


# KOREA AEROSPACE RESEARCH INSTITUTE





A full-page photograph of a rocket launch. A white rocket is ascending vertically from a green launch pad. A massive, billowing cloud of white smoke and steam rises behind the rocket, filling much of the upper left and center of the frame. At the base of the launch pad, a bright orange and yellow flame is visible. Three tall, slender towers with orange and white segments stand around the launch pad. The background shows a blue sea and a clear sky. In the foreground, there are green trees and some low-lying buildings.

Aerospace technology safeguards our nation.  
It drives growth, inspires innovation, and shapes tomorrow.  
KARI leads the way with cutting-edge aerospace solutions.



President's Greetings



The Korea Aerospace Research Institute (KARI) is Korea's leading national research institute specializing in aerospace science and technology, driving the growth of Korea's aerospace industry through the research and development of cutting-edge technologies.

Grounded in our commitment to innovation that shapes the future of humanity, we are expanding new frontiers while pursuing sustainable development.

Our work spans a wide range of fields—from advanced aeronautics and satellite development to space launch vehicles, deep space exploration, and the practical use of satellite data. We remain devoted to continuous research and development that enhances Korea's global competitiveness by boldly leading the advancement of next-generation technologies and actively supporting domestic industry.

KARI is also committed to cultivating future talent, expanding international cooperation, and strengthening the foundation of the national aerospace sector—so that Korea may emerge as a global leader in aerospace science and technology.

As a national research institute, we will contribute to both the environment and society through aerospace innovation, uphold the highest standards of transparency and integrity, and earn the public's trust through ethical management.

We kindly invite your continued interest and support as we rise to meet the challenges of the sky and beyond.

Thank you.

Sangchul Lee, President of the Korea Aerospace Research Institute

Mission

Contribution to sustainable development of the national economy and improved quality of life through new exploration, technology advancement, development, and dissemination in the field of aerospace science and technology



Major Functions




- Research and development of comprehensive systems and core technologies for aircraft, satellites, and space launch vehicles.
- Support for the establishment of national aerospace development policies, and distribution and dissemination of information on aerospace technology
- Collaborative utilization of test and evaluation facilities by industry, academia, and research institutions, and training of specialized personnel in key mission areas.
- Development of technology, quality certification, and bilateral certification between countries ensuring aerospace safety and quality assurance.
- Collaboration and support for related industries such as small and medium-sized enterprises in technology commercialization and business development.







History / Achievements




**1989. 10**  
Establishment of KARI under Korea Institute of Machinery & the Minerals (KIMM)




**1990. 12**  
Ground-breaking ceremony for the building of the institute




**1992. 10**  
Building Completion Ceremony




**1993. 04**  
Development of experimental aircraft




**1993. 06/09**  
Launch of a single-stage sounding rocket (KSR-I)




**1993. 09**  
Development of EXPO unmanned airship




**1996. 11**  
Incorporation of KARI




**1997. 03**  
Development of twin-engine composite aircraft




**1998. 06**  
Launch of a two-stage sounding rocket (KSR-II)




**1999. 12**  
Launch of KOMPSAT-1 (Arirang-1)




**2001. 09**  
Development of canard aircraft




**2002. 11**  
Launch of Korea's first liquid-propellant rocket (KSR-III)




**2003. 08**  
Ground-breaking ceremony for the space center




**2003. 09**  
Launch of STSAT-1




**2003. 10**  
Development of multi-purpose stratosphere unmanned airship




**2006. 07**  
Launch of KOMPSAT-2 (Arirang-2)




**2008. 04**  
Korea's first astronaut




**2009. 06**  
Completion of the NARO Space Center




**2010. 06**  
Launch of COMS (Cheollian-1)




**2011. 11**  
Development of Smart UAV




**2012. 05**  
Launch of KOMPSAT-3 (Arirang-3)



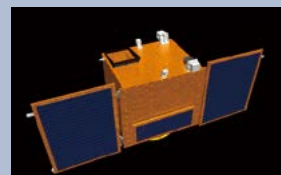
**2012. 06**  
Development of dual-use core components for the Korean Utility Helicopter (Surion)




