Excel ENGINEERING COLLEGE (AUTONOMOUS)

# WISPERS OF THE WIND

UNVEILING THE SECRETS OF THE SKY.

MAGAZINE ARHAKRZ

2023-24

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## WHERE INNOVATION REDEFINES ALTITUDE.

AERONAUTICAL DEPARTMENT

UNVEILING THE SECRETS OF THE SKY.

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Messages

## CHAIRMAN'S MESSAGE

The field of aeronautics is constantly evolving, demanding a relentless pursuit of knowledge and a commitment to pushing the boundaries of what is possible. I am consistently impressed by the pioneering research, the groundbreaking projects, and the unwavering passion displayed by our faculty and students. You are not only shaping the future of aviation but also inspiring the next generation of engineers and leaders.

I encourage you to continue fostering a culture of collaboration, innovation, and intellectual curiosity. Embrace new technologies, explore emerging trends, and never cease to challenge yourselves. The future of aeronautics is bright, and I am confident that the Aeronautical Department will continue to play a pivotal role in shaping it.

**Dr. A K Natesan**
**Chairman**

## VICE-CHAIRMAN'S MESSAGE

**Dr. N. Mathan Karthik**
**Vice- Chairman**

I am thrilled to extend my warmest greetings to each and every one of you. As we continue to navigate the complexities of the aerospace industry, I am reminded of the incredible talent, dedication, and passion that defines our department.

As we move forward, I encourage you to remain curious, to question the status quo, and to push the boundaries of what is possible. The aerospace industry is rapidly evolving, and it is our responsibility to stay at the forefront of this revolution.

## PRINCIPAL'S MESSAGE

"Dear Faculty and Students of the Aeronautical Department,

I hope this message finds you well. As we continue to strive for excellence in engineering education, I wanted to take a moment to express my appreciation for the outstanding work being done in the Aeronautical Department.

Your department has consistently demonstrated a commitment to innovation, research, and student success. The cutting-edge projects, research collaborations, and industry partnerships that you have established are a testament to your dedication and expertise.

**K. Bommana Raja**
**Principal**

## HEAD OF THE DEPARTMENT'S MESSAGE

**Dr.K.Rajkumar**
**Head of the department**

I am proud of the progress we have made in recent years, and I am excited about the opportunities that lie ahead. Our department's focus on experiential learning, entrepreneurship, and community engagement has not only enhanced our students' learning experience but also prepared them for successful careers in the aerospace industry.

As we move forward, I encourage you to continue pushing the boundaries of innovation and excellence. Let us work together to achieve our department's strategic goals and to establish ourselves as a premier department of aeronautical engineering.

# DEPARTMENT OF AERONAUTICAL ENGINEERING

## VISION

*TO EMPOWER THE STUDENTS WITH SUBJECT KNOWLEDGE OF AERONAUTICAL ENGINEERING FOR SERVING THE SOCIETY IN A CHALLENGING GLOBAL ENVIRONMENT,*

## MISSION

- *TO PROVIDE QUALITY TECHNICAL EDUCATION IN TUNE WITH THE CHALLENGES. TO OFFER LATEST TECHNOLOGICAL DEVELOPMENTS IN THE FIELD OF AERONAUTICAL ENGINEERING.*

- *TO INTEGRATE THE INTELLECTUAL,SPIRITUAL,ETHICAL AND SOCIETY DEVELOPMENT OF THE STUDENTS FOR BECOMING DYNAMIC AEROATUICAL ENGINEERS.*

- *TO INITIATE DESIRES FOR UNDERTAKING ENTERPRENEURSHIP AND LIFELONG LEARNING.*

# PROGRAM EDUCATIONAL OBJECTIVES (PEO's)

## PEO 1

- *Graduate will have the ability to handle industrial challemges through advanced engineering technologies.*

## PEO 2

- *graduate will have the capability to become socially, intellectually, and ethically responsible aeronautical engineers.*

## PEO 2

- *graduate experties with essential technical, managerial and soft skills that make themto be professionally competent.*

