

TOPICAL REPORT

AVIATION

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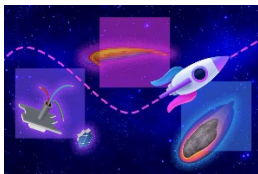
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AVIATION



Charting a safe course through a highly uncertain environment

"MIT researchers have developed a technique that could help this spacecraft land safely. Their approach can enable an autonomous vehicle to plot a provably safe trajectory in highly uncertain situations where there are multiple uncertainties regarding environmental conditions and objects the vehicle could collide with.

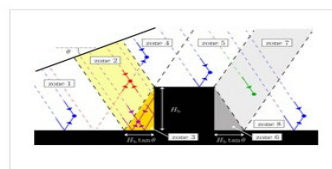
The technique could help a vehicle find a safe course around obstacles that move in random ways and change their shape over time. It plots a safe trajectory to a targeted region even when the vehicle's starting point is not precisely known and when it is unclear exactly how the vehicle will move due to environmental disturbances like wind, ocean currents, or rough terrain."

Source: MIT

'Urban Canyons' Prolong Sonic Booms in Cities

"Twenty years after the retirement of the Concorde, several industrial and research projects want to make supersonic flight a reality again. However, supersonic planes produce sonic booms loud enough to warrant noise concerns and regulations, limiting their use over land. In The

ENGINEERING



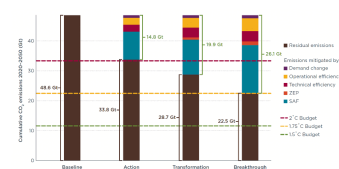
Sonic boom reflection over an isolated building and multiple buildings

"Sonic boom reflection is investigated over an isolated building and multiple buildings using numerical simulations. For that, the two-dimensional Euler equations are solved using high-order finite-difference techniques. Three urban geometries are considered for two boom waves, a classical N-wave and a low-boom wave. First, the variations of the pressure waveforms and the corresponding perceived noise are analyzed along an isolated building. The influence of the building is limited to an illuminated region at its front and a shadow region at its rear, whose size depends on the building's height and the Mach number. Two buildings are then considered. In addition to arrivals related to reflection on the building facades or to diffraction at the building corners, low-frequency oscillations, associated with resonances, are noticed in the street canyon."

Source: The Journal of the Acoustical Society of America

Design and Analysis of Low-Cost Aircraft Landing Gear Trainer System for Aviation Maintenance Training

AVIATION



Vision 2050: Aligning Aviation with The Paris Agreement

"Airlines and governments have committed to achieving net-zero emissions from aviation by mid-century. In this report, we develop a roadmap to evaluate the emission impacts of ICCT scenarios for aviation technology and operations using a new Projection of Aviation Carbon Emissions (PACE) model. Our goal is to assess the extent to which measures can reduce cumulative carbon dioxide (CO₂) emissions from global aviation in line with 1.5°C, 1.75°C, and 2°C targets.

Three decarbonization scenarios—Action, Transformation, and Breakthrough—are analyzed along with a Baseline scenario, each built around six important parameters: (1) traffic; (2) aircraft technology; (3) operations; (4) zero-emission planes (ZEPs); (5) sustainable aviation fuels (SAFs); and (6) economic incentives."

Source: ICCT

Boeing 2022 Sustainability Report - Sustainable Aerospace Together

"Boeing is committed to protecting, connecting and exploring our world and beyond, safely and sustainably. Our commitment to sustainability is rooted in our company values and our stakeholders' expectations. It

Journal of the Acoustical Society of America, published on behalf of the Acoustical Society of America by AIP Publishing, University of Lyon researchers conducted simulations comparing how sonic booms reflect differently over a single building, two neighboring buildings, and multiple buildings spaced at regular intervals."

Source: American Institute of Physics

UK team wins engineering award for wing that cuts aircraft CO2 emissions

"A Belfast-based team behind an innovative aircraft wing that cuts the emissions of commercial airliners has won a prestigious engineering award, in a much-needed boost for an industry wracked by uncertainty over Brexit and Donald Trump's tariffs."