**2013. 01**  
The 3<sup>rd</sup> launch of Korea's first space launch vehicle (KSLV-I)




**2013. 08**  
Launch of KOMPSAT-5 (Arirang-5)




**2013. 11**  
Launch of STSAT-3




**2013. 12**  
Development of KC-100




**2014. 05**  
Development of OPV




**2015. 03**  
Launch of KOMPSAT-3A (Arirang-3A)




**2016. 12**  
KARI designated as national organization for space development in Korea




**2018. 11**  
Launch of a test launch vehicle (Nuri TLV)




**2018. 11**  
Successful automatic transition flight of the QTP-UAV




**2018. 12**  
Launch of GEO-KOMPSAT-2A (Cheollian-2A)




**2020. 02**  
Launch of GEO-KOMPSAT-2B (Cheollian-2B)




**2020. 08**  
Successful 53 straight hour flight of stratosphere solar-powered unmanned Electrical Aerial Vehicle-3 (EAV-3)



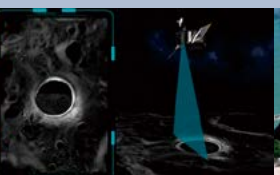
**2021. 03**  
Launch of CAS 500-1




**2021. 10**  
The 1st test launch of Nuri (KSLV-II)




**2022. 06**  
The 2nd test launch of Nuri (KSLV-II)



**2022. 06**  
KPS development begins



**2023. 01**  
Danuri normal operation begins

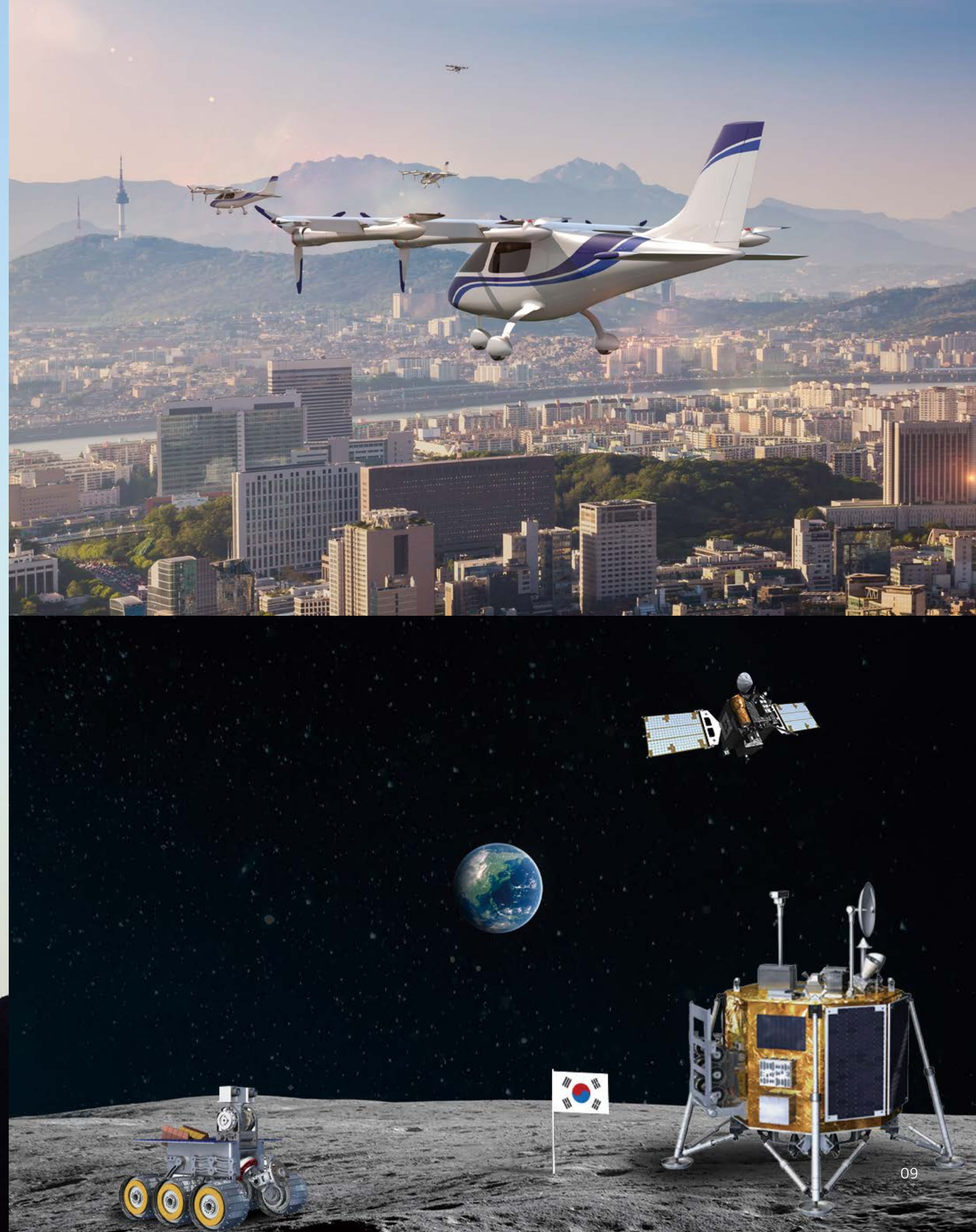


**2023. 05**  
The 3rd launch of Nuri





Aerospace R&D :  
Powering Korea's Strategic Future

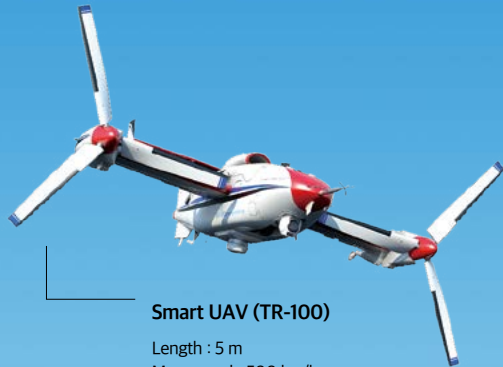




Development of next-generation, eco-friendly, and high-efficiency unmanned aviation  
Core technology driving innovation in future transportation

KARI is conducting research and development on unmanned aerial vehicles incorporating artificial intelligence (AI) and Internet of Things (IoT) technologies to lead the future of aviation technology.

