SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

9 January – 5 March 2021

TOPICAL REPORT

AVIATION

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AVIATION INDUSTRY

This is why Singapore needs to save its airlines and aviation sector

"Budget 2021 has adopted a more focused approach towards the most impacted sectors of the economy…Is this support justified?

As mentioned by Deputy Prime Minister and Minister of Finance Heng Swee Keat in his Budget speech on Tuesday (Feb 16), this support is to preserve the core capabilities and Singapore's position as a hub for global air travel and industries directly linked to this critical sector."

Source: Channel News Asia

A post-Covid flight path for the aviation industry

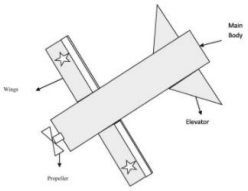
"WITH no clear end in sight of the Covid-19 pandemic, the global aviation industry is not ready to take off anytime soon.

The International Air Transport Association (IATA) has forecast that the industry will not recover to 2019 levels until 2024, a year later than previously projected."

Source: Business Times

Aviation industry suffers 'worst year in history' as COVID-19 grounds international travel

AIRCRAFT MATERIALS



Sustainable and smart metal forming manufacturing process

"The main motive of replacing or modifying the prevailing conventional manufacturing techniques into modern, smart and sustainable manufacturing like industry 4.0 is to become more competitive and to adopt customization & sustainability. Integration of industrial internet of things (IIoT) with automated supply chain has given optimized productivity, quality, and economical feasibility. This manuscript throws some light on different metal forming process, servo press application in automobile, aviation industry and different components require to make metal forming smart and sustainable in term of industry 4.0."

Source: Materials Today

Research on the development of titanium alloy recovery technology in civil aviation industry

"Aviation industry enterprises have been using titanium alloy, and the need for high-quality titanium keeps increasing, following the increase of aircraft production rate at home and abroad. Therefore, the use of residual

INSIGHT

Effects of Novel Coronavirus (COVID-19) on Civil Aviation: Economic Impact Analysis – 24 February 2021

"Executive Summary: Economic Impact in Brief • Scenario Building – Analytical consideration – Shapes of Economic Recession and Recovery – Indicative Scenarios and Paths Forward 2 • Estimated 2020 Results and Near-term Outlook: Global • Estimated 2020 Results and Near-term Outlook: Regional Breakdown – Africa – Asia/Pacific – Europe – Latin America/Caribbean – Middle East – North America • Appendix A. Overview of Early Impact B. Scenario Assumptions in Detail C. Estimated Results at Route Group Level D. Summary of Analysis by Other Organizations"

Source: ICAO

COVID-19 Air Traffic Dashboard

"The COVID-19 pandemic has profoundly impacted the operations of air carriers, airports and air navigation service providers (ANSPs). The decisions taken today, and in the months to come, will impact the future of the industry. It is imperative for States, industries and all stakeholders to have reliable information and tool to monitor and

"As international travel came to a near complete standstill in 2020 due to the COVID-19 pandemic, the aviation industry suffered what it describes as "the worst year in history for air travel demand". According to the International Air Transport Association (IATA), global passenger traffic as measured in revenue passenger kilometers declined by 65.9 percent compared to 2019, as international passenger demand dropped 75.6 percent and domestic demand fell 48.8 percent below 2019 levels."
Source: World Economic Forum

Why does aviation still have a man problem?

"Aerospace and aviation have a serious man problem. Despite support programmes, mentorships, training, resource groups, workshops, outreach efforts and other corporate initiatives that ostensibly strive to improve gender parity, men continue to drastically outnumber women in the industry.
For women, the imbalance is infuriating. For men, it should be a wake-up call."
Source: Flight Global

Build world-class aviation metropolis

"With the new dedicated facility to provide for safe business travel at the Singapore Expo (New facility opens in Changi to provide for safe business travel, Feb 19), it is now possible to consider turning Changi Airport into a world-class aviation metropolis, or aerotropolis.
Jewel Changi Airport could be an anchor component. Other components that could complement it include a monorail system or a large hospital for the international community."
Source: Straits Times

Airlines are changing their flight destinations after the devastating shock of Covid

"The sector has been severely hit by the coronavirus pandemic, with people being advised to stay at home. Lufthansa said on Thursday that it registered a 75% drop in the number of passengers between 2019 and 2020 — highlighting the devastating impact experienced by many airlines since Covid hit.
However, they are now studying ways to adjust business models as economies attempt to reopen in the coming months."
Source: CNBC

RECOVERY PLAN

titanium recovery and secondary use appears to be particularly important. This article introduces the current status of titanium alloy processing, reviews the current situation of titanium alloy recycling at home and abroad, analyzes the problems faced by the current development, as well as suggestions on the future development of titanium alloy recycling."
Source: Spie Digital Library

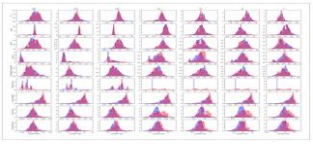
Milling Force Model for Aviation Aluminum Alloy: Academic Insight and Perspective Analysis