Source: Independent UK

HYPERSONIC AIRLINER



China successfully tests hypersonic airliner technology: Reports

"The Nanqiang No 1, a model likely to be a technology demonstrator for a hypersonic airliner, has finished the first phase of testing, according to Chinese media.

The model, which is referred to as a prototype, has been tested in a laboratory in Fujian Province, China, the South China Morning Post reports. According to the report, the aircraft weighs 500 kilograms (1,100 pounds). Scientists involved in the project expect to finish the testing program and transition to building a flyable prototype by 2025.

While the report does not explain what kind of tests were conducted, a photograph attached to the document suggests that it could have been wind tunnel testing.

An actual prototype is now expected to fly by 2028. It will be powered by a set of turbofan, rocket and ramjet engines, will be capable of seating up to 10 passengers, and able to reach speeds of up to Mach 6 (six times the speed of sound), the report explained."

Source: Aerotime

AIRCRAFT DESIGN



Aerodynamics of Perching Birds Could Inform Aircraft Design

"Landing gear mechanism trainer is an important and useful equipment for aircraft module training. It is essential for trainees to comprehend the theory as well as practical training related to maintenance of the landing gear system. The device can also be used in the lecture or during ground school course training. In this work, the design of low-cost aircraft landing gear system for training purpose is proposed. Market feasibility study is first conducted, and the design parameters of the proposed hydraulic landing gear trainer system is based on the survey results. The landing gear system is equipped with retractable main and nose landing gear. By using engineering methods such as House of Quality (HoQ), and Morphological Method, three conceptual designs of hydraulic landing gear trainer system were proposed. The final design was selected by using the engineering approach which is Weighted Decision Matrix (WDM)."

Source: Springer Link

Effects of vertical vibration on sitting comfort in civil aviation during the cruising flight

"This paper investigated the effects of vertical vibration on sitting comfort in civil aviation, with particular attention to high-frequency components (i.e., 30–100 Hz). We generated 24 vibration stimuli at four positions (i.e., the co-pilot, front, middle, and rear seat positions) in the aircraft cabin, with magnitudes ranging from 0.05 to 2 ms⁻² r.m.s. and durations of 10 s. Twenty-four subjects (12 males and 12 females) judged the vibration discomfort using a category-ratio method. We found a significant effect of high-frequency vibration on comfort: vibration stimuli at the middle and rear seats contained more energy at high frequencies and caused significantly greater discomfort than those at the co-pilot and the front seats. However, this effect became less significant with increasing magnitudes of vibration stimuli. The discomfort predicting models provided more accurate results by amplifying weighting factors for high-frequency vibration than those using standardized weightings (i.e. Wb and Wk weightings)."

Source: Taylor & Francis

Computational analysis of skid resistance of aircraft tire on wet runway pavement with different groove depths

"This study aimed to develop an integrated approach to evaluate the groove depth effect on water depths and skid resistance on runway

encompasses our focus on environmental stewardship, social progress and inclusion as well as values-based, transparent governance. In our 2022 Sustainability Report, we provide a comprehensive view of Boeing's achievements and progress over the past year as well as our path toward a sustainable aerospace future."

Source: Boeing

AIR TRAVEL



Global Outlook for Air Transport Times of Turbulence

"The 20th century saw two World Wars and the Great Depression before going on to deliver the most spectacular global economic performance in human history. The acceleration in the improvement in global living standards is intimately correlated with the improvement in connectivity, and with the advent of global commercial aviation in particular, post-World War 2 (Chart 1). Real GDP grew 19-fold between the years 1900 and 2000, corresponding to an average annual rate of growth of 3%1. This unprecedented economic record has been interrupted in the 21st century. The 2008 Global Financial Crisis was the most severe recession globally since the Great Depression. Now, the world is facing two wholly global and systemic crises simultaneously – climate change and the COVID-19 pandemic. Moreover, there is again war in Europe. Together, these crises will dampen GDP growth in the near as well as in the long term. Prior to the outbreak of the war between Russia and Ukraine on 24 February 2022."

Source: IATA

June 2022 Air Travel Consumer Report

"The Air Travel Consumer Report is a monthly product of the Office of Aviation Consumer Protection (OACP). The report is designed to assist consumers with information on the quality of services provided by the airlines."

