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| **S.NO** | **TITLE OF PAPER** | **Author and Year of Publication** | **CONTRIBUTIONS OF THE WORK** | **RESEARCH GAPS** | **CHALLENGES** | **PROPOSED - METHDOLOGY** |
| 1. | Gain Scheduling for H- Infinity Controllers:  A Flight Control Example | Robert A Nicholas  2020 | New approach used for developing linear dynamic controllers used for autopilots-based systems and their tracking areas. | 1 to 2 years | Computation of the gained controller differs from computation of the scheduled pitch-rate in two aspects. | Our approach to gain scheduling is a combination of extended linearization ideas. |
| 2. | Flight management systems for all Electric aircrafts | Maxim Kaptsov | The Airbus E-Fan 1.0 model is used to obtain numerical results and validate the optimal solutions. | 2 years | Maximum endurance optimal control problem | The use of batter model with internal resistance provides more precise results compared to those obtained for an ideal battery therefore maximum life expectancy. |
| 3. | Flight test experience with an electro mechanical actuator | Gavin D. Jenny | This paper discusses the integration and testing of the EPAD electromechanical actuator on the SRA. | 1 year | One final issue of the actuator was ram rotation.  But this was not the issue with hydraulic ram controller. | The EPAD EMA program successfully validated the use of an electric actuator on a modern high performance fighter aircraft with certain modifications. |
| 4. | Hardware design of flight control system and flight experiments on small-scale unmanned Aerial Vehicle | Huayou Liang | The result shows that the flight control systems designed in the paper has good practicability and high reliability, and meets the requirements of the small-scale unmanned aerial vehicle for the function and performance of flight control systems. | 2 years | Overall stability of the flight system to be maintained is difficult. | In this paper, the idea of hardware design of quadcopter and other types of flight systems is presented. |
| 5. | Hardware-in-the-Loop Simulator for Research on Fault Tolerant Control of Electrohydraulic Flight Control System | Mark Karpenko and Nariman Sepehri | This paper describes the development in hardware in loop simulator to support the design and testing the novel fault tolerant control and condition monitoring schemes for fluid power systems. | 2 years | As seen in various readings obtained from the graph some alpha values are incorrect in number and according to the series of the values. | The suitability of HIL simulation framework to support future experimentation in the presence of flight control actuator faults was demonstrated in this paper. |
| 6. | HoanKiemAir: simulating impacts of urban management practices on traffic and air pollution using a tangible agent-based mode | Arnaud GRIGNARD | This model can be used as a decision support tool for local authorities and as an information tool for the general public. | 1 year | To make pollutants level clearer we have to use AQL calculation method in order to get the correct result with proper accuracy. | In this paper an agent base model is discussed to simulate air and traffic control security. |
| 7. | Multi-Agent Tools for Air Traffic Management | Fabio Silva Carvalho | This case study is an abstract representation of the Brazilian Airspace Control System. | 1 year | Requires proper communication talking and other LAN based facilities. | The intended simulation will synthetically cover the temporal behavior of the aircraft circulation inside an airport set. |
| 8. | Multivariable Adaptive Algorithms for Reconfigurable Flight control | Marc Bodson | The application of multivariable adaptive control system in flight information display system is very much efficient to various standards. | 1 year | Reconfiguration is likely the feature of future generations and may require huge programming aspects and complexity. | A new adaptive algorithm with a new variable forgetting feature is also used and is found to yield a useful alternative to covariance resetting as a solution to covariance. |
| 9. | Neural Networks-Based Sensor Validation for the Flight Control System of a B777 Research Model | Giampiero Campa | This paper shows the result of the analysis of a scheme for sensor failure, Detection and Identification and Accommodation. | 1 to 2 years | Problems faced are related to level of noise in the measured signal, level of accuracy and level of the on-line estimator. | The scheme has shown to be successful in the detection, isolation and accommodation of failures “injected” on the WVU B777 flight data. The mapping accuracy and the generalization capabilities of both classes of NNs have shown to be critical for the performance of the scheme. |
| 10. | Reliable Robust Flight Tracking Control: An LMI Approach | Fang Liao | This paper studies the reliable robust tracking controller design problem against actuator faults and control surface impairment for aircraft. First, models of actuator faults and control surface impairment are presented. Then a reliable robust tracking controller design method is developed. | 1 to 2 years | The closed-loop system is robustly stable.  In tactical operations where emergency requirement is there not effective as compared to normal procedure. | In this paper, we have investigated a reliable robust tracking controller design method for an airplane in the presence of actuator faults and control surface impairment. Based on the multi objective robust performance analysis of the system in the nominal case and the faulty cases using an LMI method, a reliable robust tracking controller. |