# PROGRAM SPECIFIC OITCOMES (PEO's)

## PSO 1

- *Exhibit skill and knowledge on aerodynamics, propulsion and structures*

## PSO 2

- *Solve real time problems related to aircraft manufacturing and maintanence*

## PSO 2

- *Apply CAD/CAE tools to design and analyse the aircraft components*

# TRANSFORMATIVE TRENDS IN AVIATION

# FROM AI TO ECO-FUELS: TOP 10 TRANSFORMATIVE TRENDS SHAPING THE AVIATION LANDSCAPE IN 2024

08 Wed 2023

airsiders

**The aviation industry is a dynamic, ever-evolving sphere, constantly adapting to meet the demands of an increasingly global and interconnected world. As we move towards 2024, the industry is gearing up for significant transformations that will redefine how we travel, conduct business, and connect with one another. These shifts are powered by advancements in technology, changing geopolitical landscapes, and a renewed emphasis on sustainability.**

**In this article, we'll take a deep dive into the ten biggest trends set to reshape the aviation industry in 2024. We'll explore the rise of sustainable aviation fuels, the impact of geopolitical disruptions, the shift from air to rail, the potential global recession, and the role of artificial intelligence. We'll also delve into advanced air traffic management, the burgeoning Asian market, personalized passenger experiences, health and safety measures in the post-Covid era, and the exciting prospects of drone delivery and urban air mobility.**

## 1. Sustainable Airline Fuels (SAF) and Bio-Fuels

SAFs have the potential to significantly reduce the carbon footprint of aviation. They are produced from sustainable resources such as waste oils and agricultural residues, offering a viable and environmentally friendly alternative to conventional jet fuels.

Airlines and airports must work together to develop the necessary infrastructure and logistics to accommodate this transition, ensuring that the switch to SAFs is both sustainable and economically viable.

The move to SAFs will also require regulatory support and incentives. Governments and aviation authorities can play a key role in facilitating this transition by providing policy frameworks and financial incentives that encourage the use of these fuels. For airlines, the switch to SAFs can offer

significant benefits such as improved public image, potential cost savings in the long term, and alignment with global environmental goals.

Moreover, the use of SAFs can help airlines attract eco-conscious customers, who are increasingly considering the environmental impact of their travel choices. By offering greener travel options, airlines can differentiate themselves in a competitive market and enhance their customer appeal.

**Challenges and Possible Solutions**

- High cost and limited availability of SAFs: Investment in SAF production and supply chain could reduce costs and increase availability.
- Regulatory barriers: Collaboration between airlines, governments, and regulatory bodies to develop supportive policie

**-Chittaluru Praveen**

## 2. Geopolitical Disruption

In an increasingly interconnected world, geopolitical disruptions can have far-reaching effects on the aviation industry. From conflicts to economic sanctions, these disruptions can lead to sudden changes in oil prices, affecting the cost of jet fuel and ultimately the pricing of fares. Airlines need to develop robust strategies to manage these risks, including hedging fuel costs and dynamically adjusting routes and schedules based on evolving geopolitical situations.

Virtual interlining offers a promising solution to these challenges. By enabling airlines to provide seamless travel across multiple carriers, virtual interlining can help airlines adapt to sudden changes in routes due to geopolitical disruptions. This flexibility not only ensures service continuity but also enhances customer satisfaction by minimizing disruptions to their travel plans.

Moreover, airlines can leverage advanced data analytics and AI to predict and respond to geopolitical disruptions. By analyzing historical data and current geopolitical trends, these technologies can help airlines forecast potential disruptions and develop proactive strategies to mitigate their impact.

**Navigating Geopolitical Challenges: Key Issues**

Development of strategies to manage risks associated with geopolitical disruptions

Adoption of virtual interlining to maintain service continuity

**Challenges and Possible Solutions**

Sudden changes in oil prices and flight routes: Leveraging data analytics and AI for predictive modeling and proactive decision-making.

