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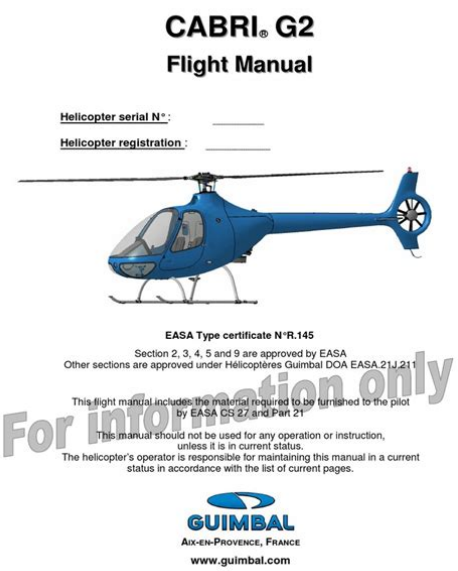

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Book Descriptions:

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To browse Academia.edu and the wider internet faster and more securely, please take a few seconds to upgrade your browser. You can download the paper by clicking the button above. The main considerations concern the helicopters ascending to the altitude under initial conditions, which were assumed in the project and how the change of the defuzzification method affects the work of the fuzzy controller. The authors analyzed the following the aircraft, the crew and the payload. The authors assessed the altitude and the minimum time of the helicopter climb. In designing and the work simulation process, the authors used Matlab and Simulink software. A comparison of the influence of selected defuzzification methods on the work of the fuzzy controller was made. Download fulltext PDF The main considerat ions co ncern th e h elicopters ascending to the altitude under initial conditions, which were assumed in the project and how the change of the defuzzification method affects the work of the fuzzy controller. The authors analyzed the following the aircraft, the crew and the p ayload. The authors assessed the altitude and the minimum time o f the helic opter climb. In designing and the work s imulation process, the authors used Matlab and Simu link software. Guimbal Cabri G2 Fig. 1 is a two seat light single engine helicopter manufactured by the French company, Helicopter es Guimbal. Thanks to its auto rotation properties, it is ranked among the safest helicopters worldwide. It was certified in accordance with the strictest construction standards, CS 27, which until now have been met only by much larger and more expensive aircraft s. Thanks to the spacious cabin, low operating cos ts and a larg e display of engin e parameters of the Cabri G2, it is not only ideal for training inexperienced pilots, but also it proves excellent for tourist flights, as well as flights on demand.http://alpineacademykathmandu.com/userfiles/dewalt-433-manual.xml

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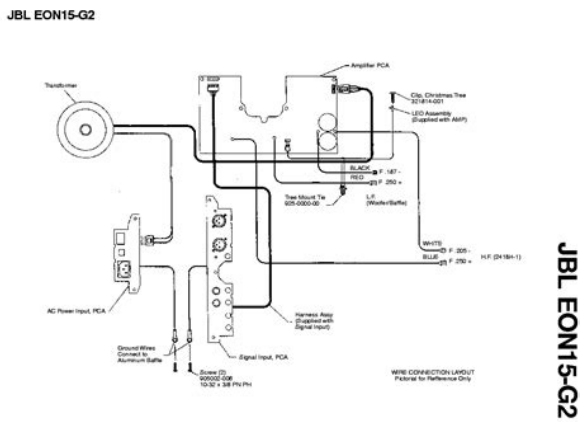
This helicopter is backed up by its experience in training pilots in ten countries around the world including Germany, Switzerland, Australia and New Zealand. Currently, it is being used in D e blin. The rotorcr aft is powered by a piston engine manufactured by Lyocoming with an electroni c ignition system and a dig ital power regulator of nominal pow er, 180 KM reduced to 145 KM. The Cabri G2 is standard equipped with modern avionics system Garmin GTM650. In place of a conventional tail rotor system, the designers used a Fenestron, which improves the performance, secu rity, as well as enhancing the handling of the helicopter.Each input signal is described by t hree Gaussi an membership functions expressed in ki lograms Fig s. 2 4 . This is the time in which the helicopter is going to rise to a g iven altitude. This is a parameter whic h additionally determin es the safety of the executed flights because the crew is able to specify more precisely at which point of the flight it will be on a set flight altitude. The principles were based on the initially adopted assumptions.The principle base is made up of deduction rules that specify the manner of work of the designed system. See examples of rules below Fig. 7. Base of selected deducti on principles 3. ANALYSIS OF PROPER SYSTEM PERFORMAN CE Having establ ished all the required parameters, we received the control plane Fig. 8 . Fig. 8. Control surface After a thorough analysis of the control surface, it can be concluded that the r esults of the project are satisfactory with the initial assumptions. The table below shows the results based on 20 sample data, which were used for the analysis of the programme ’ s performance. In order to facilitate read ing the data contained in the table, we de scribed the data by colors.http://duvarkagidierzincan.com/userfiles/dewalt-610-router-manual.xml