"Aluminum alloy is the main structural material of aircraft, launch vehicle, spaceship, and space station and is processed by milling. However, tool wear and vibration are the bottlenecks in the milling process of aviation aluminum alloy. The machining accuracy and surface quality of aluminum alloy milling depend on the cutting parameters, material mechanical properties, machine tools, and other parameters. In particular, milling force is the crucial factor to determine material removal and workpiece surface integrity."
Source: Springer Open

Numerical and experimental investigation of out-of-plane fiber waviness on the mechanical properties of composite materials

"The limited capability to predict material failure in composite materials and specifically in wavy composite layers has led to high margins of safety for the design of composite structures. Thus, the full lightweight potential of this class of materials is left unused. To understand the complex failure behavior of composite materials containing out-of-plane fiber waviness under compressive and tensile loading, a non-linear 2D material model was implemented in ABAQUS and validated with extensive experimental test data from compression and tensile tests."
Source: Springer Link

AVIATION DATA



Development of a Metric Concept that Differentiates Between Normal and Abnormal Operational Aviation Data

"There is a strong and growing interest in using the large amount of high-

assess the evolving impact of COVID-19 and leverage key indicators to make informed, data-driven decisions.
ICAO, using ADS-B Flight aware data and the ICAO Enterprise Data Management (EDM), has worked jointly with the Directorate General of Civil Aviation (DGCA) of Turkey to develop interactive dashboards to monitor four aspects of the impact of COVID-19 on civil aviation."
Source: ICAO

The Aviation Industry Leaders Report 2021

"For the fourth year running, Airline Economics and KPMG interviewed major aviation industry leaders in a series of in-depth interviews that delve deep into the impact of the global pandemic crisis on the commercial aviation industry. Airline Economics and KPMG conducted virtual interviews with more than 30 senior industry executives at leasing companies, banks and airlines, over Zoom or telephone in December 2020 and January 2021."
Source: KPMG

Aircraft Black Box Market Statistics and Research Analysis Released in Latest Industry Report 2020 | COVID19 Impact Analysis With Top Manufacturers Analysis: Garmin International, Inc., Donica Aviation Engineering Co., LTD.

"Global Aircraft Black Box Market 2020 research report presents analysis of market size, share, and growth, trends, cost structure, statistical and comprehensive data of the global market. Research reports analyses the major opportunities, CAGR, yearly growth rates to help the readers to understand the qualitative and quantitative aspects of the Global Aircraft Black Box Market. The competition landscape, company overview, financials, recent developments and long-term investments related to the Global Aircraft Black Box Market are mentioned in this report."
Source: KSU The Sentinel Newspaper

GROWTH OPPORTUNITIES IN SUSTAINABLE AVIATION FUELS & WASTEWATER TREATMENT

"This edition of the Industrial Bioprocessing TOE features information on the production of bio-jet fuel and algal oil from microalgae, development of catalytic hydrocracking technology for generation of aviation fuel from waste cooking oil, and development of catalytic graphene-based

From Light at the End of the Tunnel to Re-start: Partnering with Governments

"The International Air Transport Association (IATA) called on governments to partner with the air transport industry to devise plans to safely re-link people, business and economies when the COVID-19 epidemiological situation permits. A priority for this critical cooperation is acceleration of the establishment of global standards for vaccination and testing certification."
Source: IATA

Aviation recovery limping due to COVID-19 hurdles, but glimmer of hope persists

"The post-pandemic pathway to aviation's recovery is littered with hurdles and recovery will take several years, with domestic travel likely bouncing back faster than international travel, which largely hinges on a successful vaccination rollout globally, industry experts and sources said at an industry event March 4."
Source: S & P Global

Budget debate: S'pore's aviation sector to see some recovery this year, goal is to reopen safely, says Ong Ye Kung

"Singapore's aviation sector will see some recovery this year as some countries reopen their borders, but it will not be realistic to expect a "V-shape" rebound, said Transport Minister Ong Ye Kung."
Source: Straits Times

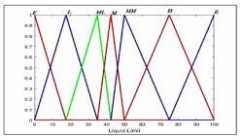
Budget 2021: Aviation sector to get S$870 million in aid this year

"Airlines and other aviation players will receive a total of S$870 million in financial support this year, as the Government continues its assistance for the beleaguered industry.
In his Budget speech on Tuesday (Feb 16), Deputy Prime Minister and Finance Minister Heng Swee Keat said the S$870 million will go towards extending aid for the sector."
Source: Channel News A

ENGINEERING

quality operational data available within an airline…The purpose of this study was to develop and test a set of metrics which can complement the current exceedance-based methods. The approach was to develop two construct variables that were designed with the aim to: (1) create an aggregate construct variable that can differentiate between normal and abnormal landings (row_mean); and (2) determine if temporal sequence patterns can be detected within the data set that can differentiate between the two landing groups (row_sequence)."
Source: Wiley Online Library