By offering high-quality rail services, airlines can not only retain their customer base but also attract new customers who prefer more sustainable travel options

## 3. The Shift from Air to Rail in the EU

The trend towards rail travel in Europe is driven by both environmental concerns and government policy. Rail travel generates significantly less CO2 emissions than air travel, making it a more sustainable option for short to medium distance travel. In response, many European governments (with France leading the charge on this issue) are encouraging this shift by investing in high-speed rail networks and implementing policies that discourage short-haul flights.

While this trend presents a challenge for airlines, it also offers opportunities. Airlines can partner with rail companies to offer seamless multi-modal travel experiences, combining the speed of air travel for long distances with the environmental benefits of rail travel for shorter segments. This can enhance customer convenience while also reducing the environmental impact of travel.

In addition, airlines can leverage their expertise in logistics and customer service to diversify into the rail sector. .

-Nishanth S

**Embracing Multi-modal Travel: Key Issues**

- Partnering with rail companies to offer seamless multi-modal travel experiences
- Leveraging airline expertise to diversify into rail sector

**Challenges and Possible Solutions:**

- Reduced demand for short-haul flights: Development of hybrid models combining air and rail travel for optimal efficiency and sustainability.

## 4. Economic Headwinds

The potential for a global recession presents significant challenges for the aviation industry. Reduced consumer spending can lead to a decrease in passenger movements, impacting airline revenues. In response, airlines need to develop flexible business models that can adapt to changing economic conditions. This includes offering more affordable travel options, optimizing routes based on demand, and finding ways to reduce operational costs.

In uncertain economic times, customer loyalty becomes even more important. Airlines need to focus on enhancing the customer experience, from booking to arrival, to ensure customer retention. This includes offering flexible booking options, providing exceptional customer service, and leveraging technology to streamline the travel process.

Moreover, airlines can explore new revenue streams to mitigate the impact of reduced passenger movements. This includes ancillary services such as in-flight entertainment and connectivity, premium seating options, and personalized services. By diversifying their revenue streams, airlines can better weather economic downturns and ensure long-term sustainability.

**Adapting to Economic Uncertainties: Key Issues**

- Development of flexible business models to adapt to changing economic conditions
- Focus on enhancing customer experience to ensure customer retention

**Challenges and Possible Solutions**

- Decrease in passenger movements and airline revenues: Diversification of revenue streams through ancillary services and partnerships.

## 5. Artificial Intelligence (AI) and Automation

AI and automation are transforming the aviation industry, offering numerous benefits including operational efficiency, cost savings, and improved customer experience. In aircraft maintenance, predictive analytics can help identify potential issues before they become major problems, reducing downtime and maintenance costs. In baggage handling, automation can speed up processing times and reduce the risk of lost or delayed baggage.

In customer service, AI can provide personalized experiences based on customer preferences and behaviors. This could include personalized marketing offers, tailored in-flight services, and dynamic pricing. By providing a more personalized service, airlines can enhance customer satisfaction and loyalty, driving increased revenues.
Moreover, AI can help airlines optimize their operations and decision-making. From dynamic route planning to demand forecasting, AI can provide valuable insights that enable airlines to operate more efficiently and effectively. As the technology continues to evolve, the possibilities for AI in aviation are virtually limitless.

**Leveraging AI for Operational Efficiency: Key Issues:**

- Use of predictive analytics for aircraft maintenance
- Automation of baggage handling processes

**Challenges and Possible Solutions**

- High upfront investment in AI technology: Exploration of partnership models or phased implementation to manage costs.
- Privacy concerns: Adoption of robust data governance practices to ensure privacy compliance and build customer trust.

## 6. Advanced Air Traffic Management

Advancements in air traffic management technologies are set to transform airspace systems, increasing efficiency, reducing delays, and enhancing safety. AI-powered aircraft routing can optimize flight paths, reducing fuel consumption and minimizing flight times. Dynamic airspace configurations, enabled by real-time data analysis, can adapt to changing traffic conditions, ensuring efficient use of airspace. And enhanced ground operations, leveraging automation and data analytics, can streamline airport processes, reducing turnaround times and improving passenger experience.
For airlines, these advancements can improve operational efficiency, reduce costs, and enhance service reliability. By reducing delays, airlines can ensure more on-time arrivals, enhancing customer satisfaction and loyalty. Furthermore, efficient air traffic management can enable more flights without requiring additional infrastructure, supporting growth without significant capital investment.
For airports, advanced air traffic management can enhance capacity and throughput, enabling them to handle more flights without compromising safety or efficiency. This can attract more airlines to the airport, driving revenue growth.
Moreover, by reducing ground delays, airports can improve the passenger experience, enhancing their reputation and competitiveness.