O n the basis of the weight of the helicopter, the crew weight, and payload, as specified in the software, w e received the resulting altitude at which the helicopter, Guimbal Cabri G2, is able to rise. The altitude range is as foll ows The small l oad of the helicopter, the greater rising altitude is, with time respectively shorter than in the case of excessive load. It is essential to observe the weight standa rds due t o the fa ct that they affect the qual ity and efficiency of the e xecuted maneuvers, which are crucial in aviation. In addition, if the maneuvers are more efficientl y made, a better air traffic flow is in th e air. The control surfaces that were obtained The reason for this is that th e method use s the extreme smallest v alues for calculation of the crisp value. In the graph, it may be

deduced that the climb altitude depends on the load of the helicopter the less it is loaded, the higher is the a ltitude; and the opposite, the more it is loaded, the lower th e altitude it is. The simulation confirmed the assumption that two methods of defuzzificati on in the presented project center of gravity and cent er of sum give better results than the other t wo met hods. 6. SUMMARY A ND CONCLU SIONS In the system designing process, the he ight that is possible to reach by the Guimbal Cabri G2 helicopter in required time was determined. It was obtained with the use of the Matlab software. The input and outp ut values were determined in accordance to th e helicopter ’s, Guimbal Cabri G2, technical instructions. However, the duration of helicopter rising was repeatedly measured by a pilot with 30 years of experience and equals approximately 3.5 min on an average. It was also possible to observe during the crew changes, that if the helicopter is under heavier load, it does not climb up so swiftly.Duri ng the simulation tests, a constant weight of the crew was assumed. The helicopter payload changes due to fuel consumption.

However, in real life, during one day of the flight, the crew may chan ge and it affects the whole helicopter weight. Fig. 1 4. System project input signal s Fig. 1 5. System project output signal “ascending altitude” for different defuzzification methods References 1. Cabri G2 Flight Manual, EASA Type certificate N o R.145. Guimbal AI X EN PROVENCE, FRANCE. 2. Bronowicz, J. Podstawy aerodynamiki s mig l owca. Reprin ted with permission of Sens or magazine. In Robotics and Automation. Information Sciences. Scientific work of the Warsaw University of Technology. In IEEE Symposium on Industrial Electronics and Applications ISIEA 2010. IEEE transactions on control systems technology. 2004. Vol. 122. P. 315 325. ESRE L conference proceedings.EASA Type certificate N o R.145 Cabri Cabri G2 Flight Manual, EASA Type certificate N o R.145. Guimbal AIXENPROVENCE. Firstly, modeling phase begins with a derivation of suitable mathematical model to describe the lateral directional motion of an aircraft. Then, the Linear Quadratic Controller LQR and Fuzzy Logic Controller FLC are developed for controlling the roll angle of an aircraft system. Simulation results of roll controllers are presented in time domain and the results obtained with LQR control are compared with the results of FLC. Finally, the performances of roll control systems are analyzed in order to decide which control method gives better performance with respect to the desired roll angle. According to simulation results, it is showed that LQR controller deliver the best performance than fuzzy logic controller. View Show abstract Automatic Landing System Design Using Fuzzy Logic Article Mar 2000 J GUID CONTROL DYNAM Kyungmoon Nho Ramesh K. Agarwal A fuzzy logic control system is developed for automatic landing control of both a linear and a nonlinear aircraft model.