| 11. | Research and Implement of Flight Multi-function Display System Based on GL Studio/OpenGL | Wang Zhi-Le | As the modern military aircraft comprehensive navigation electricity display equipment, the Multi-function Display system (MFD) has extremely highly information and the integration. | 1 year | Building tactical and complex algorithms for multi- purpose flight information display system becomes more difficult. | Multi-function flight display system (MFD Multi-function Display) is a human-computer Interface of the aircrew and integrated avionics systems, using computer, electronic display and the multiplexed bus to make the on-board avionics integrated into the display according to the functions. Multi-function display system can show the flight tactical information under the control of peripheral function keys, generally from 2 to 4 multi-function display component. Multi-function flight display system simul |
| 12. | Research on Fault Diagnosis Technology of UAV Flight Control System Based on Hybrid Diagnosis Engine | Jin Yan | In order to solve the problem of real-time fault diagnosis of UAV flight control system, a fault diagnosis method based on hybrid diagnosis engine is proposed. | 1 year | In the previous fault diagnosis research, it is difficult to establish an accurate dynamic mathematical model. | As the core system for controlling the flight configuration, flight attitude and motion parameters of UAV, in case of failure, the flight control system will not be able to complete the task, or cause the UAV to lose control, resulting in serious consequences.Therefore, the real-time fault diagnosis of the UAV flight control system and the accurate location of the fault are of great significance for improving the safety and reliability |
| 13. | Self-Learning in Aerial Robotics Using type-2 Fuzzy Systems: Case Study in Hovering Quadrotor Flight Control | AYAD AL-MAHTURI | This paper aims to design an enhanced self-adaptive interval type-2 fuzzy control system (ESAF2C) for stabilization of a quadcopter drone under external disturbances. | 2 years | To handle external disturbances and the ground effect in the closed-loop flight control system, a robustness term is added to the control effort | The efficacy of the proposed controller is investigated in a hovering quadcopter drone through numerical simulations and real-time flight tests in the presence of external disturbances. |
| 14. | Software-in-the-loop simulation for improving flight control system design: a quadrotor case study | Giuseppe Silano | In this paper the method of software-in-the-loop (SIL) methodology allows to detect and manage instabilities of a quadrotor control system that otherwise might not arise when considering only MATLAB/Simulink simulations. | 1 year | Difficulty in obtaining raw data with comparative analysis and technological surveys with proper accuracy. | The use of the SIL technique allows to understand the behavior of the flight control system by comparing and evaluating different scenarios, with a details level quite close to reality. At the same time, it is possible to discover issues that a model-inthe-loop (MIL) simulation does not necessarily detect, even if carried out through a multi-physics co-simulation approach. |
| 15. | Subliminal air traffic control: Human friendly control of a multi-agent system | Eva Cruck | In this paper a hybrid control model with uncertainty and state constraints, and solve the problems in game setting by using tools from viability theory. | 1 year | Difficulty in obtaining raw data along with proper accuracy in test cases. | These actions have to be small enough to be imperceptible by air traffic controllers. We formulate the subliminal control problem as a robust optimization problem in which the cost is related to the perception of risk. |
| 16. | The Design and implementation of Primary Flight Display components based on SCDAE | Wang Yuanxun | According to the requirement of today’s generation this paper focuses modelling mechanism of safety- Critical Application. | 2 years | Difficulty in obtaining primary data with some secondary data in order to implement the concept of SCDAE. | The results shows that SCDAE realizes the automation of software development to a great extent, saves a lot of verification time, and reflects the advantages of software development in SCDAE environment. |
| 17. | The Realization of Flight Simulation system Based on OpenGL | YAO Hong-ge | The flight environment virtual simulation system can simulate the flight rules in 3D space. In the system the aircraft model is 3D and can be controlled. Also, its poses can be displayed in 3D. | 1 year | Requires a lot of networking capacity items in order to facilitate the bets results with real time automation. | The results of visual simulation show that this system is workable and effective. It is an important simulation environment for the study of the flight operation in the air and offers a very effective, economical means or approach for the research and development of other similar systems1 |