This includes high-altitude, long-endurance solar-powered drones, vertical takeoff and landing manned and unmanned dual-use aircraft (OPPAV) for future urban transportation innovation, and low-altitude Unmanned Aircraft System Traffic Management (UTM) for safe and efficient UAV operations. Additionally, KARI is actively pursuing core technology development for unmanned mobility to foster the UAV market ecosystem.



**Smart UAV (TR-100)**  
Length : 5 m  
Max. speed : 500 km/h  
Max. take-off weight : 1,000 kg  
Endurance : 5 hours



**Surion (Development of key modules for dual civil-military purposes)**  
Passengers : 13 including pilot  
Main rotor diameter: 15.8 m  
Max. take-off weight : 8,709 kg  
Max. cruise speed : 261 km/h



**Quad Tilt Prop-UAV (QTP-UAV)**  
Length : 2 m  
Max. speed : 160 km/h  
Total Weight : 48 kg  
Payload : 3 kg  
Endurance : 30 minutes (battery), 2 hours (hybrid)



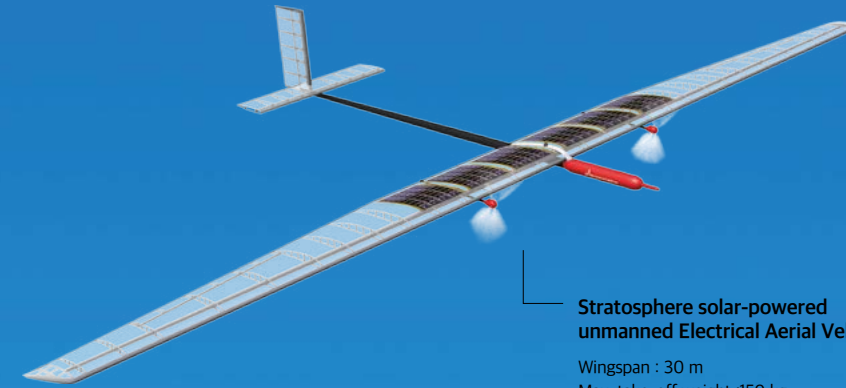
**Indoor small-sized disaster and public safety UAV (MC-1)**  
Weight : 6.91 kg  
Size (hub to tub) : 589 mm  
Operating hours : 20.4 minutes



**Outdoor medium-sized disaster and public safety UAV (MC-3)**  
Weight : 28.61 kg  
Size (hub to tub) : 1,680 mm  
Operating hours : 26.3 minutes



**Outdoor small-sized disaster and public safety UAV (MC-2)**  
Weight : 14.19 kg  
Size (hub to tub) : 910 mm  
Operating hours : 21.6 minutes



