PARLIAMENT QUESTION: RESEARCH DEVELOPMENT AND INNOVATION SCHEME IN DEEP TECH AREAS

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The Government has initiated several steps to promote R&D in deep tech areas such as AI, robotics, automation, renewable energy, small nuclear, drones, biotechnology, and climate tech as per following details:

The Department of Science & Technology (DST), Government of India, is implementing the National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS), with an outlay of Rs. 3,660.00 crore. Under this mission, a project titled “Bharat-Gen: A Suite of Generative AI Technologies for India” is being implemented with funding support of Rs. 235.17 crore at the Technology Innovation Hub (TIH) Foundation for IOT and IOE, IIT Bombay. This project is a multimodal, multilingual Large Language Model initiative, focused on developing efficient and inclusive AI solutions in 22 Indian languages. The mission has established 25 Technology Innovations Hubs (TIHs) in reputed academic institutions across India, out of which some are working in Technology verticals related to deep tech areas including Al, robotics, automation and drones as per the following details:

Technology Innovation Hubs (TIHs) & Host Institute (HI)	**Technology Vertical (TV)**	**Sanctioned Budget (Amount in Rupees cr)**	**Released Budget (Amount in Rupees cr)**
IIT Kharagpur AI4ICPS I-Hub Foundation, IIT Kharagpur	Artificial Intelligence and Machine Learning	24.45	24.45
I-HUB for Robotics and Autonomous Systems Innovation Foundation, IISc Bengaluru	Robotics & Autonomous Systems	270.00	114.25
NMICPS Technology Innovation Hub on Autonomous Navigation Foundation (TiHAN), IIT Hyderabad	Autonomous Navigation and Data Acquisition systems (UAV, RoVetc)	185.00	128.43
I-Hub Foundation for Cobotics (IHFC),IIT Delhi	Cobotics	127.95	85.91

Climate, Energy and Sustainable Technology (CEST) division of DST is supporting several initiatives to promote R&D in deep tech areas related to renewable energy and climate tech. These include projects in areas of new and emerging storage technologies, advanced hydrogen and fuel cells, methane mitigation, carbon capture and utilization, and hard-to-abate sectors. Electric Vehicle Solutions led by Startups (EVolutionS) programme of DST supports innovative deep tech startups in translating their proof of concepts and prototypes into commercially viable products through Technology Business Incubators (TBIs), with an aim to accelerate Electric Vehicle component development to create robust supply chain ecosystem in the country. Further, under the Climate Change Programme, techniques have been developed for weather and climate

prediction using AI/ML tools.

Under Anusandhan National Research Foundation (ANRF) projects amounting to Rs. 310.64 crore have been supported under the Electric Vehicle Mission and Intensification of Research in High Priority Areas (IRPHA) scheme.

The Department of Biotechnology (DBT) is implementing the BioE3 (Biotechnology for Economy, Environment and Employment) policy for "Fostering High-performance Biomanufacturing" across various sectors, including bio-based chemicals, precision therapeutics, climate-resilient agriculture, and biodiversity-based innovations. The policy aims at enabling start-ups, SMEs, industries and academia with access to shared infrastructure/facilities and resources for pilot & pre-commercial scale biomanufacturing of viable commercial bio-based products.

The Council of Scientific and Industrial Research (CSIR) is supporting R&D initiatives in the deep tech domains such as Al, Robotics, Drones, EV, Semiconductor designs etc, under several mission mode projects like CSIR League for AI based Industrial Manifestation (CLAIM); Design and development of a Deep Sea Autonomous Underwater Vehicle [DAUV]; AI Enabled Technologies and Systems and Medical Instruments & Devices with total budget outlay of Rs. 24.18 cr, Rs. 29.77 cr, Rs. 23.48 cr and Rs. 17.30 cr respectively.

The Ministry of New and Renewable Energy (MNRE), through its Renewable Energy Research and Technology Development Programme (RE-RTD) scheme, supports research institutions and industry to enable indigenous technology development and manufacture for widespread applications of new and renewable energy in an efficient and cost-effective manner across the country. The MNRE encourages research and technology development proposals in collaboration with the industry and provides up to 100% financial support to Government/non-profit research organizations and up to 50-70% to industry, startups& private Institutes. The total budget allocated for this scheme for Rs. 228 crore for 5 years.

