

# TOPICAL REPORT

## AVIATION

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### AIRLINES



#### Thailand tourism collapse poses existential crisis for airlines

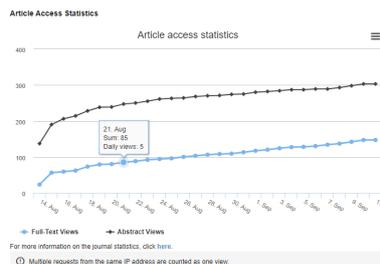
"The departure gates at Bangkok's Don Mueang international airport are usually packed with travellers scrambling to catch their flights — to cities in China, Southeast Asia, and within Thailand. Snaking queues were par for the course, be it at check-in, security, or even to use the toilets. But for most of 2020 that scene has been a distant memory, as the airport hunkered down amid the coronavirus outbreak, which saw international and domestic travel restricted to curb the spread of the virus."

Source: Flight Global

#### British Airways: more turbulence for aviation industry?

"It's safe to say that BA and its parent company IAG have had a challenging 2020 ... IAG, perhaps more so than competitors, needs to keep its focus set on the long-term. With a model oriented toward international travel, BA is likely to take longer to recover than budget airlines like easyJet and Ryanair, who

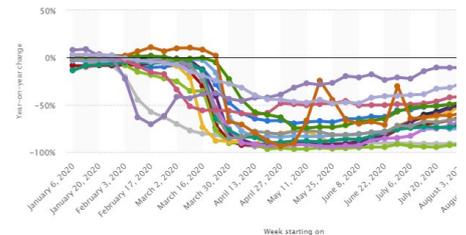
### REGIONAL AIRLINE



#### An analysis of the success factors for passenger boarding enthusiasm for low-cost regional airline routes

"Airports are important air transportation facilities, providing cargo transportation, aircraft takeoff and landing, and passenger services. Trade liberalization and globalization along with shifting economies and trading focuses have led to the rapid growth of airline and cargo transportation in Asia-Pacific regions. Therefore, Asian countries are constantly expanding and improving their airport facilities. Thus, improving and measuring airline service quality has attracted significant research attention in recent years. The Chinese Government has also actively promoted low-cost tourism, although competition in low-cost carrier markets was bound to be fierce. This not only promoted tourism industries but also attracted many foreign visitors to taking low-cost carriers to China for sightseeing. With international oil prices and regional economy issues, full-service carriers face considerable operational pressure on cost and competition. This

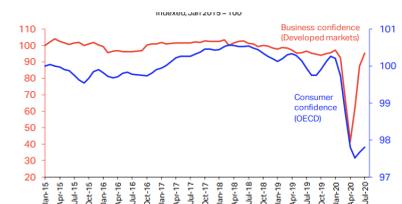
### AIRLINES



#### Year-on-year change of weekly flight frequency of global airlines from January 6 to August 30, 2020, by country

"The impact of the novel coronavirus (COVID-19) can be seen on every sector of the most affected countries as well as globally. For the week starting August 30, 2020, the number of scheduled flights worldwide was down by 47 percent compared to the week of September 2, 2019. The impact of COVID-19 on the Chinese aviation reached a peak in the week starting February 17, 2020, with flight numbers down by 70.8 percent."

Source: Statista



#### Airline shares fail to recover with global equity markets

"We show that while the overall equity markets have recently fully recovered, airline share prices have

specialise in short-haul and domestic flights."

Source: Fidelity International



### Border openings and uniformity crucial to airline recovery

"Reopening borders is one of the most urgent concerns for airlines as they grapple with the COVID-19 crisis—not just to ensure immediate survival, but also as an essential ingredient for long-term..."

Source: Aviation Week

### AIR TRAVEL



### How COVID-19 has enhanced the need for One ID

"With the COVID-19 crisis, passengers' concerns and demands are changing. According to a recent IATA COVID-19 Passenger Survey, once the pandemic has subsided and it has been declared safe to travel, 84 per cent of travellers would feel safer having touchless processing throughout the airport. This is complemented by 65 per cent of travellers being extremely concerned or somewhat concerned by handing over their passport/phone/boarding pass to airport officials. To reflect this and help contribute towards government-imposed travel restrictions being lifted, passenger confidence in air travel returning and the safe restart of aviation, IATA – through its One ID initiative"