**Stratosphere solar-powered unmanned Electrical Aerial Vehicle-4 (EAV-4)**  
Wingspan : 30 m  
Max. take-off weight :150 kg  
Payload : 20 kg  
Altitude : 12 km ~ 18 km  
Range : 500 km



**Electric Vertical Take-Off and Landing Optionally Piloted Personal Aerial Vehicle (OPPAV)**  
Length : 6.15 m  
Cruise speed : more than 200 km/h  
Max. take-off weight : 650 kg  
Range : more than 50 km



**Tilt-Rotor UAV (TR-60)**  
Length : 3 m  
Max. speed : 250 km/h  
Max. take-off weight : 210 kg  
Endurance : 5 hours



# Satellites

## World-class capability in ultra-high-precision Earth observation satellites Development and operation of medium and large-sized GEO satellites

KARI is developing and operating multipurpose practical satellites such as the Arirang series, which are world-class Earth observation satellites, next-generation medium-sized satellites, as well as GEO Cheollian series satellites capable of monitoring weather, atmospheric environment, and oceans. KARI has actively transferred its accumulated world-class technology for satellite development to the private sector to promote growth of the national space industry. Moving forward, KARI plans to enhance the observation capabilities of low-orbit satellites and develop public complex communication satellites (GEO-KOMPSAT-3, Cheollian-3) for national disaster response and enhancement of national safety capabilities, along with highly accurate precision navigation satellites to provide accurate positioning and timing information.







## National Satellite Intergrated Operation and Enhanced Utilization of Satellite Imagery

Efficient integrated operation in response to the growing number of national satellites

Increased Artificial Intelligence (AI)-based research and development for the better usability of satellite information

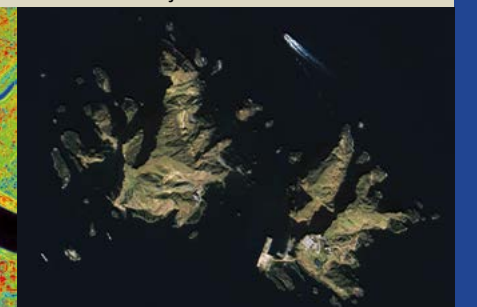
In response to the growing number of national satellites, the National Satellite Integrated Operations System is under development to ensure the rapid and systematic provision of satellite information. Additionally, to facilitate efficient and reliable national satellite operations, the Korea Satellite Operations Center has been established in Jeju. Furthermore, KARI is enhancing satellite imagery utilization through AI-based research such as AI-based object detection and improvement in image processing speed.



Korea Satellite Operations Center in Jeju



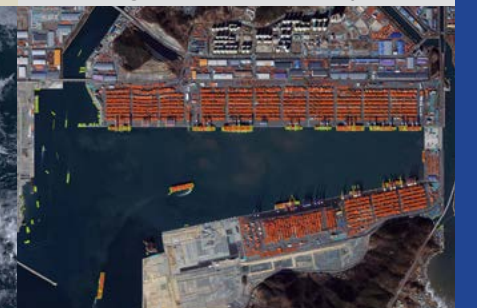
Infrared image of Seoul taken by Arirang 3A



Test image of Dokdo island taken by CAS-1



Typhoon Maysak, GEO-KOMPSAT 2A



AI-based object detection image of an oboject of interest



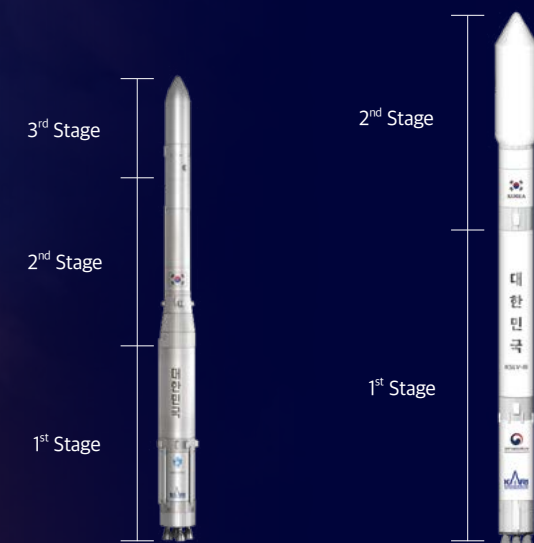


## Space Launch Vehicles

- Achieved independent space transportation capability through the development of Nuri
- Improving reliability through repeated launches and promoting industrialization through technology transfer to the private sector
- Pursuing R&D of small launch vehicles and next-generation launch vehicles with enhanced launch capability