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A linear longitudinal aircraft model, with landing gear and flaps deployed at the sea level, is

employed for fuzzy logic controller design of automatic landing system including the tno landing phases, the glidepath capture and the Bare maneuver In addition, the fuzzy control system is tested on a sixdegreeoffreedom nonlinear aircraft model,It is shown that the simple tuning fuzzy controller, by altering scaling factors, is well suited for controlling the trajectory of the aircraft in the landing phase that requires simultaneous control of the engine thrust for changing the velocity and the elevator for changing the pitch attitude to change the altitude with a constant airspeed. View Show abstract A Practical Design Approach to Stabilization of a 3DOF RC Helicopter Article Fulltext available Mar 2004 IEEE T CONTR SYST T Kazuo Tanaka Hiroshi Ohtake Owen Wang This paper presents a practical design approach to the stabilization of a three degrees of freedom 3DOF RC helicopter. First, the nonlinear model of the RC helicopter is constructed. To facilitate control design, a simplified version of the nonlinear model is derived. A TakagiSugeno fuzzy model is then constructed to represent the simplified nonlinear model. The control purpose is to stabilize the RC helicopter while taking into account practical performance considerations in terms of good speed of response and small control effort. To achieve the control objective, we impose a decay rate condition to ensure a good speed of response and an input constraint condition to avoid actuator saturations in the control design. Both conditions are represented in terms of linear matrix inequalities LMIs. By simultaneously solving them, we render a stabilizing fuzzy controller that achieves good speed of response with small control effort. However, the controller designed for the simplified model can not always stabilize the original nonlinear model due to discrepancies introduced via the simplification process.

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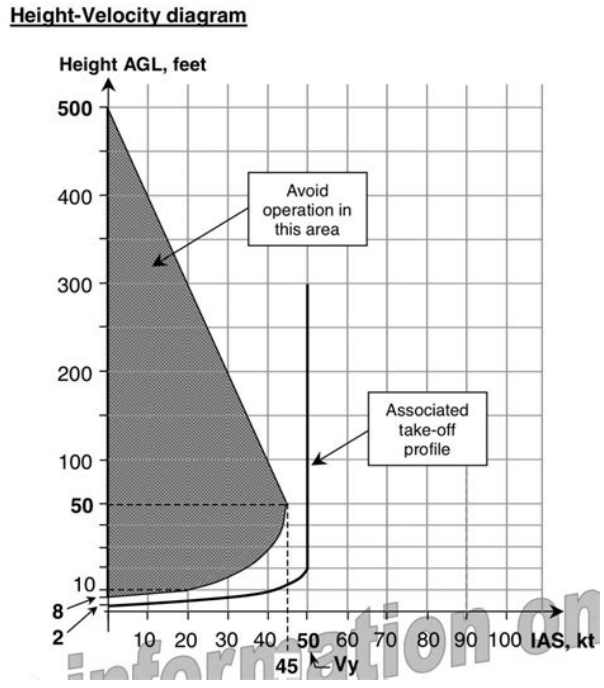

To overcome this limitation, we design a robust fuzzy controller to compensate for the modeling discrepancies. The resulting robust stability condition with good speed of response is represented in terms of LMIs. By simultaneously solving this condition together with an input constraint condition, we arrive at a robust stabilizing fuzzy controller that achieves good speed of response without actuator saturations. Both simulation and experimental results are included to demonstrate the viability and applicability of the approach. The input of the fuzzy logic is engine performance parameters gathered from aircraft for every flight during cruise. The fuzzy rule inference system for different engine faults is based on expert knowledge and real life data in the Turkish Airlines fleet.