Source: US Department of Transportation

WHITE PAPER



Revealed - how to make the hybrid airspace work

"To uncover the mystery behind these differences in motion, a team of researchers in the UCF Department of Mechanical and Aerospace Engineering studied the aerodynamics of bird perching maneuvers and their implications for aircraft design. The researchers' findings were recently published in *Physical Review Fluids*, and it was highlighted in this prestigious journal as an "Editor's Suggestion." Their paper also featured in *Physics*, the online magazine from the American Physical Society.

The team, led by aerospace engineering doctoral student Dibya Raj Adhikari, found that the sweeping motion, which changes the shape of a bird's wing, increases lift and allows for better control of aerodynamic forces during a landing."

Source: University of Central Florida

AEROSPACE ENGINEERING



Dragonflies use vision, subtle wing control to straighten up and fly right

"With their stretched bodies, immense wingspan and iridescent coloring, dragonflies are a unique sight. But their originality doesn't end with their looks: As one of the oldest insect species on the planet, they are an early innovator of aerial flight.

Now, a group led by Jane Wang, professor of physics in the College of Arts and Sciences and professor of mechanical and aerospace engineering in the College of Engineering, has untangled the intricate physics and neural controls that enable dragonflies to right themselves while they're falling. The research reveals a chain of mechanisms that begins with the dragonfly's eyes – all five of them – and continues through its muscles and wing pitch."

Source: Cornell University

MATERIAL SCIENCE



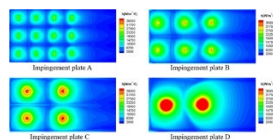
4D composite printing can improve the wings of drones, according to new Concordia research

"Hoa is a professor of mechanical, industrial and aerospace engineering at the Gina Cody School of Engineering and Computer Science. Using a technique Hoa pioneered known as 4D printing of composites,

pavement. Finite element modelling of tire-water-pavement interaction was developed to calculate pavement friction coefficient of aircraft tire. Spatial distribution of water film depth was obtained based on analytical modelling and validated with field measurements. The results show that the thicker water film depth and the smaller friction coefficient are expected with the smaller groove depth. The effect of groove depth becomes more significant in the region close to the centerline of runway. The non-uniform distribution of water film depth would cause different skid resistance encountered by aircraft tires and increase safety risk of landing when aircraft wander happens. The developed simulation approach can be used to determine the threshold of groove depth for maintenance treatment considering rainfall condition, aircraft operation, and geometry of runway."

Source: Taylor & Francis

PHYSICS



The Influence of Geometrical and Inlet Parameters on the Impingement Cooling of Aviation Kerosene

"In the present paper, numerical study of flow and heat transfer properties of RP-3 kerosene in an impingement model are conducted with SST $k-\omega$ turbulence model and a 10-species surrogate of kerosene. The independence of grids is first studied and the numerical results are compared with experimental data for validation. Characteristics of flow and heat transfer of kerosene flow in the impingement model are studied with different inlet temperatures, dimensionless open areas, and separation distances. The heat transfer coefficients and pressure losses increase with decreasing dimensionless open areas. The separation distance $H/d=2$ gets the best heat transfer performance and the separation distance $H/d=3$ gets the best heat transfer uniformity on the target plate. Higher inlet temperature gets a higher heat transfer performance and heat transfer uniformity on the target plate."

Source: ASME Digital Collection

Adaptive Air-Data Smoothing Estimation with Customized Wind Model Based on Flight Data

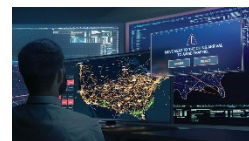
"New blockchain-style information sharing will make a seamlessly integrated ecosystem of crewed and uncrewed aircraft in the UK's skies a reality, say Cranfield researchers.

Uncrewed aerial vehicles and operations are already bringing benefits, such as improving medical logistics for isolated areas, or enabling inspections of difficult to reach infrastructure such as high masts and wind farm turbines. But a transformation of air traffic management (ATM) capacity and systems is needed to open up a new age of commercial opportunities for the aviation sector, as well as drone-enhanced public services: urban air taxis, cargo and delivery services, security operations, healthcare support and environmental monitoring.