**Transforming Airspace Systems: Key Issues**

- AI-powered aircraft routing for optimal flight paths
- Dynamic airspace configurations for efficient use of airspace

**Challenges and Possible Solutions**

- High cost and complexity of implementing advanced technologies: Phased implementation and leveraging of partnerships to share costs and expertise.

**-Aman Arayan**

## 7. Rise of the Asian Market

Asia's growing middle class, with its increasing disposable income and appetite for travel, presents a significant opportunity for airlines and airports. Countries like China and India are seeing a surge in air travel demand, driven by economic growth and urbanization. To tap into this growing market, airlines need to understand the unique needs and preferences of Asian travelers and tailor their offerings accordingly.

However, the Asian market also presents challenges, including intense competition, regulatory hurdles, and infrastructure constraints. Success in this market requires a deep understanding of local cultures, business practices, and regulatory environments. Airlines need to build strong local partnerships and invest in market research to navigate these challenges and seize the opportunities.

Moreover, the rise of the Asian market is reshaping global aviation networks. Traditional hub airports in Europe and North America are facing competition from emerging hubs in Asia. To stay competitive, these traditional hubs need to adapt their strategies, focusing on service excellence, connectivity, and efficiency.

**Tapping into the Asian Market: Key Issues**

- Understanding the unique needs and preferences of Asian travelers
- Building local partnerships to navigate market challenges

**Challenges and Possible Solutions**

- Intense competition and regulatory hurdles: Deep market research and local partnerships to understand and navigate the market effectively.
- Virtual interlining technologies can enable smaller, regional airports to become more agile and offer additional connections and travel locations for passengers in expanding regions.


## 8. Personalized Passenger Experience

Personalization is becoming a key differentiator in the aviation industry. Thanks to advances in data analytics and AI, airlines can now understand their customers better than ever before. They can use this insight to provide personalized services and offers, enhancing customer satisfaction and loyalty.

For instance, airlines can tailor their marketing messages based on individual customer preferences and behaviors, increasing the effectiveness of their marketing efforts. They can also personalize inflight services, such as meal choices, entertainment options, and seating preferences, enhancing the travel experience.

However, personalization also raises privacy concerns. Airlines need to ensure that they handle customer data responsibly and transparently, complying with data protection regulations and respecting customer privacy. By doing so, they can build trust with their customers, which is crucial to the success of their personalization efforts.

**Enhancing Customer Experience through Personalization: Key Issues**

- Tailoring marketing messages and services based on customer preferences
- Leveraging data analytics to enhance personalization

**Challenges and Possible Solutions**

- Privacy concerns: Ensuring responsible and transparent handling of customer data to build trust and comply with regulations.

**9. Health and Safety Measures Post-Covid**

The Covid-19 pandemic has brought health and safety to the forefront of the aviation industry. Enhanced cleaning protocols, social distancing measures, and contactless technologies have become the norm, and are likely to remain so in the foreseeable future.

These measures not only protect passengers and staff, but also help to rebuild customer confidence in air travel. Airlines that prioritize health and safety can differentiate themselves from competitors and attract health-conscious travelers.