Source: International Airport Review

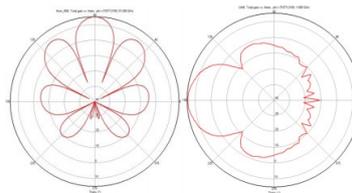
### No holidays for the sick: functions and powers of aviation regulators during COVID-19 pandemic

"In the midst of the COVID-19 pandemic and in a move to boost economic activity through medical tourism in Malaysia, the government has announced that it will partially reopen Malaysia's borders to medical tourists from designated green zone

study used the fuzzy delphi and decision making trial and evaluation laboratory methods to explore and analyze key factors for passengers choosing low-cost airlines. We considered passengers using U Airlines to travel from Shanghai to Taiwan (Taoyuan, Kaohsiung Far) and investigated service quality, low-price strategies, switching costs, and boarding willingness factors. We found that boarding willingness and service quality were strongly relevant to passenger satisfaction. Service quality should be prioritized, followed by switching cost, to enhance passenger boarding willingness. Low-cost regional airlines need to prioritize improving service quality empathy and service quality responsiveness with limited resources. Performance indicators such as willingness, service quality assurance, and service quality reliability showed significant benefits for overall service performance and passenger boarding willingness."

Source: MDPI

### COMMUNICATION SYSTEMS



### Channel modeling and tropospheric effects on millimeter wave communications for aviation applications

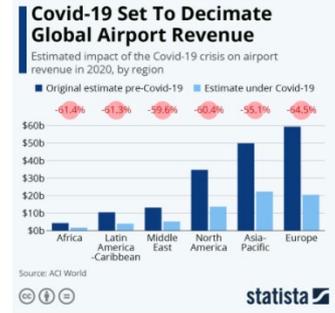
"Next generation communication systems will be designed to be faster, more secure and easier to connect with than current systems. Along with the concept of internet of things (IoT), many more devices will be required to communicate with each other. In the case of aeronautical vehicles and systems, in addition to current navigation and surveillance systems, more data links will be required for multiple applications, such as photography, inspections, and entertainment. Current aviation frequency bands will likely be unable to support all proposed services. Apart from air-to-ground (AG) communication links, airport surface terrestrial links and satellite-to-air links (SA) are also of research interest."

Source: Scholar Commons

barely risen from the low point in March."

Source: IATA

### AIRPORTS



### Covid-19 set to decimate global airport revenue

"The collapse of passenger numbers has now led to revenue from passenger and aircraft-related charges as well as ancillary aviation-related services such as ground-handling evaporating. That is set to have far reaching consequences for airports, especially given levels of uncertainty regarding the recovery trajectory of global air traffic."

Source: Statista

### How airports can sustain the COVID-19 crisis and thrive beyond it

"This whitepaper talks about a COVID-19 aligned business transformation journey for airports over the coming months and years. This journey includes the phases of sustain, strategise and transform. Find out more about how shifting the business resiliency framework for survival can help airports identify opportunities for cost containment; repurposing them for business continuity and future needs."

Source: International Airport Review

### MARKET



### Effects of Novel Coronavirus (COVID-19) on civil aviation: Economic Impact Analysis

"The latest estimates indicate that the possible COVID-19 impact on world scheduled passenger traffic

countries (eg, Brunei, Singapore, South Korea, Japan, Australia and New Zealand), allowing them to fly in via commercial or chartered flights." Source: International Law Office

## Touchless check-in kiosks are trialled at Tokyo Haneda Airport

"Japan Airlines is to test touchless check-in kiosks at Tokyo Haneda Airport in a bid to help passengers abide by COVID-19 preventative guidelines."

Source: International Airport Review

## TECHNOLOGY INNOVATION



## A new single-engine plane was designed to be so efficient it can make flying private cost the same as a commercial airline

"Otto Aviation's newest aircraft doesn't look like your average private plane but that's exactly why it's set to disrupt the industry and make private flying more accessible to the masses — if it can live up to its promises. The Celera 500L boasts incredible performance capabilities that are nearly unbelievable upon the first review and make it unlike even the most efficient aircraft currently roaming the skies ... If you can get past its looks, the Celera 500L is a great deal for private flyers at a cost of only \$328 per hour, which would make it among the cheapest private charter aircraft on the market."