AIRFIELD MANAGEMENT



Fuzzy Knowledge Based System for Suitability of Soils in Airfield Applications

"This paper proposes a new decision-making approach for soil suitability in airfield applications without a need to perform any manual works like use of tables or chart. A fuzzy knowledge - based approach is built to rate soil suitability in qualitative terms for airfield application. The proposed model describes a new technique by defining fuzzy descriptors using triangular functions considering the index properties of soils as input parameters and fuzzy rules are generated using fuzzy operators to classify soil and rate its suitability for airfield applications. The data obtained from the results of the laboratory test are validated with the results of the fuzzy knowledge-based system indicating the applicability of the Fuzzy model created. The approach developed in this work is more skilled to other prevailing optimization models. Due to its system's flexibility, it can be suitably customized and applied to laboratory test data available, thus delivering a wide range for any geotechnical engineer."
Source: Civil Engineering Journal

Analysis of an Airport Pavement Management System during the Implementation Phase

"The study analyzes an airport pavement management system (APMS) during the implementation phase… The obtained findings concern the planning of M&R activities over the years. Depending on pre-established scenarios, the design choices are the result of the most profitable strategy among those bioreactors for conversion of lignocellulosic biomass into biofuels that can be used in the aviation industry. The TOE also features information on the use of thermo-catalytic reforming technology to convert waste cooking oil and food waste into biocrude oil, which can be further purified to obtain sustainable aviation fuels. It also features information on the integration of gasification and Fischer Tropsch refining process for conversion of wood waste into aviation and renewable diesel fuels."
Source: Frost & Sullivan

Vendors Offer New Digitized Solutions to Drive the Global Airport Security Market

"As global air passenger volume grows, enhanced airport security becomes more critical than ever. The airport security landscape is continuously evolving, creating challenges for airport operators and solution providers. The first step to mitigate a threat is to identify it, followed by deploying operational policies and technologies to minimize it. Today's airport threat landscape offers solution providers ample growth opportunities to mitigate emerging dangers such as cyber threats, sophisticated technology threats, and health threats like COVID-19."
Source: Frost & Sullivan

Global Commercial Air Traffic Management (ATM) Markets Report 2020: Rising Adoption of Automation and Digital Technologies Due to COVID-19

"The "Disruptive Technologies Drive the Growth of the Global Commercial Air Traffic Management (ATM) Market, 2020" report has been added to ResearchAndMarkets.com's offering.
Worth $3.58 billion in 2019, revenue is expected to reach $4.89 billion in 2027, at a compound annual growth rate (CAGR) of 4.0% (however, revenue trajectory will vary by segment).
This research service on the commercial ATM market encompasses communication, navigation, surveillance, automation, and simulation systems. The study covers the global market and provides an 8-year forecast. Market forecast is based on the rate at which ATM systems are adopted by various airport tiers and area control centers (ACCs)."
Source: Research & Markets

COMPENDIUM

Helping aviation take-off again

"The aviation industry is facing the biggest challenge in its history. Commentators have identified that despite this, the industry does have an unprecedented opportunity to 'bounce back greener'. However, for a sector that in its early years developed innovative technology at pace, the aviation industry today faces significant challenges industrialising innovation and introducing new products."
Source: The Engineer

SIA Engineering Unveils Engine Services Division

"Singapore-based SIA Engineering Company (SIAEC) has established a new engine MRO division initially providing quick turn shop visits and light maintenance services for CFM LEAP-1A and -1B engine.
Operating as Engine Services Division, SIAEC says the new business will focus on increasing value to its OEM partners and airline customers, enhancing its integration in the engine MRO value chain and strengthening SIAEC's engine services eco-system."
Source: Aviation Week

MSP Silver Ramp Project Earns Grand Award for Engineering Excellence

"The newest, and one of the tallest, structures at Minneapolis-St. Paul International Airport (MSP) has gained recognition for engineering and design feats that have created a modern iconic structure for the airport while greatly improving parking capacity and ground transportation services."
Source: Aviation Pros

ST Engineering Takes In First A320 For P2F Conversion

"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: Aviation Week

CYBERSECURITY

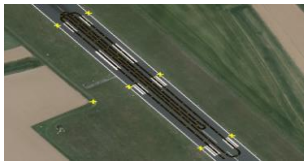
Airline data hack: hundreds of thousands of Star Alliance passengers' details stolen

technically admissible. The study highlights current limitations of the implemented APMS regarding data available."
Source: Springer Link

Environmental Impact and External Costs Associated with Hub-and-Spoke Network in Air Transport

"This paper explores the impact and external costs associated with hub-and-spoke network in air transport from an environmental perspective. With some mathematical models, we construct a hub-and-spoke network and take a quantitative study on the environmental impact of air transport. For calculating pollutant emissions, meteorological conditions were considered to revise the pollutant emission factors of the Engine Emissions Data Base (EEDB) published by International Civil Aviation Organization (ICAO)."
Source: MDPI

