GOVERNMENT OF INDIA
MINISTRY OF ELECTRONICS AND INFORMATION TECHNOLOGY
RAJYA SABHA
UNSTARRED QUESTION NO. 3246
TO BE ANSWERED ON: 28.03.2025

INVESTMENT IN PHOTONIC CHIP RESEARCH FOR NEXT GENERATIONCOMPUTING

3246. SHRI SANJEEV ARORA:

Will the Minister of ELECTRONICS AND INFORMATION TECHNOLOGY be pleased to state:

(a) whether India is investing in photonic chip research for next-generation computing infrastructure;
(b) the safeguards implemented against the rise of adversarial machine learning threats;
(c) whether quantum encryption is being integrated into critical national digital infrastructure; and
(d) the research progress on neuromorphic computing for Artificial Intelligence (AI) efficiency enhancement?

ANSWER

MINISTER OF STATE FOR ELECTRONICS AND INFORMATION TECHNOLOGY
(SHRI JITIN PRASADA)

(a) to (d): Photonic chips use light instead of electricity to process and transmit data, offering ultra-high speed, high bandwidth, and good energy efficiency. They generate minimal heat, are immune to electromagnetic interference, and support dense parallelism. These chips are better suited for new applications such as 6G, Artificial Intelligence (AI), quantum computing, data centers, optical interconnects, neural network acceleration, and quantum communication.

Government is supporting research in photonic chips through various initiatives:

- Ministry of Electronics and IT is supporting research in Photonic Integrated Circuits (PICs) based on various material platforms such as Silicon, Lithium Niobate, Diamond, Polymer or Composite and its packaging technology.
- The Department of Science and Technology (DST) is implementing the National Quantum Mission. Under the Mission, on Thematic Hub has been set up on Quantum Computing at IISC Bengaluru. One of the objectives of the T-Hub is the development of photonic qubits and photonic quantum processors, driving research in photonic chip technology to support next-generation computing infrastructure.

The Indian Computer Emergency Response Team (CERT-In), MEITY issues alerts and advisories regarding latest cyber threats/vulnerabilities including malicious attacks using Machine Learning (ML) and countermeasures to protect computers, networks and data on an ongoing basis.

- In May 2023, an advisory was published by CERT-In.
- September 2024: Certified Security Professional in Artificial Intelligence (CSPAI) program was launched.
- CERT-In is one of the International partners to co-sign the joint high-level risk analysis report on Artificial Intelligence (AI) entitled “Building trust in AI through a cyber-risk-based approach,” published by the National Cybersecurity Agency for France (ANSSI) in February 2025,

- CERT-In published “Cyber Security Guidelines for Smart City Infrastructure” in February 2025 including measures for secure usage of Artificial Intelligence (AI) and Machine Learning (ML) for smart city infrastructure and applications.

Safe and Trusted AI is one of the seven pillars of IndiaAI Mission. Several Responsible AI projects have been selected to address the need for robust guardrails and ensure the responsible development, deployment, and adoption of AI technologies.

Several quantum technologies are under development in government institutions such as Centre for Development of Telematics (CDOT) and Centre for Development of Advanced Computing (CDAC). These technologies include Post-Quantum Cryptography (PQC) solutions, Quantum Key Distributions (QKD) and quantum secure smart Video IP phone with quantum secured voice/ video calling.

Neuromorphic computing is a brain-inspired approach to designing hardware systems. It mimics the structure and function of the human brain using neural networks and spiking signals. Ministry of Electronics and Information Technology (MeitY) is supporting R&D project in this area.

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