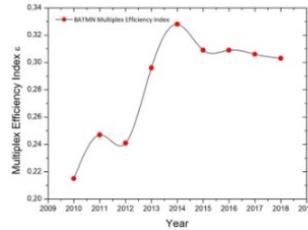
Source: Business Insider



## Honeywell expands navigation offerings

"Honeywell is introducing the HGuide n380, a new inertial navigation system that communicates position, orientation and velocity of an object — such as an autonomous vehicle or unmanned aerial vehicle (UAV) — even when global navigation satellite signals are unavailable. Smaller, lighter and lower-priced than previous Honeywell inertial navigation systems, the HGuide n380 is built using

## SYSTEMS AND NETWORKS



## The Multiplex Efficiency Index: unveiling the Brazilian air transportation multiplex network

"Modern society is increasingly massively connected, reflecting an omnipresent tendency to organize social, economic, and technological structures in complex networks. Recently, with the advent of the so-called multiplex networks, new concepts and tools were necessary to better understand the characteristics of this type of system, as well as to analyze and quantify its performance and efficiency. The concept of diversity in multiplex networks is a striking example of this intrinsically interdisciplinary effort to better understand the nature of complex networks. In this work, we introduce the Multiplex Efficiency Index, which allows quantifying the temporal evolution of connectivity diversity, particularly when the number of layers of the multiplex network varies over time. Using data related to air passenger transportation in Brazil we investigate, through the new index, how the Brazilian air transportation network has been changing over the years due to the privatization processes of airports and mergers of airlines in Brazil. Besides that, we show how the Multiplex Efficiency Index is able to quantify fluctuations in network efficiency in a non-biased way, limiting its values between 0 and 1, taking into account the number of layers in the multiplex structure. We believe that the proposed index is of great value for the evaluation of the performance of any multiplex network, and to analyze, in a quantitative way, its temporal evolution independently of the variation in the number of layers."

Source: Nature Scientific Reports

## Multi-Fault Diagnosis Approach Based on Updated Interacting Multiple Model for Aviation Hydraulic Actuator

"The aviation hydraulic actuator (HA) is a key component of the flight control system in an aircraft. It is necessary to consider the occurrence of multiple faults under harsh conditions during a flight. This study designs a multi-fault diagnosis

compared to Baseline... The actual impacts will depend on duration and magnitude of the outbreak and containment measures, the degree of consumer confidence for air travel, and economic conditions"

Source: ICAO

## Global airline IT market analysis & forecast to 2025: Covid-19 - Impact on Aviation Industry / Impact on Airline IT / Current State of Airlines

"Key Issues Addressed:

What is the current market for airline information technology, and how will it change by 2025?

What are the various segments making up the airline IT market? How much does each segment contribute to the overall airline IT market and how will the composition change by 2025?

What are the major digital trends on which airlines are focusing on? How do airlines plan to solve their pain points by using digital technologies?

Who are the key solution providers in the market, and how are they responding to the new trends in the airline industry?

Who are the disruptors in this area, and how will they impact the current market for the incumbent solutions providers?."

Source: Research and Markets

## Aviation Lubricants Market worth \$2.9 billion by 2025 - Exclusive Report by MarketsandMarkets™

"According to the new market research report "Aviation Lubricants Market by Type (Hydraulic Fluid, Engine Oil, Grease, Special Lubricants & Additives), End User (OEM, Aftermarket), Technology (Mineral-Based, Synthetic), Application, Platform, and Region - Global Forecast to 2025", published by MarketsandMarkets™, the Aviation Lubricants Market size is projected to grow from an estimated USD 2.0 billion in 2020 to USD 2.9 billion by 2025, at a CAGR of 7.2% during the forecast period. The increase in aircraft orders, passenger traffic, and military spending are some of the key factors driving the aviation lubricants market. The rising demand for the aircraft to operate efficiently at extreme conditions of temperature and pressure is driving the aviation lubricants market."

Source: PR Newswire

## REVIEW

## Regional Briefing - Asia Pacific - August 2020

Honeywell's rigorous design standards to withstand harsh environments in the air, on land or at sea."

Source: Air Traffic Management



### **I tried microsoft's flight simulator. The earth never seemed so real.**

"Microsoft's latest version of Flight Simulator is so realistic that it suggests a new way of understanding the digital world."

Source: New York Times



### **Europe, china agree to streamline aviation product approvals**

"The EU and China have brought into effect a new agreement aimed at harmonizing product approval regulations and enhancing safety in the civil aviation sector."