A new report — published on 15 June 2022 — sets out how collaboration in the aviation industry can increase much-needed levels of automation and autonomy in ATM, and meet safety standards for uncrewed traffic being set out by the International Civil Aviation Organisation. With this established, elements of a hybrid airspace are predicted to be in place from 2024."

Source: Cranfield University

ARTIFICIAL INTELLIGENCE



AI in the Sky: How Artificial Intelligence and Aviation Are Working Together

"Artificial intelligence (AI – also related to Machine Learning, or "ML" as it's called) has reached new heights: a cruising altitude of 10,000 - 70,000 feet to be precise. Commercial airlines and military aviation have already begun embracing AI, using it to streamline routes, cut harmful emissions, improve customer experience, and optimize missions. However, with AI comes a string of questions, technical challenges, and even mixed feelings. Both the Federal Aviation Administration and the European Union Aviation Safety Agency (EASA) have taken a positive interest in AI. EASA published a report in February 2020 discussing the trustworthiness of AI and how aviation can take a human-centric approach to AI programs. Boeing and Airbus are working on AI both separately and via combined international partnerships. The world's aerospace safety organization, Society of Aerospace/Automotive Engineers (SAE) is publishing aviation standards

the authors performed a feasibility study on the application of a new way to manufacture adaptive compliant trailing edge (ACTE) morphing wings. The experimental technology replaces the commonly used hinged wing flap with one that is attached to the main wing body but can bend up to 20 degrees.

"Our paper shows that a UAV using this kind of wing can support a good amount of load for small or medium-sized vehicles," says Hoa, director of the Concordia Centre for Composites."

Source: Concordia University

SUSTAINABLE AVIATION



Singapore Airlines partners with government in SAF pilot and credit programmes

"The World Robotics report shows that Europe is the region with the highest robot density globally, with an average value of 114 units per 10,000 employees in the manufacturing industry. For more facts about robots watch IFR's video news about Europe in one minute."

Source: Green GreenAir News

Could sustainable aviation fuel (finally) drive the global travel industry towards carbon neutrality?

"With more airlines looking to use SAF, the demand for the fuel is set to increase, which would have implications for foreign investment across a number of geographies.

Australia provides an example. The country has been exporting large quantities of feedstock to be turned into SAF overseas, as it lacked a domestic commercial-scale SAF industry. However, a recent partnership between Australian carrier Qantas and European aviation corporation Airbus looks set to speed up the establishment of an SAF industry in Australia."

Source: Airport Technology

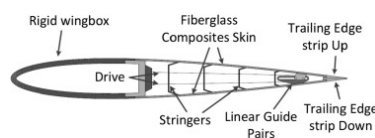
First-ever flight of a commercial regional aircraft to use 100% SAF in both engines takes place in Sweden

"Commenting on the test flight, ATR's Bortoli said: "After more than a century of commercial flights powered by kerosene, we are at the dawn of a new era. In recent months, we carried out a series of successful flights with sustainable fuel in one

"The wind disturbance in flight induces measuring error of air data, including the true airspeed, angle of attack, and sideslip angle. To obtain the air data with better accuracy, a synthetic filtering system integrated with a customized wind model and an adaptive square root Kalman smoother (ASR-UKS) were proposed based on the flight data of civil aviation aircraft. The Gaussian process (GP) regression was first used to extract the random and rapid-changing turbulence that deteriorated the air-data measurements, and a parameterized turbulence model was built by autoregressive (AR) modeling. After this, a synthetic filtering system integrated with the recursive turbulence model was developed based on the inertial measurements in flight data. Finally, the ASR-UKS was designed to estimate the airspeed, angle of attack, and sideslip angle within the finite time span of flight data."

Source: ASCE Library

COMPOSITE STRUCTURE



Development of a new flexible wing concept for Unmanned Aerial Vehicle using corrugated core made by 4D printing of composites

"This paper presents a feasibility study on the application of the method of 4D printing of composites for the efficient manufacturing of adaptive compliant trailing edge (ACTE) morphing wing. The ACTE morphing wing is a tapered sandwich structure made of composite materials. The wing has flat upper and lower skins, and a corrugated core. The corrugated core is made using the concept of 4D printing of composites. With this concept, there is no need for a mold with complex geometry to make the corrugated core. Instead only a flat mold is used. A prototype of the wing was made and tested. It was shown that this wing can sustain the load for a medium size Unmanned Aerial Vehicle, with flex angle up to 20°."