The very smallest is used for defuzzification, since it provides a more meaningful result than others. The complete loop of engine health monitoring EHM is automatically performed by the programs and Fuzzy Logic Toolbox in MATLAB. The program triggers an alert if any output exceeds a specified value. Finally, the method is utilized for monitoring the engines in the Turkish Airlines fleet. Fuzzy logic is a very useful method for automated health monitoring strategies. The AEHMS can greatly simplify the EHM system for airlines and minimizes its drawbacks, such as extra labor hours, human error and requirement for engineering expertise. View Show abstract EmergencyOriented expert systems A fuzzy approach Article Dec 1985 INFORM SCIENCES Janusz Kacprzyk Ronald R. Yager An expert system used to respond to inquiries concerning emergencylike states in a system is presented. As is usually the case, many soft, imprecise, and subjective aspects are involved. A soft data base is therefore required to make it possible, first, to formally represent the information, and second, to manipulate e.g., infer, summarize, etc. such information.

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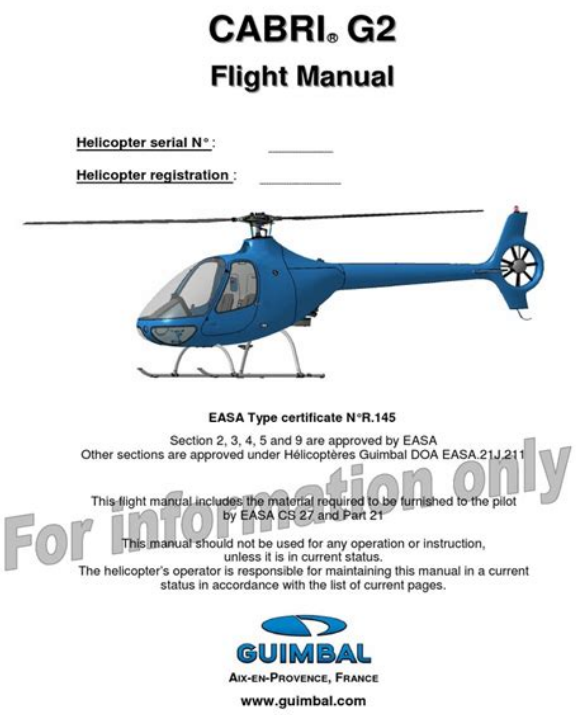

Fuzzy set and possibility theory offers promising tools and techniques. The emergency orientation of the expert system considered has the following two basic implications speed of operation handling the soft information involved and a safetyfirst attitude to be reflected. Such expert systems are particularly important in such fields as medicine, nuclear technology, and aviation. A fuzzy setbased calculus of evidence measures and of linguistically quantified statements employed is an appropriate apparatus from both points of view mentioned above. View Show abstract A fuzzy expert system for aviation risk assessment Article Apr 2009 EXPERT SYST APPL Michael Hadjimichael The Flight Operations Risk Assessment System FORAS is a risk modeling methodology which represents risk factors and their interrelationships as a fuzzy expert system. A FORAS risk model provides a quantitative relative risk index representing an estimate of the cumulative effects of potential hazards on a single flight operation. FORAS systematizes the process of eliciting human expertise, provides for a natural representation of the knowledge in an expert system, and automates the process of risk assessment. The FORAS tool is valuable to airline safety departments for examining

risk trends, to pilots and dispatchers for assessing risks associated with each flight, and to airline management for quantifying the effects of making safetyrelated changes. The quantitative relative risk index generated by FORAS allows comparisons between flights, and facilitates the communication of safety issues throughout the organization. A MATLAB standard configuration environment and the Aerosim Aeronautical Simulation Block Set are utilized for simulation studies, presented through a visualization interface; results illustrate controller performance and potential.