| 18. | 4D Flight Guidance Displays, A GATE-TO-GATE SOLUTION | Wolfgang J. Kubbat | Since most information is presented in a graphical way, it can intuitively be seized by the pilots. Especially in phases of high workload, the highly pre-processed information and its redundant presentation will significantly contribute to assure pilots situation awareness both in the air and on the ground. | 1 year | The challenge to increase air traffic capacity and at the same time improve safety and efficiency significantly will only be met, if future cockpit instruments will guarantee the pilots spatial situation awareness in any phase of flight. The only way to achieve this is synthetic vision. | The HMI currently consists of two perspective displays complementing one another. The Primary Flight Display (PFD) incorporates a synthetic insight out view, while the Navigation Display (ND) is characterized by a synthetic ‘birds eye view’. By providing not only flight guidance but also taxi and traffic information the two displays support the crew from gate to gate. |
| 19. | FLIGHT TESTING OF A PROTOTYPE COCKPIT DISPLAY OF TRAFFIC INFORMATION FOR APPROACH SPACING APPLICATIONS | Julie L. Garloch, Rockwell Collins | Results are reported regarding the human factors aspects of the operational concepts and use of the prototype formats. | 1 year | NASA concluded that the use of a CDTI for approaches was not feasible using raw display data, because spacing was too difficult to maintain. Now, twenty years later, we are attempting to solve the same problem again, although this time with new technology - ADS-B. | In order to perform a workload intensive task such as this while maintaining a desired spacing with a leading aircraft, it was our desire to impact the existing displays as little as possible. With this in mind, we developed a generic CDTI that contained the following CDTI unique symbology: |
| 20. | An Off-Axis Flight Vision Display System Design Using Machine Learning | Shan Mao | In this paper proposed methodology is related to off-axis flight vision display system design with a free-form surface using machine learning to simulate the visual distance variation during take-off and landing training for pilots. This design is realized by ray tracing using ZEMAX software | 1 year | Requires a large amount of quantitively analysis. | Our results demonstrate that the design of a flight visual display system can be transformed into a machine learning problem and further optimized by training and learning with abundant data, providing an avenue to design more powerful and complex imaging optical systems |
| 21. | Initial Flight Test Results of Ohio University’s 3-Dimensional Cockpit Display of Traffic Information | Maarten Uijt de Haag | This paper discusses the initial flight test results of a 3-Dimensional Cockpit Display of Traffic Information (3D-CDTI). | 1 year | Requires a standard based test results along with proper accuracy. | The 3D-CDTI display will be enhanced by referencing traffic information to terrain. This will make it much easier for the flight crew to determine location of the tactic. |
| 22. | SAFETY RELEVANT NAVIGATION AND CERTIFIABLE DATABASES FOR 3D SYNTHETIC VISION SYSTEMS | L. May, J. Pfister, H. Raabe | This paper shows that these two essential prerequisites for a SVD are at a very far developed stage and may be available as commercial equipment and procedures in the near future. | 1 year | Today’s use of databases in cockpits is limited to Flight Management Systems (FMS) or Terrain Warning and Alert Systems (TWAS). Currently, these devices use individual proprietary data in very low-resolution displays [Proc97/1]. | While the Navigation System has to provide information about current position, attitudes, and sensor integrity, the databases provide information for terrain, obstacles, airports and navigation aids. |
| 23. | An experimental analysis of situation awareness for cockpit display interface evaluation based on flight simulation | Wei Hengyang | Aircraft cockpit display interface for information perceiving. During the process of aircraft design, situation awareness is frequently considered to improve the design. | 1 year | Random allocation of direction along with proper measurements is very much necessary in this type of model. | The results show that analysing the SA can serve as an objective way to evaluate the design of CDI, which could be proved from the consistent HR data. |
| 24. | Flight Departure Time Prediction Based on deep Learning | Hang Zhou | This paper proposes a deep learning-based flight departure time prediction model. First, this paper analyses the influence of different factors on flight departure time and the influencing factor. | 1 year | Then, considering the long short-term memory (LSTM) network is prone to over-fitting in limited data sets, the random forest model was used to classify and predict flight delays. | Finally, compared with several commonly used neural network models and random forest models in machine learning, the advantages of the model built in this paper are highlighted. |