Source: Aviation Week



### **Otto aviation hopes to torpedo the business jet market with its curious new design. Will it sink or swim?**

"Otto Aviation is looking for investors to advance its unconventional "Celera" business aircraft from a prototype to a production airplane built in the thousands. The media attention the company has garnered since formally unveiling the Celera 500L last week is no doubt pleasing. But with the spotlight comes scrutiny and the questions that all startup aviation manufacturers face. The answers often determine whether a new effort even reaches the market. In Otto's case the mere appearance of the Celera with its bulbous fuselage, pusher propeller and short, thin wing, leads to questions."

Source: Forbes

method based on the updated interacting multiple model (UIMM). The correspondence between the failure modes and the key physical parameters of HA is found by analyzing the fault mode and mechanism. The key physical parameters of HA can be estimated by employing a series of extended Kalman filters (EKF) related to the different modes of HA. The models in UIMM are updated once the fault is determined. UIMM can reduce the number of fault models and avoid combinatorial explosion in the case of multiple faults. Simulation results indicate that the multi-fault diagnosis method based on UIMM is effective for multi-fault diagnosis of electro-hydraulic servo actuation system."

Source: MDPI

## **SUSTAINABLE ENERGY**



### **Bio-Based Cycloalkanes: The missing link to High-Performance Sustainable Jet Fuels**

"The development of sustainable energy solutions that reduce global carbon emissions, while maintaining high living standards, is one of the grand challenges of the current century ... This work is intended to inspire other researchers to study the conversion of sustainable feedstocks to full-performance aviation fuels. An acceleration of this research is critical to reducing the carbon footprint of commercial and military aviation on a timescale that will help blunt the impacts of global warming."

Source: Chemistry Europe

## **RENEWABLE ENERGY**

### **Performance and emissions of drop-in aviation biofuels in a lab scale gas turbine combustor**

"There is a growing need for drop-in biofuels for gas turbines for enhanced energy security and sustainability. Several fuels are currently being developed and tested to reduce dependency on fossil fuels while maintaining performance, particularly in the aviation industry. In this study the performance and emissions of four different aviation drop-in biofuels was evaluated. They include: UOP HEFA-SPK, Gevo ATJ,

"A summary of the latest available data and current issues across a number of key economic, market and industry variables in Asia Pacific."

Source: IATA



## With ultralight lithium-sulfur batteries, electric airplanes could finally take off

“Electric aircraft are all the rage, with prototypes in development in every size from delivery drones to passenger aircraft. But the technology has yet to take off, and for one reason: lack of a suitable battery... Lithium sulfur is also capable of providing the required levels of power and durability needed for aviation, and, most important, it is safe enough...The new technology has been a long time coming, but the wait is now over. “

Source: IEEE Spectrum



## Boeing discloses new flaw with 787 Dreamliner jet as problems mount

“The problems at Boeing continue to mount. The company disclosed a new problem with the manufacturing of its 787 Dreamliner that will put a further crimp in its aircraft deliveries.

Boeing announced Tuesday a second problem with the 787, this one affecting its horizontal stabiliser on planes that have yet to be delivered. Last month the company grounded eight planes over a problem with the joining of parts of the 787's fuselage.

The flaw is yet another blow to Boeing, which has already been unable to make deliveries of its best-selling plane, the 737 Max, for the past 18 months.”

Source: 9News

## SYSTEMS



## Guide to Self-Service Technologies

Amyris Farnesane, and SB-JP-8. These aviation biofuels are currently being produced and tested to be ready for full or partial drop-in fuels as the replacement of traditional jet fuels. The characteristic performance of each fuel from the pre-vaporized liquid fuels was performed in a high intensity (20 MW/m<sup>3</sup>-atm) reverse flow combustor. The NO emissions showed near unity ppm levels for each of the fuels examined with a minimum at an equivalence ratio of ~0.6, while CO levels were in the range of 1000-1300 ppm depending on the fuel at an equivalence ratio between 0.75-0.8. For an equivalence ratio range between 0.4 and 0.6, NO and CO emissions remained very low (between 1-2ppm NO and 2400-2900ppm CO) depending on the fuel. The examined biofuels did not show any instability over a wide range of equivalence ratios from lean to near stoichiometric condition. These results provide the behavior of these drop-in aviation biofuels for use in high intensity gas turbine combustors providing stability and cleaner performance without any modification to the combustor design.”