View Show abstract Fuzzy Control of an Autonomous Helicopter Conference Paper Fulltext available Aug 2001 Bourhane Kadmiry Dimiter Driankov This work presents a horizontal velocity controller for theWe use a novel approach to the design consisting of two steps 1. Mamdanitype of fuzzy rules to compute each of the desired horizontalThe performance ofThere are many applications involving ablation. At present polymer abla tive composites are more and more often used to create thermoprotective systems in various applications. They should be used due the fire protection of modern building constructions, in tunnelling designing and as thermo protective systems of electronic, optic and magnetic memories of digital data. The ablative composites have the better thermoprotective properties when the components have high specific heat, high density, and small thermal conductivity, so small thermal diffusivity too. Nowadays, the investigation of thermal protection ablative properties of polymeric materials seems to be very important because of terrorist threats. This research subject gained even more significance, which has been taken into consideration by NATO DAT Defence Against Terrorism. The results of the proposed topic could have an application character but also constitute the basis for the design of thermic shields, especially for the protection of civil constructions. The practical realization of the project purposes include ablation tests on polymer composites modified with mineral and ceramic nanopowders as well as the determination of the effect of materials composition on their selected thermal protection properties. Un cuadrotor es un helicoptero con cuatro rotores, el cual permite tener una mayor estabilidad que un helicoptero normal.La simulacion del modelo se ha hecho con la herramienta Simulink de Matlab con tiempos de respuesta y prestacionesThe aim of this text is to descrive the implemetation of a cuadrotor model with fuzzy logic.

Cuadrotor is an helicopter with four rotors, that makes the machine have more stability than in a normal one. Cuadrotor has six libertity grades, three of them due to the position height, horizontal movement, vertical movement; and the other three about the orientation pitch, roll and yaw. A fuzzy controlator is used to established the model. It has four entries desired height, desired roll, desired pitch and desired yaw; the exits are the potency of each rotor necesary to reach the desired situation from the present state. Simulation has been made succesfully with Simulink, tool of Matlab, with excelent times. Owing to the use of electronic control systems, modern helicopters have a wide range of possibilities, both in terms of manoeuvrability and combat. The primary assumption was to design a fuzzy controller using FuzzyLogic Toolbox in the Matlab software package that will facilitate similar results, and, above all, will eliminate the altitude measurement error resulting from the bank of a helicopter. The aim of the project is to develop a fuzzy controller which will allow generating the range extent depending on the sea conditions and the radar crosssection of the tracked object. The project uses Matlab and Fuzzy Logic Toolbox software. They perform an automatic simulation, which takes into account various weather conditions at sea as well as different size floating objects. The project was created in MATLAB environment equipped with the Fuzzy Logic Toolbox package. The discussion revolves around the problem of preventing icing. By automating the activities related to the programming of the antiicing system, it is possible to significantly relieve the pilot and increase the safety of air operations, particularly in conditions which are conducive to the formation of icing. Currently, the Diamond DA42 aircraft is not

authorized to fly into known icing conditions.

The use of a fuzzy expert system to control the antiicing system would greatly increase the scope of operations of the Diamond DA42 aircraft. In the era of common digitalization and far reaching progress in the field of cybernetics, it is necessary to use the knowledge and experience in military cybernetics applications. In the field of machines, control fuzzy expert inference systems open new horizons and possibilities. It should be noted that this technology used in some cases has already produced successful results. This paper aims to describe how the fuzzy expert inference membership function shapes influence analysis on selected air tasks efficiency evaluation results. Presented results prove that proper fuzzy membership functions shape selection has fundamental influence on aircraft system level of efficiency evaluation its calculation accuracy. Using this technology in military aviation air tasks efficiency evaluation aspects is pioneer. In the era of common digitalization and far reaching progress in the field of cybernetics, it is necessary to use the knowledge and experience in the domain of cybernetics in military applications. Artificial intelligence that so much influences on the imagination of scholars actually opens new horizons when it comes to control the machines. Relatively recently, it is introduced for military applications such departments of artificial intelligence as fuzzy logic, expert systems and fuzzy control theory. Findings. In this paper, fuzzy expert inference membership function shapes influence analysis on selected air tasks efficiency evaluation results are described. Practical implications. The issue solved in the paper is based on application of theoretical results in practice. The paper can be estimated to bridge the gap between theory and practice in specific field. The considerations focus on questions with regard to the probability of armour penetration with the initially established conditions in the project.