RUNWAY MANAGEMENT

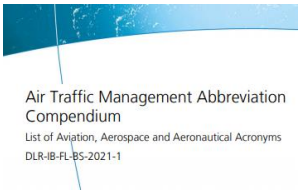


The Innovative Model of Runway Sustainable Management on Smaller Regional Airports

"Airport runways are exposed to large traffic loads and other external factors which cause their transformation. Monitoring the state of the unevenness and determining the runway defectiveness is a complex procedure which includes fast and qualitative measurements of the execution of flatness, their evaluation and the determination of the level of runway defectiveness. For this purpose, an improved process of determining airport runway defectiveness is proposed, based on geodetic survey and the management information system prototype, which enables evaluating the results of the executed survey and suggesting the runway maintenance measures."
Source: MDPI

Innovative Business Model for the Management of Airports in Purpose to Identify Runway Damage in Time

"Runways are exposed to significant burdens and other external factors that cause their deformation. Monitoring runway deformities and determining the resulting damage is a complicated procedure which requires a rapid and accurate



Air Traffic Management Abbreviation Compendium

"As in all fields of work, an unmanageable number of abbreviations are used today in aviation for terms, definitions, commands, standards and technical descriptions. This applies in general to the areas of aeronautical communication, navigation and surveillance, cockpit and air traffic control working positions, passenger and cargo transport, and all other areas of flight planning, organization and guidance. In addition, many abbreviations are used more than once or have different meanings in different languages. In order to obtain an overview of the most common abbreviations used in air traffic management, organizations like EUROCONTROL, FAA, DWD and DLR have published lists of abbreviations in the past, which have also been included in this document. In addition, abbreviations from some larger international projects related to aviation have been included to provide users with a directory as complete as possible."
Source: DLR Portal

TECHNICAL PAPER

Ecological and Energized Modules (EEMs) Safe Optical Runway, Powerful Carbon Capture and High-Quality Air System in Green & Clean Energy Airfield

"A novel air travel, airport facilities, and infrastructure system by an everywhere multipurpose and multilayer ecological & energized modules (EEMs) active system, which is aiming to the high safety & security, graceful and comfortable air travel environment, high-quality air, zero energy, zero-water-consumption, and zero-carbon with a 100% green rate, etc. It contains modular EEMs optical runways and totally-enclosed EEMs ecological modules and thin-film or silicon solar cells on the top layer. With the light processed and enhancing and optimizing crushed shadows & blown highlights and high contrast color layout system, the EEMs optical runway (contains VTOL, etc)

"Data on hundreds of thousands of airline passengers around the world has been hacked via a "highly sophisticated" attack on the IT systems operator that serves around 90% of the global aviation industry.
Sita, which serves the Star Alliance of airlines including Singapore Airlines, Lufthansa and United, said on Thursday it had been the victim of a cyber attack leading to a breach of passenger data held on its servers."
Source: The Guardian

SUSTAINABLE AVIATION

Aviation industry group is 'rethinking' its emissions pledge, pushing for even greener goals, outgoing chief says

"In an exit interview with the Post, International Air Transport Association (IATA) chief Alexandre de Juniac – whose tenure has been marked by the long-term crisis of climate change, as well as the more immediate one presented by Covid-19 – pledged changes on both fronts, including taking lessons from the ongoing coronavirus pandemic to apply to the next one."
Source: South China Morning Post

Airline CEOs urge White House support for greener aviation fuel

"The CEOs of American Airlines, United Airlines and Delta Air Lines and other airline officials met virtually with White House officials Friday to discuss tackling aviation pollution and urge U.S. support for greener aviation fuel."
Source: Channel News Asia

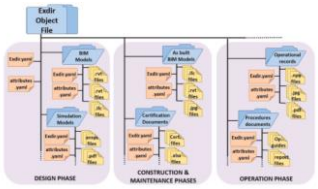
Grounded by coronavirus lockdowns, aviation mustn't be allowed to return to carbon-heavy days: Report

"Billions in financial aid have been dished out to airlines battered by Covid-19. As the world warms, governments should force the industry into decline rather than helping it back onto its feet, argues a new paper."
Source: Eco Business

UN aviation agency has an opportunity to bolster sustainable flight by adopting critical fuels criteria

"This month, the International Civil Aviation Organization, the United assessment of these deformities and evaluation of the damage they cause. In this study, an optimized process to determine this damage based on geodetic measurements was developed. A novelty of our research is a prototype model for the maintenance of smaller airport runways with an emphasis on damage detection. The model is also intended for sustainable development, as it is open source in which we can enter various data. A model and algorithm that enables tabulation and graphical display of surface anomalies were developed for the detailed analysis of the collected data."
Source: MDPI

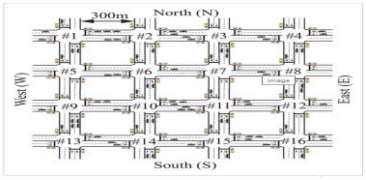
AIRPORT PAVEMENT MANAGEMENT



Opportunities in airport pavement management: Integration of BIM, the IoT and DLT

