introduction of full aerodynamic spoilers for lift/drag control and addition of spoilerons.
- Addition of slat control to improve lift. Note: It's effect on stall performance will be properly integrated in the future.
- Addition of a detailed 3D drag analysis for the aircraft surface e.g skin friction, Lift-Induced drag which are all affected by the aircraft and wing geometry.
- Improved ground effect analysis with the integration of new methods.
- Added a more detailed analysis of aerodynamic coefficients at each section of the aerofoil based on the provided Root and Tip airfoil data i.e. at every section of the wing, the effective coefficient is calculated based on the tip and root airfoil performance data.
- Improved the data collection system from Javafoil to both increase the amount of collectible data and make the operation easier.
- Implementation of a refuel and resupply system and general fixes.

v 2.121

ADDITIONS

- Implementation of a realistic fuel and distribution system. The fuel tanks can now be placed in different parts of the aircraft and will have effect on the balance (COM position) of the aircraft
- Addition of a fuel selector system for the distributor. The distributor can be instructed to use fuel from the Left, Right or Central Tanks. Or left in Automatic mode.
- Addition of a fully dynamic Balance system. The Center of Gravity of the aircraft is determined from the included payload, equipment and fuel tank weights and positions.

v 2.11

- Added support for interior sounds
- System restructuring to improve performance and minor bugs.

v 2.016

CHANGES

- Complete system rewrite from the ground up to fix major bugs and restructure the script communication system.
- Reduce operational scripts down from 76 to 48 usually with combined functionality to reduce complexity and save performance.
- Aircraft control sensitivity on the Roll, Pitch and Yaw axis can now be set within the controller script.

- Instrumentation and COG functions have been combined to save performance
- Bomb, Missile, Rocket and Bullet components will now derive from a single "Munition" script to make setup easier and save performance
- Weapons manager component has been replaced with the "Armament" system which controls the stores and sends control information through the pylon connection to the munition.
- Health and destruction system have been returned to a non-fused state to ease understanding and usage.
- The main controller script now combines all the functions of the JATO Controller, STOVL controller and base control to save performance and centralize the aircraft controls.
- Aircrafts can now be started "Hot" with the engines running and at a set altitude/speed.

ADDITIONS

- Added support for biplanes, wing and stabilizer selection and customizations
- Added options to extract more data from airfoil plot file
  - Stall Angle
  - Reynold Number
  - Max Cl etc.
- Added new public functions to each script to ease calls and external control
- Added ground effect simulation for the aerofoils which affects lift and induced drag values.
- Added support for sliding/extension slat and hydraulic components
- Smoother and easier foil setup with position and orientation selection.
- Added radar signature-based detection and sizing, also added a lock alert/indication on the base transponder.
  - Option to scale individual icon on the radar screen
  - RCS return now affects icon size
- Radar and camera views and added support to get list and properties of detected objects.
- Free camera mode and player view functionality.
- Added option for pure data processing on peripheral computer components or combined guidance functionality.
- Extended the data collection functionality of the logger system, new data that can be collected include;
  - Control inputs
  - Wing loading
  - Fuel consumption
  - Angle of attack etc.
- Added direct fuel weight conversion based on selected unit on the fuel tank
- Added support for more fuel types
- Added gun recoil functionality and support for rigidbody bullets.

v 1.2

- Added the complete weapons system
- Added cockpit levers and dials

- Tachometer
- Speedometer
- Altimeter
- Variometer
- Artificial Horizon
- Throttle Lever
- Control Stick and Yoke
- Compass
- Fuel Gauge
- Gear Position Indicator
- Bank Level
- Added Support for Interior/Exterior Camera Switch. Press "C"

v 1.17

- Added option to restart the scene. Press "R".
- Added selection option for individual display units on the control board
- Added support for variable sweep wings for aircrafts such as B-1B or F-14 •
- Added new airstrip lights • Numerous bug fixes

v 1.16

- Added Flaperon Control surface
- Added Support for fixed landing gears
- Added Catapult Launch system
  - EMALS (Electromagnetic Launcher) Catapult
  - Steam Catapult System
- Added support for asymmetric surface deflections
- Added support for flap and gear animations
- Added support for physical dials and gauges