In the analysis the authors took into account three parameters armour thickness, armour slope and target distance. The designed a fuzzy expert system in the Matlab software as well as conducting simulation of its performance in the Simulink programme. The authors presented the performance of the system based on twenty samples for research, which simulate different thickness of the target armour, different distance from the target and different slope of the armour. The authors presented control surfaces, due to which it is possible to analyse the system performance. They also show the simulation process in the Simulink software package with the preset values. On the basis of the created controller, it is clear that a welldeveloped system, which had undergone testing and optimization, is capable of calculating near reality probability values. The designed system might improve fire effectiveness of ground targets during air training and combat tasks, as well as optimizing the consumption of airtoground armour piercing AP shells. Read more Discover more Last Updated 16 May 2020 Download citation What type of file do you want. RIS BibTeX Plain Text What do you want to download. Citation only Citation and abstract Download ResearchGate iOS App Get it from the App Store now. Install Keep up with your stats and more Access scientific knowledge from anywhere or Discover by subject area Recruit researchers Join for free Login Email Tip Most researchers use their institutional email address as their ResearchGate login Password Forgot password. Keep me logged in Log in or Continue with LinkedIn Continue with Google Welcome back. Keep me logged in Log in or Continue with LinkedIn Continue with Google No account.

Users suggestions for high quality tutorial references are welcome please post it in the other topic and I will manage it These differences are being addressed in the long term development plan of the project, and will gradually be covered to some extent.Do not use chat for extended support, only basic questions. You will need to reload the G2 right after. Projects Highlights Project under constant development Development plan and evolution are including EVERY aspect of the project 3D modeling and textures, flight dynamics modeling, fmod sounds, interactivity, systems etc.. Highly engineered, robust helicopter simulation which pushes XPlanes outofthebox features and flight

dynamics model to its extent. Highly detailed visualization of the Guimbal Cabri G2 helicopter. Engineered as a Native XPlane aircraft Maximum XPlane compatibility without the use of 3rd party plugins or external coding dependencies. Electronic Pilot Monitor EPM Simplified yet authentic and effective EPM display. FULLVR mode feature Enables to operate and fly the G2 without physical hardware for the pedals. Built in compatibility with the AviTab plugin for 3D and VR AviTab visualization and interaction. Perfect for new helicopter pilots and for helicopter conversion for fixed wings aircraft pilots due to its docile flying characteristics and simple yet effective design features. Highly responsive support forum. The VSKYLABS Guimbal Cabri G2 Project was designed to follow as much as possible and practical, the actual flight operations of the real Cabri G2. It is highly recommended to use the original Flight Manual as a reference. Not all the MLI modes of operations are covered. The reason for this is that the VSKYLABS Cabri is engineered as a native XPlane aircraft, utilizing XPlanes outofthebox features and systems. The Cabris EPM is a specific avionics system which is not included in XPlane.

As development continues, more and more solutions will be found to try and cover as many modes and display cues as possible. Realism Settings Make sure that you are flying the VSKYLABS Guimbal Cabri G2 with XPlanes realism settings on 100% full realism. The VSKYLABS Cabri is designed with the approach that helicopter simulation should not demonstrate overexcessive pilot workloads just to hold it in the air. To experience the actual projects flying handling, XPlanes realism and stability settings should set to maximum realism. Recommended Links Disclaimer The following links are brought here asis, and VSKYLABS is not responsible for its content. Before you start, it is highly recommended to visit the Helicopteres Guimbal website . The Guimbal company website is featuring official and useful information regarding the Cabri G2, including freetodownload customer documents upon registration. Another useful resource is of CABRIUSA. They have a very exciting YouTube channel called Pilot Yellow in which they share their daily routines, flying practices and world wide adventures. Among the interesting and funfactored content you will find useful tutorial videos of the Cabri G2 startup checklist, autorotations etc.. BC Helicopters website Pilot Yellow YouTube channel Here are a few tutorialvideos of the Cabri Pilot Yellow Please note that some of the procedures shown in the following videos with the real Cabri G2 may be slightly different than the possible ones in the VSKYLABS Cabri G2. These differences are mostly derived from one of the VSKYLABS core development elements which is creating its addons based on the default, built in outofthebox features and systems algorithms of XPlane, which may be lacking in comparison the the real Cabri G2 for example in the VSKYLABS Cabri G2 the EPM is a simplified version of the real EPM, not covering all of its modes of operation. These differences are being addressed in the longterm development plan of the project.