"This paper aims to explore how digitalization technologies can help to better control and supervise road pavement and refurbishments at airports. In particular, Building Information Modeling, but also the Internet of Things and Distributed Ledger Technologies, have been considered. Particular attention has been devoted to the efficiency and effectiveness of management actions involving the control and supervision of maintenance and rehabilitation of runway pavement."
Source: Elsevier

ARTIFICIAL INTELLIGENCE



Intelligent IoT systems for traffic management: A practical application

"The incorporation of Artificial Intelligence algorithms in Intelligent Transportation Systems gives rise to new opportunities for a more sustainable urban mobility. However, one of the main challenges is to decide when and where these techniques should be applied; several options appear, such as cloud computing, fog computing, edge has a powerful visual flight, runway visual range (RVR), and significant blown highlights in 3D position and posture in a variety of complex weather and occasions for instrument landing or manually land, and taxiing, etc."
Source: SAE International

FORECAST

Forecasting the Global Supersonic Business Aviation Flight Movements Up to 2050

"Business aviation is typically the primary travel mode chosen by ultra-high-net-worth (UHNW) individuals and top executives. Business aviation passengers prefer the exclusivity associated with business jets, and are typically constrained by time and not cost when traveling. Numerous studies have found that business jets are worthwhile investments for corporations to increase connectivity and boost productivity. With the resurgence of efforts to bring back supersonic civil transport in the past decade, the supersonic business jet (SSBJ) poses to create significant value as a means of transport for these time-constrained travelers. However, the demand forecast for supersonic business aviation is not well-addressed in the publicly available literature. To better understand the potential size of the supersonic business aviation market and the extent of the future supersonic business flight network, this study utilizes a unique methodology that combines top-down and bottom-up approaches to forecast global supersonic business flight movements up to 2050."
Source: Aerospace Research Central

AIR TRAFFIC MANAGEMENT MARKET - GROWTH, TRENDS, COVID-19 IMPACT, AND FORECASTS (2021 - 2026)

"Scope of the Report
Air traffic management (ATM) comprises all the systems that assist the aircraft from its departure from an airport to its landing at a destination airport, including the transit phase. Military air traffic management is included in the study, while the unmanned traffic management (UTM) is excluded from the study."
Source: Mordor Intelligence

Disruptive Technologies Transforming the Global

Nation's aviation agency, is holding its 222nd Council meeting. On the agenda: an opportunity for ICAO Council to signal its commitment to a sustainable future for aviation by adopting an expanded set of sustainability criteria for sustainable aviation fuel (SAF)."
Source: Environmental Defense Fund

How Aviation Can Rise To The Climate Change Challenge

"Aviation is one of the most amazing displays of advancement in the history of humanity. Beyond its fundamental role in the economy and the millions of jobs that it has created, the sector has provided the major benefits of opening our world and fostering cultural exchange. As a symbol of our innovation, aviation must continue to inspire pioneers who can help it evolve toward a climate-friendly industry."
Source: Aviation Week

MARKET

Exuberance over aviation stocks may be misplaced

"LOCAL aviation-related counters posted a surge in their share prices on Monday, when a third vaccine against the novel coronavirus was authorised over the weekend for use in the United States."
Source: Business Times

FACC reveals its strategy to conquer a new aviation market

"The team at aircraft interiors supplier, FACC, have been making projections about the post-pandemic aviation world, and predict that while global megatrends may permanently change the aviation industry, the market for civil passenger aircraft will continue to experience strong growth – just of a different kind, with the coming decade shaped by climate policy and environmental protection."
Source: Aircraft Interiors International

SIA Engineering Unveils Engine Services Division

"Singapore-based SIA Engineering Company (SIAEC) has established a new engine MRO division initially providing quick turn shop visits and light maintenance services for CFM LEAP-1A and -1B engine."
Source: Aviation Week

computing, or even edge devices. In this paper, an Internet of Things-based solution for smart traffic management is presented. Using the lightweight Random Early Detection for Vehicles Dynamic mechanism as a basis, we optimize using evolutionary algorithms. Random Early Detection for Vehicles Dynamic can be applied in signaled intersections to proactively detect incipient congestion and set the best cycle and phases of traffic lights."
Source: Wiley Online Library

Deep Spatio-Temporal Neural Networks for Risk Prediction and Decision Support in Aviation Operations

"In this paper, a framework is developed to build a predictive model of future aircraft trajectory that can be utilized online to assist air crews in their decision-making during approach. Flight data parameters from the approach phase between certain approach altitudes (also called gates) are utilized for training an offline model that predicts the aircraft's ground speed at future points. This model is developed by combining convolutional neural networks (CNNs) and long short-term memory (LSTM) layers."
Source: The American Society of Mechanical Engineers

Machine Learning and Natural Language Processing for Prediction of Human Factors in Aviation Incident Reports