-Bhuvan

However, implementing these measures can also pose challenges, including increased operational complexity and costs. Airlines need to find ways to efficiently implement these measures without compromising operational efficiency or customer experience. This could involve leveraging technology, such as AI and automation, to streamline health and safety procedures.
Prioritizing Health and Safety: Key Issues
Implementing enhanced cleaning protocols, social distancing measures, and contactless technologies
Rebuilding customer confidence in air travel
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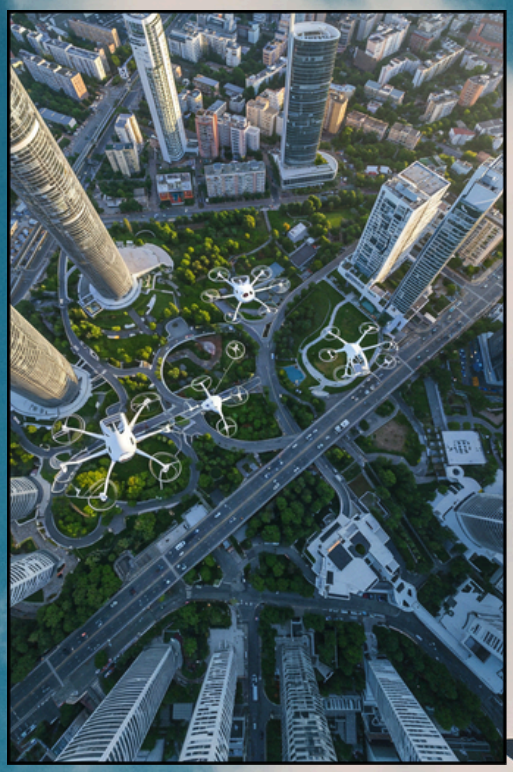
## 10. Drone Delivery and Urban Air Mobility

Drone delivery and urban air mobility are set to transform the aviation industry. Drones offer a fast and cost-effective way to deliver goods, particularly in urban areas with heavy traffic. For airlines and airports, this presents an opportunity to diversify their services and create new revenue streams.

**Harish P**



**U**rban air mobility, which involves the use of small aircraft for short-distance travel in urban areas, could also become a reality in the near future. This could transform the way people travel, offering a fast and convenient alternative to traditional ground transportation.

However, these trends also present challenges, including regulatory hurdles, safety concerns, and public acceptance. Airlines and airports need to work with regulators, technology providers, and the public to address these challenges and make drone delivery and urban air mobility a reality.

Transforming Aviation with Drones and Urban Air Mobility

- Exploring drone delivery as a new service offering
- Preparing for the emergence of urban air mobility

Challenges and Possible Solutions

- Regulatory hurdles and safety concerns: Collaborating with regulators, technology providers, and the public to address safety and regulatory challenges