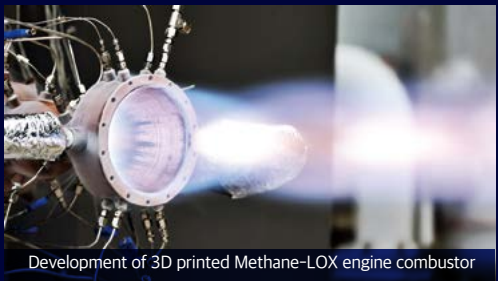
KARI has successfully developed the three-stage Nuri, a Korean launch vehicle capable of inserting 1.5-ton class satellites into low Earth orbit (600~800 km). From 2023 to 2027, KARI plans to conduct a total of five repeated launches of Nuri to ensure reliability and actively promote technology transfer to domestic industries.

Furthermore, KARI will continue research and development on clustering five 100-ton liquid engines, reignition and thrust control technologies through the development project of next-generation launch vehicles including preliminary studies on small launch vehicles, while KARI will actively support the private sector in industrialization.



	Korea Space Launch Vehicle (KSLV-II)	Next Generation Launch Vehicle (KSLV-III)
Stage Configuration	3 Stages	2 Stages
Engine Thrust (1st Stage)	300t	500t
Capacity : LEO (Low Earth Orbit)	3.3t	10t
Capacity : LTO (Lunar Transfer Orbit)	0.1t	1.8t
Engine Configuration	3 <sup>rd</sup> Stage-7t LRE x 1 2 <sup>nd</sup> Stage-75t LRE x 1 1 <sup>st</sup> Stage-75t LRE x 4	2 <sup>nd</sup> Stage-10t LRE x 2 (clustering) 1 <sup>st</sup> Stage-100t LRE x 5
Engine Characteristics	Open Cycle (Gas Generator)	Closed Cycle (Staged Combustion) Reignitable and Reusable

※ LRE : Liquid Rocket Engine



Development of 3D printed Methane-LOX engine combustor



Staged combustion reignition test



Propulsion system test complex (KSLV-II 1<sup>st</sup> stage hot firing ground test)



# Naro Space Center

## The outpost of Korean space development Gateway to space, Naro Space Center

As a core infrastructure for national launch vehicle development, the Naro Space Center has a total area of 5 million square meters, equipped with various state-of-the-art facilities for launch vehicle assembly, testing, launch, tracking, and control. During launch operations, it supports tracking and data reception through tracking stations located in Jeju and Palau in the South Pacific. The Jeju tracking station also collaborates on launch vehicle tracking, with the European Space Agency (ESA) and the French National Space Agency (CNES). In the future, the Naro Space Center plans to establish new launch pads and related infrastructure to support launches of private small launch vehicles. Additionally, it operates a Space Science Museum, where the visitors can see and experience various space development exhibits.



Staged combustion reignition test



Flight tracking facility



Launch Vehicle assembly and test facility



Engine test facility



Launch pad



Space Science Museum



# National Aviation Test Center

Korea's first professional aviation facility  
Over 10,000 users annually from 30 organizations

The National Aviation Test Center is the first of its kind in Korea, designed for integrated testing of advanced conceptual aircraft and nationally developed R&D aircraft, including ground and flight tests, as well as component performance evaluations. Located in Goheung, Jeollanam-do, this center includes facilities such as a runway (700 meters long and 24 meters wide) for medium and small aircraft, a whirl tower, and a landing gear drop test area. In 2022, an additional runway measuring 1,200 meters in length and 45 meters in width, along with two guidance runways, was added to the existing facilities. By utilizing multiple runways, the center is being developed into a comprehensive and safe flight test complex, serving as a pivotal facility for national core aircraft research and development.