"This study presents a methodology to identify and classify human factor categories from aviation incident reports. For feature extraction, a text pre-processing and Natural Language Processing (NLP) pipeline is developed. For data modelling, semi-supervised Label Spreading (LS) and supervised Support Vector Machine (SVM) techniques are considered. Random search and Bayesian optimization methods are applied for hyper-parameter analysis and the improvement of model performance, as measured by the Micro F1 score."
Source: MDPI

Predicting Adverse Events and their Precursors in Aviation Using Multi-Class Multiple-Instance Learning

"This work proposes using the multiple-instance learning (MIL) framework, a weakly supervised learning task, combined with carefully designed binary classifiers leveraging a Multi-Head Convolutional Neural Networks-Recurrent Neural Networks (MHCNN-RNN) architecture. The classifiers are then combined to perform a multi-class task, which enables the

Commercial Aerospace Industry Through 2035

"The commercial aerospace industry, common to its rich technology history, will be the leading edge in emerging technologies that will continue to shift its trajectory. This study is a deep dive into how the Fourth Industrial Revolution is shaping Aerospace 4.0 and transforming aerospace systems and the aftermarket landscape over the next decade."
Source: Frost & Sullivan

ST Engineering aerospace unit sees drop in full-year profit

"ST Engineering's aerospace unit remained in the black for the full year as cost cuts and government assistance offset the full impact of the coronavirus pandemic."
For the year ended 31 December, the unit generated an operating profit of S$199 million ($150 million), a decline of 37% year on year."
Source: Flight Global

Why Airline Shares Fell Today

"Airline stocks have been among the big winners so far in 2021, but Friday was not a good day for the sector.
Shares of American Airlines Group (NASDAQ: AAL), Delta Air Lines (NYSE: DAL), United Airlines Holdings (NASDAQ: UAL), Southwest Airlines (NYSE: LUV), Spirit Airlines (NYSE: SAVE), and JetBlue Airways (NASDAQ: JBLU) all fell by about 10% in early trading before recovering somewhat as the day went on."
Source: NASDAQ

JOB MARKET

Virus crisis upends hopes for aviation careers

"Companies are now shedding jobs, thousands of them. Airbus has plans to let 15,000 staff go, including 5,000 in France. Air France plans to cut 8,500 jobs. Air traffic was down two-thirds globally in 2020, according to the International Air Transport Association, and it does not expect a return to 2019 levels before 2024."
Source: Business Times

Transport Workers' Union survey finds 90% of aviation workers impacted by coronavirus

"Transport Workers' Union of Australia outlined (04-Mar-2021) the following key findings of a survey of more than 900 aviation workers, "which shows the need for Aviation Keeper, an extension to Jobkeeper for all aviation workers": 90% of aviation workers continue to be impacted by coronavirus, with 11% of respondents back to working in their jobs with normal hours; One in four remain stood down, while 33% of respondents work reduced hours;"
Source: CAPA Centre for Aviation

SIT engineering grad takes leap of faith with drone company

prediction of different adverse events for any given flight and the identification of their precursors with minimum post-processing."
Source: Aerospace Research Central

BLOCKCHAIN IN AVIATION

Building a blockchain for aviation maintenance records

"The objective of this paper was to create a proof of concept for a blockchain application in aviation world, with an emphasis on improving the aircraft maintenance traceability. It is well known that aviation industry manages incredible complex systems, where failure is not an option. This industry needs blockchain technology not only for safety improvements but also for a new business model where airline companies can deliver more trust and more transparency to their customers."
Source: IOP Science

CYBERSECURITY

Intelligent Cyber Defense in 5G Augmented Aviation Cybersecurity Framework

"The fifth-generation mobile network (5G) is replacing the 4G LTE hardware and communication infrastructure in connecting aviation echo system, infrastructure, and technologies. The wireless connectivity upgrade promises to make data network faster expanding the aviation technological scope. 5G augmented Internet of Things (IoT), Augmented Reality (AR) and Virtual Reality (VR) provides new dimensions to integrated digital technologies. The high reliability and low latency of 5G absorption is advantageous for digital aviation. In this project we explore the cyber challenges associated with 5G and ways to mitigate the risk."
Source: Aerospace Research Central

AVIATION & THE ENVIRONMENT

"Securing a position under the SGUnited Traineeship programme, Mr Sharif is now working as a systems engineer at drone company Drone Solutions.
In what seems to be a happy accident, he has found satisfaction in an industry which he sees as being the future of aviation."
Source: Straits Times

eVTOL

EVTOL startup Joby Aviation is going public with a $6.6 billion valuation and plans to start passenger flights in 2024 — here's what we know about the company

"Joby Aviation is among the most promising startups in the electric aviation field, boasting plans for zero-emission intra-city transportation with a fleet of four-seat electric vertical takeoff and land aircraft.
Valuable partnerships with Uber and Toyota gave the firm steady funding in recent years and solidified its reputation in the field. Industry consultants and venture capitalists all gave the 11-year-old company a vote of confidence when asked to name the best electric aviation startups by Insider in January."
Source: Business Insider