**-Nikunj Kumar**
**2nd Year Aero**

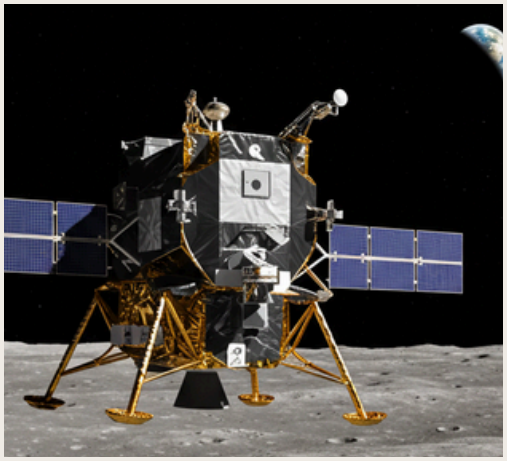

2023-24
YEAR IN REVIEW

# AEROSPACE OUTREACH

BY AMIR S. GOHARDANI

DECEMBER 2023

# A year of breaking ground: moon landings, asteroid samples and diverse spaceflight crews

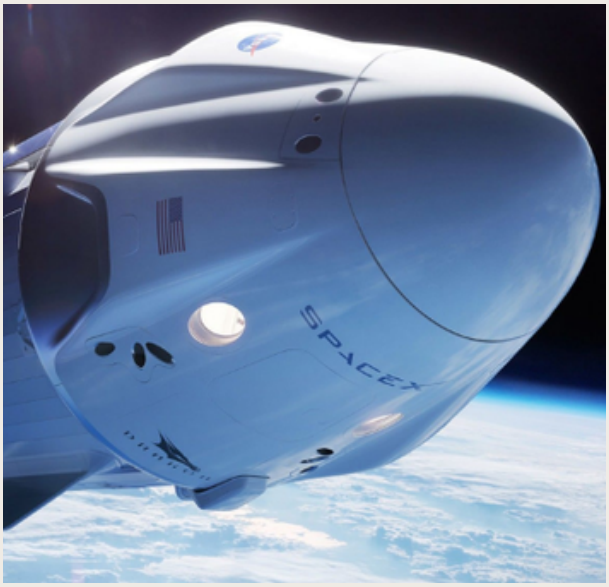


**The Society and Aerospace Technology Outreach Committee promotes the transfer and use of aerospace technology for the benefit of society.**

With many space missions in the works this year, a few made historic impact.

In April, NASA announced the crew of its **Artemis II** mission, scheduled for late 2024: NASA astronauts Victor Glover, Christina Koch and Reid Wiseman and Canadian Space Agency astronaut Jeremy Hansen. This crew contains several firsts: Glover will be the first Black astronaut to orbit the moon and Koch the first woman. Hansen will be the first Canadian astronaut to participate in a lunar mission.

In August, India's **Vikram** lander touched down near the lunar south pole for the **Chandrayaan-3** mission, making India the fourth country to land a robotic craft on the moon — the United States, China and the former Soviet Union being the first three.

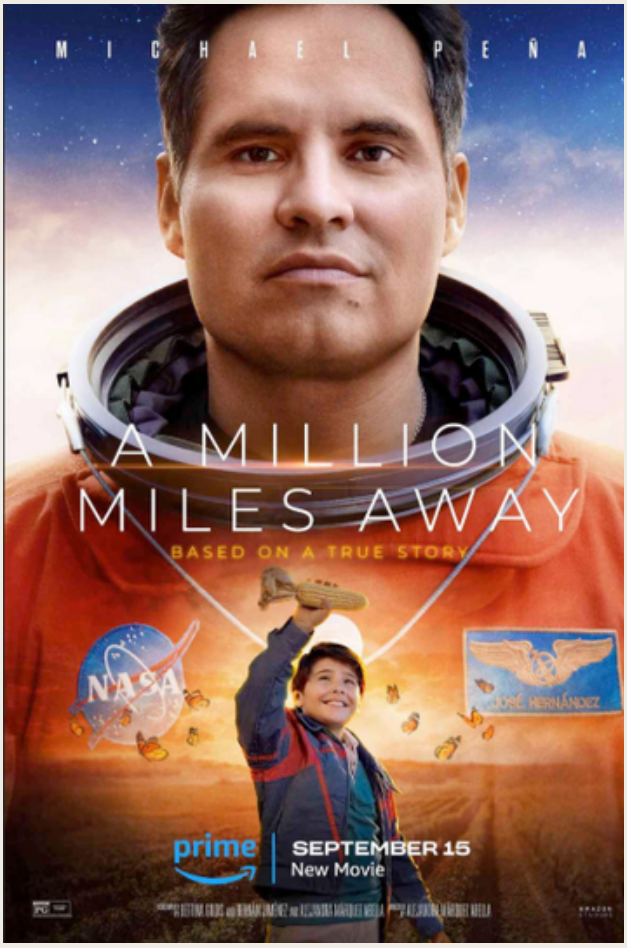



Days after the landing, a **Crew Dragon Endurance** capsule was launched toward the **International Space Station** with the most internationally diverse crew of any SpaceX launch to date. The crew consisted of mission commander Jasmin Moghbeli, a NASA astronaut; European Space Agency astronaut Andreas Mogensen; Japanese astronaut Satoshi Furukawa; and Russian cosmonaut Konstantin Borisov. The four crew members are scheduled for a six-month stay on the station.

September was an eventual month. **Frank Rubio** broke the record for the longest spaceflight by a NASA astronaut, spending 371 days aboard ISS. The previous record of 355 days was set in 2022 by Mark Vande Hei. Rubio's record was not planned. He arrived at ISS in September 2022 with two Russian cosmonauts for a six-month mission. In December, their Soyuz capsule developed a coolant leak, prompting NASA and Roscosmos to extend their stay as the leak was studied. Roscosmos later determined that a meteoroid struck the capsule and in February sent a replacement Soyuz to the station to bring the three crew members home.