Source: Elsevier

Smart Materials in Additive Manufacturing, Volume 2 : 4D Printing Mechanics, Modeling, and Advanced Engineering Applications

"Additive manufacturing (AM), as one of the most powerful manufacturing methods, is

and training based upon AI (this author's company, AFuzion Inc., is the primary training resource for all SAE worldwide training programs). But there are still many questions left unanswered, particularly when it comes to safety. With so much unknown surrounding AI, does it have a place in our safety-critical world? The airline industry may have some answers."

Source: Avionics International

engine. We decided it was time to perform the first test flight with 100% SAF in both engines. This helps us to certify our aircraft to fly solely on sustainable fuels faster and to enable more sustainable connections as a result.

"The flight represents a true milestone for the entire aviation industry as it shows that this technology works and can be promptly adopted by many in our industry to speed up the transition to low-emission aviation."

Source: GreenAir News

ExxonMobil's first cargo of sustainable aviation fuel lands at Changi Airport

"ExxonMobil has delivered its first cargo of certified Sustainable Aviation Fuel (SAF) to Changi Airport. The oil company is amongst the suppliers chosen to be part of the Civil Aviation Authority of Singapore (CAAS) pilot program on the use of SFA in Changi.

In a statement, ExxonMobil said the SAF was "manufactured by blending ExxonMobil-produced refined jet fuel with the Neste-produced neat SAF at ExxonMobil facilities, before being delivered to Changi Airport's fuel hydrant system."

Source: Singapore Business Review

eVTOL



Vertical Aerospace Chooses Molicel to Provide Battery Cells for the VX4 eVTOL

"Lithium-ion cell manufacturer Molicel was recently chosen by Vertical Aerospace to supply battery cells for the VX4 air taxi. Vertical is designing and manufacturing the VX4, its electric vertical take-off and landing (eVTOL) aircraft, with capacity for a single pilot and four passengers. The eVTOL developer is targeting entry into service in 2025 for the VX4.

Vertical revealed its full-scale design of the VX4 in December 2021, and the company announced a merger with Broadstone Acquisition Corp. around the same time. Since then, Vertical's ordinary shares have been listed on the New York Stock Exchange as EVTL. Conditional pre-orders for Vertical's aircraft total 1,350, including customers such as American Airlines, Avolon, and Bristow."

Source: Aviation Today

Full-Scale AIR ONE eVTOL Prototype Performs Its First Hover Flight

fabricating a three-dimensional (3D) structure using computer-aided design (CAD) data by adding material layer by layer. In contrast to traditional manufacturing processes that start from raw block material and remove waste materials, the AM process can demonstrate better aspects such as freedom of design, reduced postprocessing, and waste reduction. With emerging smart materials such as shape memory polymers, the 3D printing technology has upgraded to a technology that is called four-dimensional (4D) printing, in which the fourth dimension expresses time. In this technology, by using active materials, the printed structure can reshape its configuration and also change its mechanical properties in the presence of external stimuli such as temperature, magnetic field, and/or electric field. The fabrication and modeling of 4D-printed structures are considered due to their extensive applications in various areas such as biomedical and robotic."

Source: Elsevier

ARTIFICIAL INTELLIGENCE

$$\Phi_c(A_i, A_j) = \begin{cases} \sqrt{\frac{w_{ic}(P_{ic} - P_{jc})}{\sum_{k=1}^m w_{kc}}} & \text{if } (P_{ic} - P_{jc}) > 0, \\ 0 & \text{if } (P_{ic} - P_{jc}) = 0, \\ -\frac{1}{\theta} \sqrt{\frac{(\sum_{k=1}^m w_{kc})(P_{jc} - P_{ic})}{w_{jc}}} & \text{if } (P_{ic} - P_{jc}) < 0. \end{cases}$$

Evaluation of Artificial Intelligence Applications in Aviation Maintenance, Repair and Overhaul Industry via MCDM Methods

"Airline operators are looking for ways to improve flight performance and flight safety, and to minimize maintenance-repair costs and the number of unplanned breakdowns over time. It is exceedingly difficult to achieve optimal results in such a large system with hundreds of variable factors. However, technological developments facilitate the exchange of data between interrelated operational activities and make it meaningful by processing the big data that emerges from the operations performed. In this sense, artificial intelligence (AI) concept has started to be a big supporter of maintenance-repair-overhaul (MRO) companies. In this research, it will be carried out to determine the most appropriate area in which AI technology can be used in aviation MRO activities, and to detect the most suitable AI tool for this determined area via multi-criteria decision-making (MCDM) method."