Early commercial eVTOL models need safety records equal to commercial aviation

"Horizon Aircraft, the advanced aerospace engineering company that has developed the Cavorite X5, the world's first eVTOL (electric vertical take-off and landing) aircraft that can fly the majority of its mission exactly like a normal aircraft, says the early eVTOL passenger models that are used in commercial operations should have safety records equal to those in the commercial aviation sector in order to prevent accidents and fatalities."
Source: SUAS News

Tropospheric air pollution—aviation industry's case

"In this chapter, the impact of CO2 emissions from a specific industry, aviation, is detailed together with monitoring of CO2 by airlines. In addition, forward-looking schemes by the aviation industry, such as the European Union's Emission Trading Scheme, are presented. Technical discussions are provided related to (1) calculations of aircraft CO2 direct emissions from individual and national flights and worldwide records, and (2) an evaluation of the contribution and impact of some additions to CO2 greenhouse gases, such as of NOx and water vapor, on radiative forcing."
Source: Science Direct

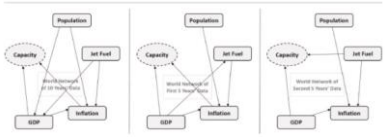
Strategic assessment of sustainable aviation fuel production technologies: Yield improvement and cost reduction opportunities

"The aviation industry has been studying strategies to produce sustainable aviation fuels (SAF) for over ten years. Our objective is to conduct detailed techno-economic analyses (TEA) of six SAF production technologies and to develop a simplified cost estimation method. Triglyceride based Hydroprocessed esters and fatty acids (HEFA) was compared against five lignocellulose-based technologies using standardized criteria."
Source: Elsevier

Role of Carbon Capture, Storage, and Utilization to Enable a Net-Zero-CO2-Emissions Aviation Sector

"A techno-economic analysis of viable scenarios for the aviation industry to achieve net-zero CO2 emissions is presented. These scenarios are based (i) on carbon capture and storage (CCS), where conventional fossil jet fuel is produced, and the corresponding emissions are offset by capturing CO2, either via direct air capture (DAC-CCS route) or via point-source capture (PSC-CCS route), and permanently storing it underground, and (ii) on carbon capture and utilization (CCU), where synthetic jet fuel is produced by using CO2 as feedstock, which is either captured from air (DAC-CCU route) or from a point-source emitter (PSC-CCU route)."
Source: ACS Publications

AVIATION NETWORK

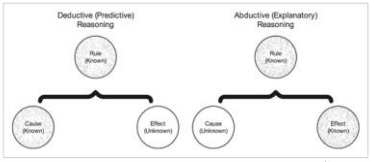


How influential factors affect aviation networks: A Bayesian network analysis

"This study is the pioneer in using Bayesian network analysis to analyze aviation networks. We identify how airport passenger and cargo volumes change with respect to different degrees of economic factors change. In addition, the Bayesian network exhibits the output in a probabilistic way to fully address the uncertainty worldwide. The findings could potentially facilitate policymakers' decisions to improve global aviation network development."

Source: Elsevier

RISK ANALYSIS IN AVIATION



When Outcomes are not Enough: An Examination of Abductive and Deductive Logical Approaches to Risk Analysis in Aviation

"This analysis argues that the underlying logic governing the traditional (and current) approaches to assess safety and risk within aviation (and other safety critical systems) is abductive and therefore focused on creating explanations rather than predictions. While the current "fly-fix-fly" approach has, and will continue to be, instrumental in improving what (clearly) fails, alternative methods are needed to determine if a specific operation is more or less risky than others."

Source: Wiley Online Library

Creating Formal Characterizations of Routine Contingency Management in Commercial Aviation

"The identification, modelling, and analysis of root causes of accidents and incidents dominate conventional safety management approaches. However, the effect of humans' safety-producing behavior on the overall resilience of the system is often neglected. Additionally, emerging aviation markets are giving rise to concepts of operation, such as urban air mobility and optionally piloted air cargo operations, that are leading to a shift in locus of control between humans and automation. Without an

understanding of the human contribution to safety, it is difficult to assess the effects of these novel role allocations on overall system safety. In this work, safety-producing behaviors are identified and abstracted into resilient performance strategies."
Source: Aerospace Research Central

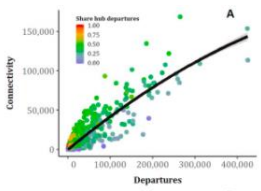
A Concept of Operations (ConOps) of an In-time Aviation Safety Management System (IASMS) for Advanced Air Mobility (AAM)

"The National Academies provided a vision for transformation of the future airspace system for Advanced Air Mobility (AAM) which is an In-time Aviation Safety Management System (IASMS). The IASMS integrates safety assurance, which is the foundation for In-time System-wide Safety Assurance (ISSA), with traditional risk management. The IASMS and its distributed architecture scales in relation to innovations in the Unmanned Aircraft System (UAS) and an increasingly complex AAM ecosystem comprised of an expanding mix of small UAS, air taxis, traditional operations, new supersonic aircraft, and space launch systems."
Source: Aerospace Research Central