Also in September, NASA's **OSIRIS-REx** spacecraft returned to Earth orbit to release a capsule filled with rocks and dust from the asteroid Bennu. That capsule touched down under parachutes at the Utah Test and Training Range, making the U.S. the second nation after Japan to collect samples from an asteroid and return them to Earth. Short for Origins, Spectral Interpretation, Resource Identification, Security-Regolith Explorer, OSIRIS-REx is an opportunity for scientists to learn more about the time when the sun and planets formed about 4.5 billion years ago. Scientists plan to study the Bennu samples for insights into how Earth acquired the ingredients that made life possible.

**NASA'S OSIRIS-REX**




A week before the OSIRIS-REx landing, Amazon Studios released **"A Million Miles,"** the story of NASA astronaut **Jose Hernandez**. Born in Mexico, Hernandez and his siblings helped his farm-working parents pick produce in the fields of the San Joaquin Valley in California. The movie tells the story of how Hernandez's dream of the stars led him to become a NASA astronaut. He applied to the program 12 times before being accepted in 2004. After completing his training in 2006, Hernandez supported space shuttle launches as a mission control capsule communicator at NASA's Kennedy Space Center in Florida. In 2009, he flew as a mission specialist aboard the space shuttle Discovery in **STS-128**, the 30th shuttle mission to ISS.

**-Rahul B Jamadar**
**2nd Year Aero**

# UAV SYSTEMS

BY MICHAEL S. FRANCIS |DECEMBER 2023

# Uncrewed and remotely piloted vehicles set records in civil and military worlds


XQ-58A VALKYRIE

The Unmanned Systems Integration Committee represents and serves the broad interests of the unmanned and robotic systems community, encompassing space, aerial, ground, surface water, underwater, and other unmanned and robotic systems, their components, and their myriad applications.

In July, a U.S. Air Force's **XQ-58A Valkyrie** demonstrator, developed by AFRL and Kratos Defense and Security Solutions, executed aerial combat tasks in flight commanded by **artificial intelligence software** — an aviation first. Its **machine learning-based algorithms**, trained over millions of datasets in a simulated environment, were developed by the **Air Force Research Laboratory** prior to the flight. The Valkyrie is a potential contender in the forthcoming **Collaborative Combat Aircraft program** announced in March by Air Force Secretary Frank Kendall. His plan would acquire and pair at least 1,000 CCAs with piloted **Next Generation Air Dominance fighters**, with development to begin in fiscal 2024. CCAs are being developed to achieve performance comparable to contemporary piloted aircraft and are expected to be significant force multipliers.

*SOLAR IMPULSE 2*

International conflicts including Russia's war on Ukraine continued to highlight the many roles for uncrewed and remotely piloted aircraft in military operations. These ranged from intelligence, surveillance, reconnaissance and targeting to lethal combat, with aircraft supplied from external partners on both sides of the conflict.

In February, **Skydweller Aero** announced it had completed the first fully autonomous flight demonstrations with its uncrewed, solar-powered aircraft. The Oklahoma company's "mega-endurance" aircraft is an optionally piloted version of the **Solar Impulse 2**, an experimental plane that in 2015 became the first aircraft to make an around-the-world flight on solar power. Upgraded with a human-rated fly-by-wire system, the aircraft flew in Spain autonomously from takeoff to landing, although a safety pilot was on board.

Small drones continued to expand their presence in domestic and international civil and commercial markets. In August, **Walmart** announced a partnership with drone developer **Wing** (an Alphabet company) to expand deliveries in the Dallas area to an additional 60,000 homes. In a September blog post, Wing said it delivers "upwards of 1,000 packages a day" with its fixed-wing, hydrogen fuel-cell-powered drones. In July, **New York City** released new regulations to increase operations of uncrewed aircraft, including drones in all five boroughs, and the state's Power Authority approved the first funding for a planned $37.2 million program to expand use of drones for infrastructure inspection.