Source: The American Society of Mechanical Engineering

## Production of Biojet fuel from waste raw materials

“This chapter reviews the use of waste raw materials to produce biojet fuel. There are three main waste feedstocks: triglyceride-containing materials, lignocellulosic, and sugar and starchy. The chapter discusses the conversion of waste triglycerides through hydroprocessing and presents the transformation of lignocellulosic residues, through different technologies, to produce renewable aviation fuel. It shows the production of biojet fuel from sugar and starchy residues. The chapter also discusses the main challenges and future trends in the use of residues to produce aviation biofuel. Waste triglyceride feedstock includes waste cooking oil, animal fats, oil extracted from agroindustrial residues, and bio-oil obtained from pyrolysis. Waste lignocellulosic feedstock includes wood waste, agricultural residues, textile residues, solid urban waste, among others. Lignocellulosic materials such as agricultural wastes are attractive feedstock for biojet fuel production, since they are abundant and renewable.”

Source: Wiley Online Library

"With passenger concern high in regard to the risk of contracting COVID-19 when travelling through an airport, touchless and self-service technologies will be in high demand during the coming months. This Guide to Self-Service Technologies offers a variety of expert opinions and case studies on how self service can easily become the new normal"

Source: International Airport Review

## MARKET

### Changes in the balance of power are upending aviation

"Fee reductions across the aviation industry expose how the pandemic is shifting the balance of power between airlines, airports and passengers. As so often, budget carriers may emerge alongside consumers as the winners."

Source: Wall Street Journal

### The world's top 10 airline stocks all chinese, apart from one

"Chinese carriers are in a sweet spot, relative to their Covid-battered peers at least."

Source: Bloomberg

## ECONOMIC DEVELOPMENT & IMPACT

### China Focus: China's recovering civil aviation sector creates opportunities globally

"China's recovering civil aviation industry is generating new opportunities for global players amid the country's resilient economy and push for wider opening-up ... Leading the global air traffic recovery, China's reviving civil aviation industry is fostering new business opportunities for the global market and industry players."

Source: XinhuaNET

## ENVIRONMENT



### Aviation a smaller contributor to climate change than previously thought

"Aviation has a smaller impact on climate change than previously thought but it's also growing rapidly and its effects are more complex than other contributors according to a new study. A team of European climate

## ENVIRONMENT



### Impacts of aviation emissions on near-airport residential air quality

"Impacts of aviation emissions on air quality in and around residences near airports remain underexamined. We measured gases (CO, CO<sub>2</sub>, NO, and NO<sub>2</sub>) and particles (black carbon, particle-bound aromatic hydrocarbons, fine particulate matter (PM<sub>2.5</sub>), and ultrafine particles (reported using particle number concentrations (PNC) as a proxy)) continuously for 1 month at a residence near the Logan International Airport, Boston. The residence was located under a flight trajectory of the most utilized runway configuration. We found that when the residence was downwind of the airport, the concentrations of all gaseous and particulate pollutants (except PM<sub>2.5</sub>) were 1.1- to 4.8-fold higher than when the residence was not downwind of the airport. Controlling for runway usage and meteorology, the impacts were highest during overhead landing operations: average PNC was 7.5-fold higher from overhead landings versus takeoffs on the closest runway. Infiltration of aviation-origin emissions resulted in indoor PNC that were comparable to ambient concentrations measured locally on roadways and near highways. In addition, ambient NO<sub>2</sub> concentrations at the residence exceeded those measured at regulatory monitoring sites in the area including near-road monitors. Our results highlight the need for further characterization of outdoor and indoor impacts of aviation emissions at the neighborhood scale to more accurately estimate residential exposures."

Source: ACS Publications

scientists has re-crunched the numbers and determined that aviation is responsible for 3.5 percent of the global warming effect that results from human activities. Previous estimates pegged the aviation contribution at about 5 percent. The new data takes into account some balancing factors in the ways that aircraft pollute."

Source: AV Web

### Can flying go green? (video)

"The aviation industry says it is going green to reduce carbon emissions and help save the planet. Justin Rowlett investigates its plans and asks whether it is promising more than it is delivering."

Source: BBC

### Key technology for mass-production of lignin-bio-aviation fuels for reducing greenhouse gas

"Technology for reducing the viscosity of lignin oil from wood wastes with a high potential for industrial applications. Potential for the mass-producing petroleum-replacing fuels and reducing greenhouse gas emissions through bio fuel"

Source: EurekAlert!