The Department of Atomic Energy (DAE) is actively involved in R&D initiatives in deep-tech domains such as development of Small Modular Reactor for Clean energy. BARC has indigenously designed and developed three types of Small Modular Reactors (SMRs). DAE has developed many robotic and automation technologies for applications in high-radiation environments. The focus areas include robotics and automation for active applications to reducing man-rem expenditure during material handling, inspection and application in emergency situations. Indira Gandhi Centre for Atomic Research (IGCAR) has undertaken R&D towards utilization of robotic technologies in hot-cells of reprocessing facilities, post irradiation examination laboratories and In-service inspection of the reactor components, particularly in Prototype Fast Breeder Reactor (PFBR). Variable Energy Cyclotron Centre(VECC), use many deep tech domains such as AI, Robotics, Drones and Semiconductor designs for applications in accelerators, nuclear electronics, cybersecurity, office automation, etc. and the spin-off (s) are being used in other areas. Bhabha Atomic Research Centre (BARC) have Rs. 233.95 crores allocated for R&D projects towards development of reactor technologies, robotics and automation.

The Ministry of Electronics and Information Technology (MeitY) is engaged in R&D projects in key areas such as network and system security, digital forensics, hardware security, cybersecurity audits, and incident response. These initiatives are part of the department's mandate to strengthen national cyber security infrastructure and address relevant challenges.

The Department of Space is actively pursuing R&D activities in AI and Robotics towards Launch Vehicle Health Monitoring, Satellite Data Analysis, Space Robotics for Interplanetary Applications & Bhartiya Antariksh Station, etc.

The Government has initiated a new scheme called "Research Development and Innovation (RDI)" which aims to catalyze private sector participation in high-impact R&D and innovation across sunrise sectors and those critical to economic security, self-reliance, and strategic interests. It supports transformative projects at Technology Readiness Levels (TRL) 4 and above, enables acquisition of strategically important technologies, and promotes the creation of a Deep-Tech Fund of Funds.

The scheme has a total outlay of Rs 1 lakh crore over 6 years, with Rs 20,000 crore allocated for FY 2025–26,

funded from the Consolidated Fund of India. It offers long-term low or zero-interest loans, equity investments, and contributions to Deep-Tech Fund of Funds. Grants and short-term loans are not provided under this scheme.

Fund allocation to innovators, researchers, and start-ups will be managed through a Special Purpose Fund (SPF) under the Anusandhan National Research Foundation (ANRF), which serves as the Level 1 Fund Custodian. Implementation will be carried out by Second-Level Fund Managers, including Alternate Investment Funds (AIFs), Development Finance Institutions (DFIs), Non-Banking Financial Companies (NBFCs), and Focused Research Organizations (FROs), such as BIRAC, TDB, and IIT Research Parks, with approval from the Empowered Group of Secretaries (EGoS).

The Department of Science & Technology (DST) is the nodal agency for the scheme. Oversight and governance are provided by the Governing Board of ANRF, while the EGoS, Executive Council (EC), and Investment Committees (ICs) are responsible for sector approvals, fund manager selection, project evaluation, and overall performance review.

A number of Technology sectors of strategic importance have been identified under the RDI Scheme. These include energy security, climate action, and deep technologies such as quantum computing, artificial intelligence, biotechnology, and the digital economy. The scheme also covers sectors critical for strategic and economic security, with the flexibility to include additional sectors based on approval from the Empowered Group of Secretaries (EGoS).

To enhance technology readiness and support ecosystem development, the scheme finances transformative projects at Technology Readiness Levels (TRL) 4 and above, encourages the acquisition of strategic technologies, and supports the creation of a Deep-Tech Fund of Funds.

This information was given by Dr. Jitendra Singh, Union Minister of State (Independent Charge) for Science and Technology, Earth Sciences, MoS PMO, MoS Personnel, Public Grievances & Pensions, Department of Atomic Energy and Department of Space, in a written reply in the Rajya Sabha today.

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