v 1.14

- Added 2 new controls
  - Ruddervator
  - Elevon
- Added vectored thrust system with proper nozzle movement
- Added 1 new engine
  - Rocket Motor
- Updated and finished up the unguided rocket weapon
- Added weapons stores manager
- Added JATO system with the new rocket motor as boosters
- Added Full Enter-Exit System
- Added Multi-Aircraft-Scene system i.e. multiple aircrafts can now be used in a single scene without shared control problems
- Added full aircraft scalability i.e. aircraft setups can now be scaled down or up with affecting the aerofoil or other intricate systems. PS: Should only be used in cases

where the model scale is incorrect or there are issues with the setup scale after completion.

v 1.12

- Added 7 new sample aircraft demonstrators
  - A-10 Thunderbolt = Medium Bypass Engine Demonstrator/ Attack Aircraft
  - F-35 Lightning II = Low Bypass Turbofan Engine/ STOVL System Demonstrator
  - KC-10 Extender = High Bypass Turbofan Engine Demonstrator
  - V-22 Osprey = Turboshaft Engine/STOL Demonstrator
  - EA-29 Tucano = Electric Engine Demonstrator
  - ME-262 Sturmvogel = Turbojet Engine Demonstrator
  - P-2006T Tecnam = Piston Engine Demonstrator
- Added 5 new Engines
  - Reaction Engines
    - Turbojet Engine
  - Drive Engines
    - Turboshaft Engine
    - Piston Engine
    - Electric Motor
    - Liftfan
- Added new Bladefoil system
  - Added Direct creation of blade airfoils in the unity editor
- Added direct creation of new airfoils for wings with data from Javafoil directly in the editor
- Added option to edit already created airfoils
- Added new controllers (conventional and Complex for STOVL) and embedded VMC System
  - Added 2 new aircraft configurations
- Added 3 new secondary airfoil controls
  - Flaps
  - Slats
  - Spoilers
- Added weather system
  - Full day and night system
  - Added temperature localization system
  - Added temperature variation with time of the day.
- Added new lighting system
  - Strobe, Navigation, Beacon, Landing and Airport lights
- Added Electrical Power System
  - Battery
  - Battery Charger and battery Pack
- Added Solar Power System

- Solar Cells
- Solar Modules
- Solar Panels
- Added new weapons
  - Unguided Bombs
  - Basic Rockets
- Added Control configuration for controllers and joysticks
- Added direct creation of new engine powered aircrafts from the gameObject menu
- Added direct creation of new weapons also from the gameObject menu
- Added new Radar System
- Added rotating barrels for the minigun weapon
- Added health and destruction for external fuel tanks
- Added support for both combined and separate gear hydraulics
- Added incremental braking system
- Added blade propulsion system for Drive engines
- Added distribution for up to 15 fuel tanks.
- Added engine effects e.g. exhaust smoke particles and exhaust illumination for afterburner enabled engines
- Added new GUI system.

CHANGES

v 1.12

- Control surfaces have now been embedded in the aerofoil component
- Aerofoil health and engine health have all been moved into their respective parent components
- Landing gear hydraulics control has been isolated from the Silantro Gear System
- Steer speed has been limited to 20m/s to reduce catastrophic roll possibilities. Note: Can be modified in the gear component.
- Direct thrust generation has been removed the drive engines. A suitable blade must be connected to generate thrust.
- Skin drag Generation has been removed from the main controller script, it'll be better handled by the hydraulic system.

FIXES

- Fixed Engine sound problem
- Fixed Hydraulic and aerofoil editor bug
- Fixed issue of ineffective parking brake actuation
- Fixed excessive wheel sliding during takeoff roll and landing.
- Fixed assignment of instrumentation component at wake/start
- Fixed incorrect operation of the Turboprop engine. The core script has been rewritten to drive power from the turbine
- Fixed Blackbox save location problem
- Explosion will now derive from Explosive/Warhead component (still under development).