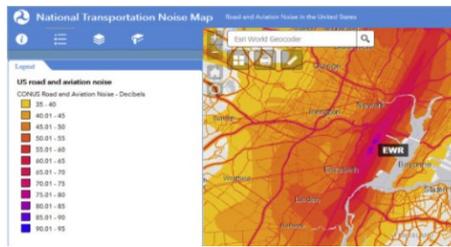
## EMPLOYMENT



### Aviation job losses could approach half-million by year's end

"The global aviation industry has racked up more than 350,000 job losses in the past six months, with more pain on the way, according to new research delving into the coronavirus pandemic's impact on the once-buoyant sector. The total could approach half a million positions after including some 25,000 cuts that don't fit into the main categories of airlines, aerospace manufacturers and airports, and another 95,000 that are threatened but not formally announced, according to Rowland Hayler, a co-founder of consulting group Five Aero, which compiled the study."

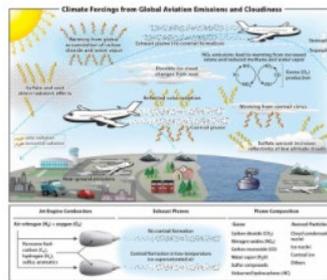
Source: Straits Times



### Residential noise exposure and health: Evidence from aviation noise and birth outcomes

"Utilizing information on exact home addresses on birth records, we exploit arguably exogenous variation in noise exposure triggered by a new Federal Aviation Administration policy called NextGen, which unintentionally increased noise levels in communities experiencing concentrated flight patterns. We examine the fetal health impact of exposure to noise levels in excess of the EPA and the WHO recommended threshold of 55 dB. We find that the likelihood of having low birth weight (LBW) babies increases by 1.6 percentage points among mothers who live close to the airport, in the direction of the runway, exposed to noise levels over the 55 dB threshold, and during the period when NextGen was more actively implemented at the airport. Our finding has important policy implications for the trade-off between flight pattern optimization and human health in light of the long-term impact of LBW on later life outcomes."

Source: Journal of Environmental Economics and Management



### The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018

"Aviation has been calculated to be 3.5 per cent of all human activities that drive climate change, new research shows. A new international study provides unprecedented calculations of the impact of aviation on the climate from 2000 to 2018 to produce the most comprehensive insight to date. The findings show that two-thirds of the impact from aviation is attributed to non-carbon dioxide emissions and the rest from CO2. The research was led by the UK's Manchester Metropolitan University, in collaboration with numerous academic and research institutions

## COVID 19



### Aviation rebound from COVID-19 is underway but full recovery may take three years

"The commercial aviation industry's rebound from COVID-19 is underway, with the number of airline flights starting to gradually increase, but widespread recovery could take several years. This is the consensus from a major industry poll conducted as part of FlightPlan: Charting a Course into the Future, an online broadcast by Inmarsat and the Airline Passenger Experience Association (APEX). Despite bracing for a slow recovery, the poll reveals a sense of optimism for the industry's future, with digitisation expected to drive the return to profitable growth."

Source: Air Traffic Management

### Singapore an early mover in restoring international aviation links

"Singapore has emerged as one of the leaders in the Asia-Pacific region in terms of easing cross-border travel restrictions imposed due to the coronavirus pandemic. The government has taken a range of steps to begin restoring traffic flows in selected markets, including negotiating travel corridors for official and long-stay workers and reducing quarantine requirements. Some transit flights via Singapore have also been allowed to resume."

Source: Centre for Aviation

### Aviation must keep fighting to keep flying post COVID-19

"An optimistic mindset, a positive outlook, a never-say-die attitude and perseverance will take us through this crisis, as this resilient industry did post 9/11, says Inderjit Singh, ICAO Airport Consultant and former CEO of Indira Gandhi International Airport."

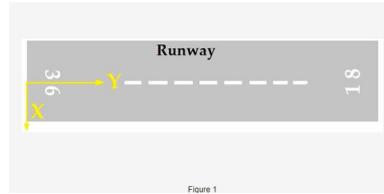
Source: International Airport Review

## REVIEW

across the globe, over the past five years"

Source: Elsevier

## SAFETY



### Improving Aviation Safety through Modeling Accident Risk Assessment of Runway

"The exponential increase in aviation activity and air traffic in recent decades has raised several public health issues. One of the critical public health concerns is runway safety and the increasing demand for airports without accidents. In addition to threatening human lives, runway accidents are often associated with severe environmental and pollution consequences. In this study, a three-step approach is used for runway risk assessment considering probability, location, and consequences of accidents through advanced statistical methods. This study proposes novel models for the implementation of these three steps in Iran. Data on runway excursion accidents were collected from several countries with similar air accident rates. The proposed models empower engineers to advance an accurate assessment of the accident probability and safety assessment of airports. For in-service airports, it is possible to assess existing runways to remove obstacles close to runways if necessary. Also, the proposed models can be used for preliminary evaluations of developing existing airports and the construction of new runways."