Whirl tower

Infra for comprehensive flight test



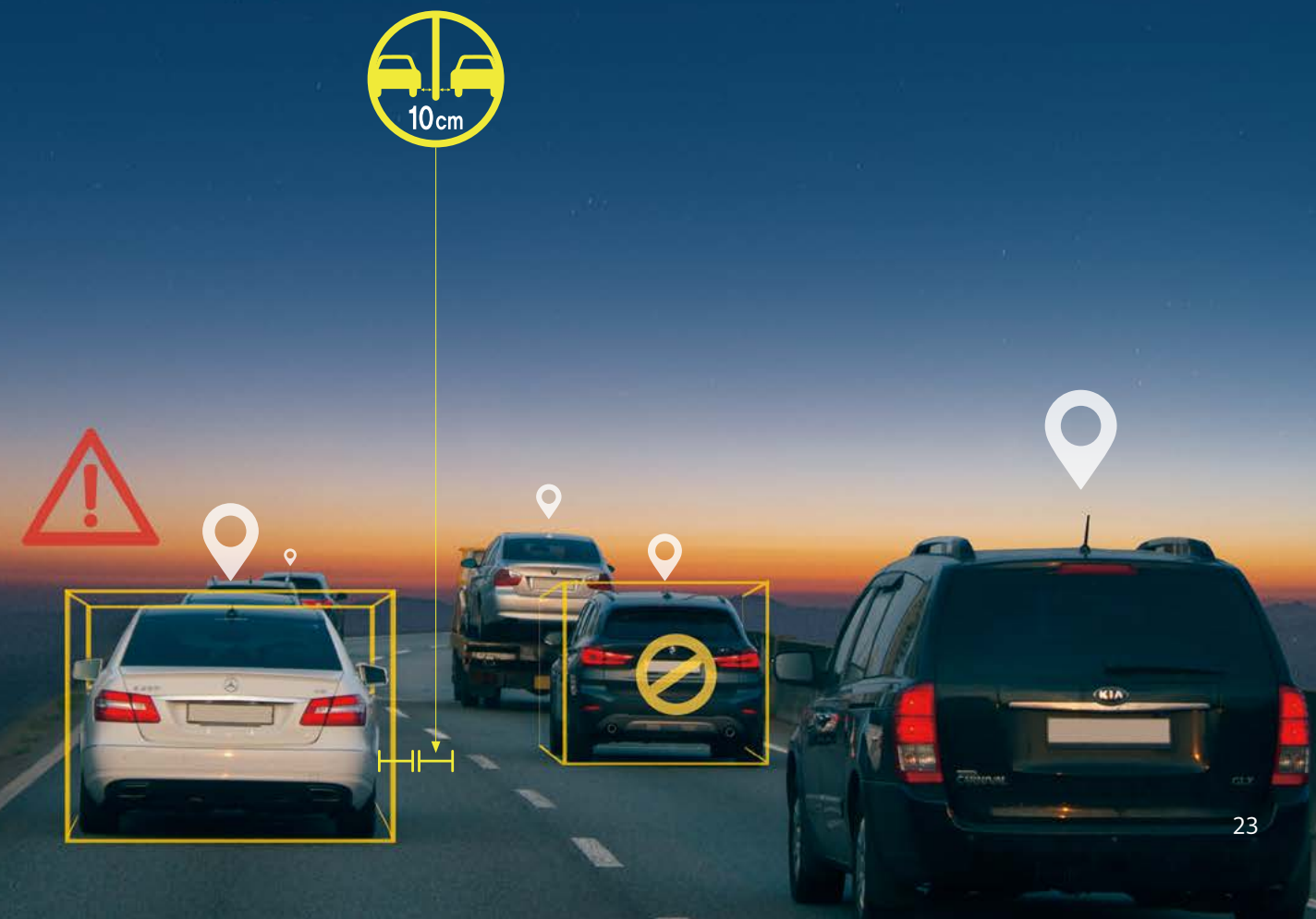


## Satellite Navigation

### Providing highly accurate positioning and timing information Development of the Korean Positioning System (KPS)

KARI is pursuing the development of the Korean Positioning System (KPS) to independently provide Positioning, Navigation, and Timing (PNT) information, which is critical infrastructure for national operations, without relying on foreign PNT systems.

Additionally, KARI has developed the Korea Augmentation Satellite System (KASS) to reduce the error range of GPS location information widely used today. Starting from 2023, KARI has been providing precise positioning and integrity information for aircraft operations.