Neural network-based probability forecasting method of aviation safety

"Aviation safety forecasting is of great significance for accident prevention. At present, aviation safety forecasting is mainly deterministic forecasting, ignoring the impact of various uncertainties on forecasting. In this paper, on the basis of deterministic forecasting, the forecasting of aviation safety probability is carried out based on the uncertainty of neural network point forecasting value. The uncertainty of aviation safety forecasting is described by three ideas: the numerical statistical characteristics of point forecasting value, the probability density fitting of point forecasting value and the distribution of error."
Source: IOPScience

AVIATION MARKET



The economic impact of aviation: A review on the role of market access

"In this paper, we use a New Economic Geography approach to comprehensively describe the

impact mechanisms. We then apply this theoretical framework to an empirical study of metrics of air transport supply, which policymakers and researchers can use to assess how well airports and their surrounding regions are connected by means of the air transport network. The results of our analysis can inform scholars and policymakers on how air transport can shape economic geography and the productivity of economic systems. The results might also provide guidance for future empirical work on the wider economic impacts of air transportation."
Source: Elsevier

The growing influence of low-cost carriers in Northeast Asia and its implications for a regional single aviation market

"This paper provides an overview of the development of the low-cost carrier (LCC) sector in China, Japan, and South Korea. It is the first paper that documents LCC contributions to the passenger traffic and cheaper fares in Northeast Asia (NEA)'s intra-markets. We argue that a single aviation market can facilitate the growth of the LCC sector, which in turn will make a significant contribution to the NEA connectivity, mobility, and integration."
Source: Journal of Air Transport Management

AIR TRAFFIC NETWORK

Control and Optimization of Air Traffic Networks

"The air transportation system connects the world through the transport of goods and people. However, operational inefficiencies such as flight delays and cancellations are prevalent, resulting in economic and environmental impacts. In the first part of this article, we review recent advances in using network analysis techniques to model the interdependencies observed in the air transportation system and to understand the role of airports in connecting populations, serving air traffic demand, and spreading delays. In the second part, we present some of our recent work on using operational data to build dynamical system models of air traffic delay networks."
Source: Annual Review of Control, Robotics and Autonomous Systems

Environmental Impact and External Costs Associated with

Hub-and-Spoke Network in Air Transport

"Under the background of economic globalization, the air transport industry developed rapidly. It turns out that the city-to-city network has not been able to adapt well to the development of the society, and the hub-and-spoke network came into being. The hub-and-spoke network demonstrates the advantages of reducing the operating costs of airlines to keep a competitive advantage, and by maintaining the interests of airlines in the rapidly developing context... For calculating pollutant emissions, meteorological conditions were considered to revise the pollutant emission factors of the Engine Emissions Data Base (EEDB) published by International Civil Aviation Organization (ICAO)."

Source: MDPI

Multidisciplinary and Multi-Objective Optimization Considering Aircraft Program Cost and Airline Network

"Aerial network routes and their flight frequencies are crucial for the strategic planning of airlines, which must choose optimum airplane types to improve revenue and/or reduce operating costs. In addition, aircraft manufacturers need to identify airplane configurations that better suit airline operations and establish list prices for their products as well as calculate the production and development costs of their products. To address these issues, the present study describes and applies a methodology to determine the optimal aerial transport network simultaneously with the identification of the optimum fleet for that network, namely, an integrated design."

Source: Aeropsace Research Central

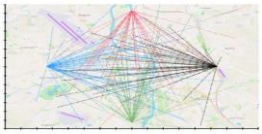
URBAN AIR MOBILITY

A Traffic Demand Analysis Method for Urban Air Mobility

"This paper explores the addressable market for Urban Air Mobility (UAM) as a multi-modal alternative in a community. To justify public investment, UAM must serve urban mobility by carrying a significant portion of urban traffic. We develop a traffic demand analysis method to estimate the maximum number of people that can benefit from UAM, for a given use case, in a metropolitan region."

Source: IEEE Xplore

UTM



Efficiency and Fairness in Unmanned Air Traffic Flow Management

"Our work considers the fairness of delay assignment in the context of UTFM. To this end, we formulate the UTFM problem with fairness and show through computational experiments that significant improvements in fairness can be attained at little cost to system efficiency. We demonstrate that when operators are not aligned in how they perceive or value fairness, there is a decrease in the overall fairness of the solution."

Source: IEEE Xplore

Sensors and Communication Simulation for Unmanned Traffic Management

"Unmanned traffic management (UTM) systems will become a key enabler to the future drone market ecosystem, enabling the safe concurrent operation of both manned and unmanned aircrafts. Currently, these systems are usually tested by performing real scenarios that are costly, limited, hardly scalable, and poorly repeatable. As a solution, in this paper we propose an agent-based simulation platform, implemented through a micro service architecture, which may simulate UTM information sources, such as flight plans, telemetry messages, or tracks from a surveillance network."

Source: MDPI