GOVERNMENT OF INDIA

DEPARTMENT OF SPACE

RAJYA SABHA

UNSTARRED QUESTION NO. 1404

TO BE ANSWERED ON THURSDAY, DECEMBER 14, 2023

USE OF AI AND MACHINE LEARNING IN THE FIELD OF SPACE

1404.   SMT. SANGEETA YADAV:

Will the PRIME MINISTER be pleased to state:

(a)   the status of use of Artificial Intelligence (AI) and machine learning research in the field of space preparedness in India during the last three years;

(b)   the details of the projects and programmes undertaken by the Department in collaboration with industry partners and startups in the domains of AI;

(c)   the funds allocated and utilised by Department of Space (DoS) for AI during the last five years;

(d)   the achievements and outcomes of AI in terms of enhancing space exploration; and

(e)   the steps taken to accelerate the pace of AI for making India a developed nation by 2047?

ANSWER

MINISTER OF STATE IN THE MINISTRY OF PERSONNEL, PUBLIC GRIEVANCES & PENSIONS AND IN THE PRIME MINISTER'S OFFICE (DR. JITENDRA SINGH):

(a)   Over the last three years, ISRO has been steadily leveraging artificial intelligence and machine learning in space domain, adapting with fast-paced technological developments in these areas. Artificial intelligence and machine learning solutions are being developed for

launch vehicles, spacecraft operations, big data analytics, space robotics, space traffic management, among others.

(b)   The projects and programmes in the domains of artificial intelligence being undertaken by Department are at different stages of feasibility studies and implementation. Major ones include –

     i.   Launch vehicle and spacecrafts mission trajectory design and autonomous operations;

    ii.   Launch vehicle and satellites health monitoring and prediction from the telemetry data;

    iii.   Satellite Data Processing for Resource mapping, weather prediction, disaster prediction, geo-intelligence (object and change detection), Precision agriculture, Agroforestry etc.

    iv.   Humanoid robots and chatbots

    v.   Space Robotics and smart manufacturing in space.

Collaborative efforts between ISRO and Institutions like IITs, IISc are involved in development of a few niche AI applications.

(c)   The development and implementation of Artificial Intelligence solutions are being incorporated in various ongoing projects & programmes of ISRO, based on technical feasibility and mission objectives. The costing of these AI solutions is subsumed within the overall funds allocated to the respective projects/programmes.

Major ones include the Gaganyaan Program, recently accomplished Chandrayaan -3 mission, Operational Launch vehicle and Spacecraft programmes, Earth Observation data analysis, etc.

(d)   The major achievements and outcomes of artificial intelligence in terms of enhancing space exploration include –

    i.   Satellite data analysis and processing of India's remote sensing, meteorological, communication, navigation satellites

    ii.   Delivery of Earth Observation applications – Crop Yield prediction, Weather Forecasting and Nowcasting, Disaster forecasting, Land Use Land Cover Maps, Urban expansion planning, Detection of encroachment, built-up, settlement, urban waterbodies, forest cover changes, roads, dams, ships, vessels etc.

iii. Interplanetary missions – Chandrayaan and Mars missions, including orbit manoeuvring and soft landing of Chandrayaan-3 including identification of the landing site.

(e)   Department of Space is taking several steps to adopt artificial intelligence solutions at a faster pace in space domain, across ISRO Centres and encouraging the private sector as well. Cross- centre endeavours are being undertaken to enable technical exchange on advances in AI technology and its applications in space domain. Some of the initiatives being discussed in the long term include the feasibility of setting-up of dedicated labs for AI, upskilling employees in the AI technologies through the Skill Development Programme at respective centres and organization of various national level AI events/workshops/conferences/seminar.

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