Source: International Journal of Environmental Research and Public Health

### A review on foreign object debris/damage (FOD) and its effects on aviation industry

"The term FOD is regularly used to depict any little thing, molecule, or garbage that doesn't have a place on an air terminal asphalt surface, and has the capacity to make mischief or harm an airplane that cruises by. By and large, FOD is related with military tasks, where it isn't unprecedented to know about 'FOD Walks.' Here, ground faculty search a zone by strolling side by side over the asphalt, halting to get the littlest of rocks or trash that may have discovered out onto the airplane activities territory. The Federal Aviation Administration (FAA) is undertaking a study to evaluate



## Are commercial aircraft production plans still too high? (podcast)

"Aviation Week editors discuss why Airbus and Boeing will need to further trim output to ride out the COVID-19 crisis."

Source: Aviation Week

## HEALTH



## Incheon becomes first Asia-Pacific airport to gain ACI Health Accreditation

"Airports Council International (ACI) Asia-Pacific has announced that Incheon International Airport (ICN) has become the first airport in the Asia-Pacific region to be accredited under the ACI Airport Health Accreditation programme. ACI's new accreditation programme assists airports by assessing the new health measures and procedures that have been introduced as a result of the COVID-19 pandemic in accordance with the International Civil Aviation Organisation's (ICAO) Council Aviation Recovery Task Force (CART) recommendations."

Source: International Airport Review

## Introducing YVR's health and safety programme, TAKEcare

"As a result of COVID-19, airports across the globe have been forced to adapt operations in order to ensure the health safety of passengers and staff. The Vancouver Airport Authority's new health and safety programme at Vancouver International Airport – TAKEcare – is working to keep passengers safe and restore confidence in travelling."

Source: International Airport Review

## UAS

numerous technologies designed to detect the Foreign Object Debris (FOD), which could have dropped on the runway. The exploration directed through this program is extremely forceful, requiring the establishment of various recognition advances at major United States air terminals, alongside a careful assessment process that evaluates execution considering the scope of climate as well as running conditions. With the information gathered from these assessments, the FAA will have the option to create execution gauges in the FOD Detection Systems. It is normal that the usage of these sorts of advancements will enormously upgrade operational wellbeing at numerous huge air terminals in the United States. The objective is focusing on the evacuation of all entities/objects that might collide with an airplane or even be ingested by an airplane's motor; an occasion that no pilot or air terminal administrator needs to occur."

Source: Science Direct/ Materials Today Proceedings

## Unsupervised Anomaly Detection in Flight Data Using Convolutional Variational Auto-Encoder

"The modern National Airspace System (NAS) is an extremely safe system and the aviation industry has experienced a steady decrease in fatalities over the years. This is in part due the airlines, manufacturers, FAA, and research institutions all continually working to improve the safety of the operations. However, the current approach for identifying vulnerabilities in NAS operations leverages domain expertise using knowledge about how the system should behave within the expected tolerances to known safety margins. This approach works well when the system has a well-defined operating condition. However, the operations in the NAS can be highly complex with various nuances that render it difficult to assess risk based on pre-defined safety vulnerabilities. Moreover, state-of-the-art machine learning models that are developed for event detection in aerospace data usually rely on supervised learning. However, in many real-world problems, such as flight safety, creating labels for the data requires specialized expertise that is time consuming and therefore largely impractical. To address this challenge, we develop a Convolutional Variational Auto-Encoder (CVAE), an unsupervised deep generative model for anomaly detection in high-dimensional time-series data. Validating on Yahoo's benchmark data as well as a case study of identifying anomalies in



## Do drones need their own network?

"Drone traffic is growing, this is nothing new. As drone traffic grows we have to consider not only the increase in the number of drones, but the types of drones and their purpose. We have hobby drones, along with enterprise drones carrying out activities such as the inspection of physical infrastructure and search and rescue activities. Then we have cargo drones. Today they are delivering small purchases and medical samples, but tomorrow with the onset of Urban Air Mobility (UAM) this cargo grows in size and aids in the movement of packages between delivery installations of organisations such as FedEx, UPS, etc. Last but not least, will be air taxis and the like that are carrying people in an autonomous fashion. That's a lot of traffic to integrate in a safe manner. The airspace is getting more and more crowded, how do we do this safely?"