*EH216-S*

In October, **EHang's two-seat EH216-S** became the first fully autonomous, **electric vertical takeoff and landing aircraft** to receive a type certificate. Its approval by the **Civil Aviation Administration of China** paves the way for EHang to begin commercial service, initially for aerial tourism and sightseeing.


At July's **EAA AirVenture** air show, in Oshkosh, Wisconsin, Boeing subsidiary **Wisk** flew its all-electric **Cora demonstrator**, the first public flight of an autonomous, electric vertical takeoff and landing aircraft. The emerging **advanced air mobility** market is focused on developing cost-competitive, short-range aircraft that provide alternatives to terrestrial vehicles including buses, taxis and cargo trucks. Wisk plans to begin passenger flights with uncrewed, remotely supervised air taxis in the late 2020s.

*FALCON 9*

In the space industry, **SpaceX** in November flew a **Falcon 9** booster for the 18th time, a record for the most flights by a rocket stage. The booster lofted a batch of **Starlink** satellites to orbit, then fired its retrorockets to autonomously land on the deck of the drone ship landing platform.

**-Shashikanth G Naik**
**2nd Year Aero**

# PROPULSION AND ENERGY

BY JAMES SZABO | DECEMBER 2023

## Explosive growth in electric propulsion

**The Electric Propulsion Technical Committee works to advance research, development and application of electric propulsion for satellites and spacecraft.**

As the year began, the European Space Agency's **BepiColombo spacecraft** continued toward Mercury, propelled by QinetiQ gridded ion thrusters. The power processing units were developed by Airbus-Crisa. BepiColombo was launched in 2018 and is scheduled to arrive at Mercury in 2025. Also early in 2019, a **BHT-200 Hall effect thruster, or HET**, built by Busek Co. of Massachusetts entered operational status on the FalconSat-6 satellite, launched in December 2018.

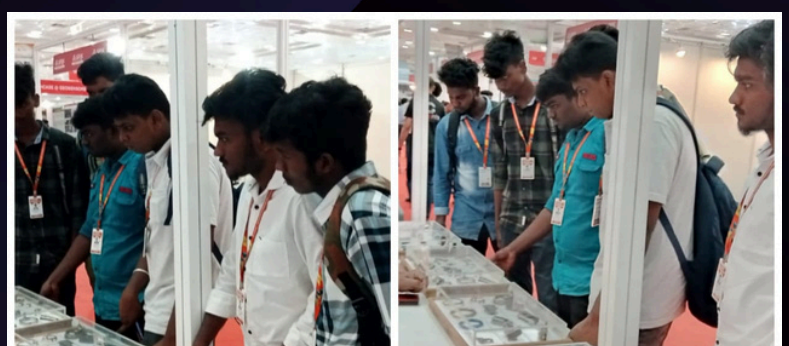

In February, four **Aerojet Rocketdyne XR-5 HET strings** were launched on Hellas-Sat. In August, another four XR-5s were launched on Advanced Extremely High Frequency-5. Arabsat 6A, launched in April, and another geostationary spacecraft launched during the year will both employ **Aerojet Rocketdyne hydrazine Arcjets** for North-South station keeping.

**-Jeevapriya.N**
**2nd Year Aero**

# GLIMPSE of AERO







# STUDENT & FACULTY corner






# ARHAKRZ MAGAZINE

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Dear Readers,

It is our pleasure to introduce the latest edition of our Aeronautical Department magazine. As we continue to push the boundaries of innovation and excellence in aeronautical engineering, this magazine serves as a platform to showcase the achievements, research, and experiences.

In this edition, we feature a range of articles that highlight the latest trends, innovations, and advancements in the field of aeronautical engineering. From the development of sustainable aviation fuels to the application of artificial intelligence in aircraft design, our authors share their insights and expertise on the topics that are shaping the future of our industry.

**FOR MORE DETAILS, PLEASE CONTACT**

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SCAN ME

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