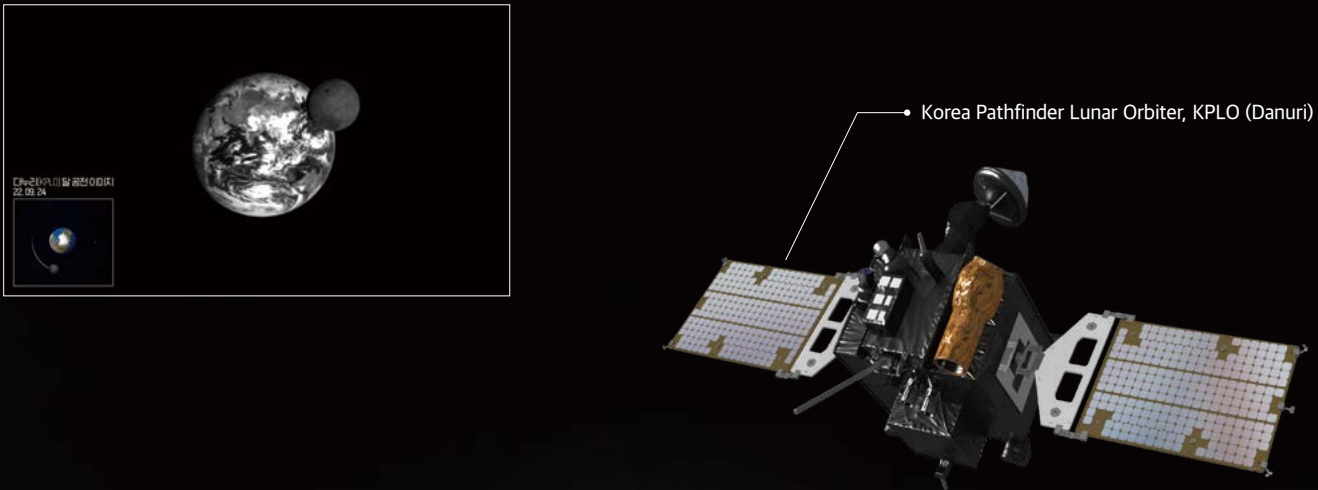


# Space Exploration

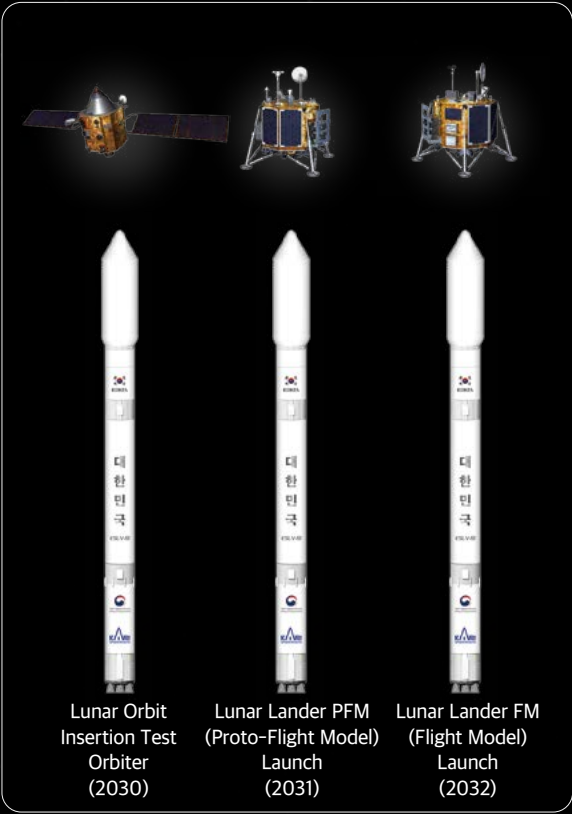
## Korea, opening the door to space exploration

KARI has launched and is currently operating the lunar orbiter, Danuri. Since 2023, Danuri has been conducting a year-long scientific mission using six scientific instruments, including optical imaging of potential lunar landing sites, polarized light imaging of the lunar surface, magnetic field and radiation observations, and validation of space internet technology.

Furthermore, Korea plans to utilize next-generation launch vehicles to send a 1.8-ton lunar lander by 2032. The mission will serve as a foundation for research and development aimed at a future Mars landing by 2045.



Korea Pathfinder Lunar Orbiter, KPLO (Danuri)




Mars exploration  
Mars orbiter (2035) & lander (2045)




## Outreach Programs

We bring you the latest R&D updates from KARI.

 KARI TV ([www.youtube.com/user/@KARItlevision](http://www.youtube.com/user/@KARItlevision))

 KARI instagram([www.instagram.com/karistory\\_kari](http://www.instagram.com/karistory_kari))

 KARI facebook([www.facebook.com/karipr](http://www.facebook.com/karipr))

 KARI twitter([www.twitter.com/kari2030](http://www.twitter.com/kari2030))



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