Source: Springer Link

MATERIAL SCIENCE

"The wingspan of this prototype is about 7.5 meters, or about 24.5 feet. "We have flown things up to 9 meters in wingspan," Plaut remarked, "but this is the first time we are starting to fly with the full form factor of the product in a configuration that can take two people." AIR is validating the performance and components with this unit before implementation in the final product. The eVTOL prototype has a take-off weight of 868 kilograms (about 1,900 pounds) and the capacity for 250 kg of payload (about 550 pounds). Its maximum speed will be 155 miles per hour."

Source: Aviation Today

UAV



Rapid Adaptation of Deep Learning Teaches Drones to Survive Any Weather

"Right now, drones are either flown under controlled conditions, with no wind, or are operated by humans using remote controls. Drones have been taught to fly in formation in the open skies, but those flights are usually conducted under ideal conditions and circumstances.

However, for drones to autonomously perform necessary but quotidian tasks, such as delivering packages or airlifting injured drivers from a traffic accident, drones must be able to adapt to wind conditions in real time—rolling with the punches, meteorologically speaking.

To face this challenge, a team of engineers from Caltech has developed Neural-Fly, a deep-learning method that can help drones cope with new and unknown wind conditions in real time just by updating a few key parameters."

Source: California Institute of Technology

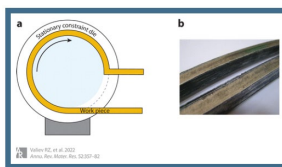
Satellites and drones can help save pollinators

"Satellites and drones can provide key information to protect pollinators, researchers say.

Their study examines new ways of using these technologies to track the availability of flowers and says this could be combined with behavioural studies to see the world through the eyes of insects.

The flowers available to insects vary from day to day and place to place, and human activity is changing landscapes in ways that affect all pollinators.

The University of Exeter research team, supported by the South Devon Area of Outstanding Natural Beauty (AONB), hope their approach can



Using Severe Plastic Deformation to Produce Nanostructured Materials with Superior Properties

"The past decade was marked by significant advances in the development of severe plastic deformation (SPD) techniques to achieve new and superior properties in various materials. This review examines the achievements in these areas of study and explores promising trends in further research and development. SPD processing provides strong grain refinement at the nanoscale and produces very high dislocation and point defect densities as well as unusual phase transformations associated with particle dissolution, precipitation, or amorphization. Such SPD-induced nanostructural features strongly influence deformation and transport mechanisms and can substantially enhance the performance of advanced materials. Exploiting this knowledge, we discuss the concept of nanostructural design of metals and alloys for multifunctional properties such as high strength and electrical conductivity, superplasticity, increased radiation, and corrosion tolerance."

Source: Annual Reviews

SUSTAINABLE AVIATION



Large but diminishing effects of climate action nudges under rising costs

"Behavioural public policy has received broad research attention, particularly in the domain of motivating pro-environmental behaviours. We investigate how far the efficacy of arguably one the most popular behavioural policy tools (green 'default change' nudges) depends on the associated cost. On the basis of a field study involving carbon offsets for over 30,000 flights booked by more than 11,000 airline customers, we show that green defaults have a large effect on voluntary climate action, even when several hundreds of Euros are at stake. The effect fully vanishes only as costs approach approximately €800."

Source: Nature Human Behaviour

Unravelling the potential of sustainable aviation fuels to

help us understand these changes, leading to better conservation."

Source: University of Exeter

Cancer drugs to be delivered via drone in UK trial

"Delivering chemo by drone is another extraordinary development for cancer patients and shows how the NHS will stop at nothing to ensure people get the treatment they need as promptly as possible – while also cutting costs and carbon emissions," NHS chief executive Amanda Pritchard commented in a press statement.