Recommended System Settings The VSKYLABS Guimbal Cabri G2 addon was tested and operated on several PC configurations. This is done from XPlanes rendering options windows in XPlane. VSKYLABS Guimbal Cabri G2 Project Introduction General Information The VSKYLABS Guimbal Cabri G2 Project is an under development project. Development roadmap is including these aspects All around 3D modeling and texturing. Systems and avionics. Flight Dynamics, aircraft performance and handing characteristics in all flight regimes from ground interaction through hovering to autorotations etc.. VR environment operations. XPlane 11 flight simulator is constantly evolving, and so as the VSKYLABS projects. There is a highly responsive support forums for the VSKYLABS project, both at the XPlane.org website and the VSKYLABS Forums website. One of the leading advantages for this approach is that as long as a default XPlane aircraft is flying and fully functional, a VSKYLABS aircraft will do the same. However, since the VSKYLABS projects are making use of XPlanes outofthebox, default flight dynamics model and systems algorithms, some systems simulation may be restricted to XPlanes default systems and features. Most noticeable are complex engine operation and computer based custom avionics such as the EPM, which is a specific computer based avionics system which is not a part of XPlanes default systems and avionics. Here

are a few examples EPM The EPM system in the VSKYLABS Guimbal Cabri G2 is a simplified version of the actual EPM. Not all of the modes are simulated, but as the development plan is making progress, more and more solutions for nonsimulated modes are implemented. Engine extended system The inter connected system of engineclutchreduction gearboxes, transmissionsrotors of the VSKYLABS Guimbal Cabri G2 is highly engineered to allow realistic operation in the needed operational and flight envelope regimes, however it is based on the default XPlane engine simulation algorithms.

This may cause some differences in engine behavior, performance, clutch reaction times, transmission loads etc. XPlane 11 Interactive Click Zones The VSKYLABS Guimbal Cabri G2 is interactively fully functional both in 2D mode 2D monitor display and VR mode Oculust Rift and other compatible gear. In the illustrations below you will find the general clickzones mapping for cockpit operations. Autopilot Clickable autopilot panel. Move to Left Seat Click on the left seat area to set the pilots view to the left seat. This mode will allow you to fly the Cabri without pedals hardware in VR environment. Although not true to life, it is a very intuitive solution which will allow full helicopter control with ease. Instruction for the Autopilot are explained down this document. Control the rotor speed using the twistgrip control while monitoring the three NR lights. The central green light will switch on when NR is in the green arc. GNS430 XPlane 11 default, fully functional GNS430. Featuring COM1, NAV1 Transponder XPlanes default Transponder system integrated into a similar to a Garmin GTX 327 case. Other than the default transponder modes, VFR button will set the transponder with 1200 visual flight rules VFR or 7700 emergency codes cyclic button. Brightness Set and operate the brightness in the EPM display AR will also be affected. Warning lights panel STARTER is ENGAGED Release the starter button as needed. BRAKE ROTOR BRAKE is ENGAGED. OIl.P OIL PRESSURE is LOW MGB.T GEARBOX DEGREDATION VSKYLABS project version v1.0b1 initial release this light is nonoperational. It will be integrated into the system down the development road. LOW FUEL Fuel is LOW ALT Alternator charging MALFUNCTION Check ALT switch ON. Switch off unnecessary electrical charges. CLUTCH Belt tension engaged or detension disengaged or clutch pressure too low reduce power, reduce IAS to 50 KTS, land as soon as practicable, be prepared to enter autorotation.