Source: Air Traffic Management

## Can ATM/UTM learn from autonomous vehicles?

"ATM recently had the opportunity to speak with Auterion to learn more about their project work to leverage tools used in the world of autonomous driving that can be transitioned into aviation. More specifically drones. The idea is that the concept of vehicle-to-vehicle (V2V) communications for autonomous vehicles could be leveraged to enable drone-to-drone (D2D) communications."

Source: Air Traffic Management

commercial flights' take-offs, we show that CVAE outperforms both classic and deep learning-based approaches in precision and recall of detecting anomalies."

Source: Aerospace Journal

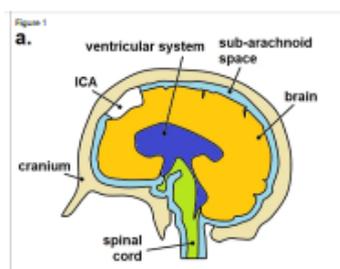
## HEALTHCARE



## You Have Control: Aviation communication application for safety-critical times in surgery

"High-risk organisations (HRO) including aviation undergo formal communication training, with emphasis on safety-critical moments. Such training is not widespread or mandatory in healthcare, and while there are many differences both share the 'human element' with circumstances leading to an increased risk of harm. In this review, we examine the concept of 'sterile cockpit', use of unambiguous terminology, callsigns, important information readback, sharing of mental models, the mini-brief, and how these may be used to reduce patient harm during safety-critical moments."

Source: Elsevier



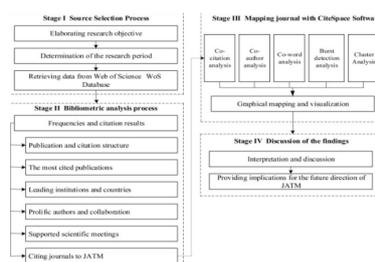
## Pneumocephalus and air travel: an experimental investigation on the effects of aircraft cabin pressure on intracranial pressure

"This study investigates the effects of aircraft cabin pressure on intracranial pressure (ICP) elevation of a pneumocephalus patient. We propose an experimental setup that simulates the intracranial hydrodynamics of a pneumocephalus patient during flight. It consists of an acrylic box (skull), air-filled balloon [intracranial air (ICA)], water-filled balloon (cerebrospinal fluid and blood) and

agarose gel (brain). The cabin was replicated using a custom-made pressure chamber. The setup can measure the rise in ICP during depressurization to levels similar to that inside the cabin at cruising altitude.  $\Delta$ ICP, i.e. the difference between mean cruising ICP and initial ICP, was found to increase with ICA volume and ROC. However,  $\Delta$ ICP was independent of the initial ICP. The largest  $\Delta$ ICP was 5 mmHg; obtained when ICA volume and ROC were 20 ml and 1,600 ft/min, respectively. The postulated ICA expansion and the subsequent increase in ICP in pneumocephalus patients during flight were successfully quantified in a laboratory setting. Based on the quantitative and qualitative analyses of the results, an ICA volume of 20 ml and initial ICP of 15 mmHg were recommended as conservative thresholds that are required for safe air travel among pneumocephalus patients. This study provides laboratory data that may be used by doctors to advise post-neurosurgical patients if they can safely fly."

Source: Nature Scientific Reports

## COVID 19



### What can we learn from the JATM literature for the future of aviation post Covid-19? - A bibliometric and visualization analysis

"This paper aims to draw lessons from retrospectively evaluating the evolution of the air transport discipline right up to the COVID-19 outbreak through the Journal of Air Transport Management (JATM), the main scholarly air transportation journal globally. As such, this study deploys a comprehensive bibliometric analysis and graphical mapping of the JATM knowledge body through CiteSpace visualization of 1483 JATM papers from 2001 to 2019. Our results suggest that while the industry has experienced pandemics and economic crises in the past, both were not dominant in influencing JATM literature neither in frequency nor in impact. That said, recovery, crisis and disruption are important key words in JATM papers not just in regard to safety and economic crisis management but increasingly also related to health concerns with recent key papers

published in the pandemic and recovery management context which may have helped the industry dealing with the current crisis as well as current JATM papers on this topic assisting with preparing for a transitioning out of COVID-19 world."  
Source: Journal of Air Transport Management

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