The NHS said each drone delivery would replace at least two car journeys and a hovercraft or ferry journey, thus saving carbon emissions.

The Isle of Wight trial will be followed by drone deliveries in Northumbria. The scheme could allow same-day orders for medical equipment and other treatments.

The NHS is working with technology company Apian, a medical drone start-up founded by a team of NHS doctors in training and ex-Googleers, on the trial."

Source: Aerotime

decarbonise the aviation sector

"The aviation industry is responsible for approximately 2% of the total anthropogenic greenhouse gas emissions. With an expected four to six-fold growth by 2050, increased attention has been paid to reduce its carbon footprint. In this study, we analyse the requirements to promote Sustainable Aviation Fuels (SAFs) from solar energy to reduce the emissions of the sector. Using a discrete spatio-temporal mathematical description of the region of Spain, we present the key elements required to produce jet fuel via Fischer-Tropsch (FT) and Methanol to fuels (MtF). We have found that solar PV, electricity storage, and alkaline water electrolysis are the key drivers for the performance of solar SAFs while the optimal location of the facilities is driven by the availability of solar radiation, underground H₂ storage, and high jet fuel demand. We show that the constant supply of H₂ requires an over sizing of technologies, which in turn decreases the utilisation of solar panels and electrolyzers. While higher usage rates could be attained by a constant supply of electricity (e.g., via the electricity grid), the use of renewable sources is essential to guarantee a reduction in CO₂ emissions compared to fossil-based jet fuel."

Source: Royal Society of Chemistry

Analysis of Factors Influencing Carbon Emissions from Civil Aviation Transportation Based on LMDI and STIRPAT Models

"The analysis of factors influencing the carbon emissions of civil aviation transport is of great significance to the low-carbon development of civil aviation transport. In order to quantify the relationship between the change of carbon emission of civil aviation transportation and each influencing factor, this paper decomposes the total carbon emission of civil aviation transportation into four influencing factors through LMDI model. Among them, population size, GDP per capita and turnover per unit of GDP contribute to the growth of carbon emissions, with contribution rates of 5.04%, 81.73% and 21.03%."

Source: Springer Link

PEDAGOGY



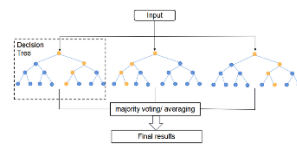
A phenomenological study and comparison of the characteristics of droplet

impact liquid film dynamics on randomly rough surfaces

"There is a strong need for educators to change the way they conduct aviation education to bring up future professionals in the industry. To cope with the COVID-19 challenge, creative online distance learning approaches become necessary. This article shows how an online lab approach offers social and cognitive support for engineering students to sustain their learning. A series of learning activities including flight simulation and virtual tours were held in an online lab setting by aviation professionals and lecturers at a university in Hong Kong to 35 undergraduate engineering students. The online lab encouraged students to apply knowledge into practice and develop their theoretical and conceptual knowledge through activities. Workshops focusing on aviation laboratory education aimed at students' development of aviation theoretical and technical knowledge, collaborative skills, field-specific, and practical skills."

Source: Taylor & Francis

FORECAST



Forecast and analysis of aircraft passenger satisfaction based on RF-RFE-LR model

"Airplanes have always been one of the first choices for people to travel because of their convenience and safety. However, due to the outbreak of the new coronavirus epidemic in 2020, the civil aviation industry of various countries in the world has encountered severe challenges. Predicting aircraft passenger satisfaction and excavating the main influencing factors can help airlines improve their services and gain advantages in difficult situations and competition. This paper proposes a RF-RFE-Logistic feature selection model to extract the influencing factors of passenger satisfaction. First, preliminary feature selection is performed using recursive feature elimination based on random forest (RF-RFE). Second, based on different classification models, KNN, logistic regression, random forest, Gaussian Naive Bayes, and BP neural network, the classification performance of the models before and after feature selection is compared, and the prediction model with the best classification performance is selected. Finally, based on the RF-RFE feature selection, combined with the logistic model, the factors affecting

customer satisfaction are further
extracted."
Source: Nature Scientific Reports

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