BHARATGEN – SCIENCE & TECHNOLOGY

NEWS: Recently, The Union Minister of State for Science & Technology has launched 'Bharat Gen' at the BharatGen Summit.

WHAT'S IN THE NEWS?

About BharatGen

1. **Definition**:
   BharatGen is India's **first indigenously developed**, **government-funded**, **multilingual** and **multimodal** Large Language Model (LLM), tailored specifically to support and promote **Indian languages, culture, and diversity**.

2. **Multilingual & Multimodal Capability**:
   The LLM supports **22 Indian languages** and combines multiple data modalities including **text, speech, and image**, enabling advanced **natural language and AI services** across linguistic and regional contexts.

3. **Developing Institution**:
   BharatGen is being developed under the **National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS)** and implemented through the **TIH Foundation for IoT and IoE** housed at **IIT Bombay**.

4. **Supporting Agency**:
   The initiative is funded and supported by the **Department of Science and Technology (DST), Government of India**, as part of its broader digital transformation mission.

5. **Objective**:
   The primary goal of BharatGen is to **revolutionize AI and digital solutions across India's linguistic landscape**, ensuring **regional inclusivity** and **local relevance** in AI applications.

6. **Execution Mechanism**:
   BharatGen's development is coordinated through a network of **25 Technology Innovation Hubs (TIHs)** established under NM-ICPS, each specializing in a specific technology vertical.

7. **Strategic Pillars**:
   The broader mission (NM-ICPS) is anchored on four pillars:

   - **Technology Development**

   - **Entrepreneurship Promotion**

   - **Human Resource Development (HRD)**

   - **International Collaboration**

8. **Sectoral Significance**:
   BharatGen is expected to empower critical sectors like:

- **Healthcare** (multilingual diagnostics, chatbot consultations)

- **Education** (language-inclusive content, translation tools)

- **Agriculture** (voice-based advisories for farmers in native languages)

- **Governance** (public service delivery using region-specific AI solutions)

9. **Governance and Grievance Redressal**:
   BharatGen aims to integrate multilingual AI systems into public platforms such as **CPGRAMS** (Centralized Public Grievance Redress and Monitoring System), making citizen engagement **more inclusive and accessible**.

National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS)

1. **Launch Year**:
   The NM-ICPS was **approved by the Union Cabinet in 2018** to strengthen India's research ecosystem in emerging technologies.

2. **Nodal Ministry**:
   It is operated under the **Department of Science & Technology (DST)**.

3. **Mission Aim**:
   To develop **cutting-edge platforms** for **Research and Development (R&D)**, **translational research**, **product development**, **start-up incubation**, and **commercialization** in the field of Cyber-Physical Systems.

4. **Establishment of TIHs**:
   25 **Technology Innovation Hubs** have been created in **premier academic and research institutes** across India to spearhead vertical-specific research and innovation.

5. **Technology Vertical Areas Include**:

- **Artificial Intelligence (AI) & Machine Learning (ML)**

- **Robotics & Autonomous Systems**

- **Cybersecurity**

- **Big Data & Predictive Analytics**

- **Intelligent Collaboration Systems**

- **Quantum Computing & Quantum Technologies**

- **Advanced Communication Systems**

- **Smart Agriculture & Water Management**

- **Mining Technologies**, etc.

About Cyber-Physical Systems (CPS)

1. **Definition**:
   A **Cyber-Physical System (CPS)** is an integration of **physical processes, computational algorithms**, and **networked sensors and systems** to enable real-time monitoring and control.

2. **Functionality**:
   CPS enables a tight coupling between the **cyber (computational)** and **physical (real-world)** elements, creating systems that **sense, compute, and act** autonomously.

3. **Applications of CPS**:

   - **Smart Grids** (for energy optimization)

   - **Autonomous Vehicles** (real-time navigation and obstacle detection)

   - **Medical Devices** (remote surgeries, health monitoring)

   - **Industrial Automation** (smart manufacturing, predictive maintenance)

About Large Language Models (LLMs)

1. **Definition**:
   LLMs are a class of **artificial intelligence models** trained on massive text datasets using architectures like **Transformers**, enabling them to understand and generate human-like language.

2. **Core Features**:

   - **Contextual Understanding**

   - **Multilingual Processing**

   - **Ability to handle unstructured data** across tasks

3. **Applications of LLMs**:

   - **Natural Language Understanding (NLU)**

   - **Machine Translation and Transcription**

   - **Content Generation (text, code, reports)**

   - **Conversational Agents (chatbots)**

   - **Summarization and Question Answering**

   - **Sentiment Analysis and Language Modelling**

About Internet of Things (IoT)

1. **Definition**:
   IoT refers to a **network of interconnected physical devices**, embedded with sensors, software, and connectivity, which enables them to **collect, transmit, and act on data**.

2. **Use Cases**:

   - **Smart Homes and Appliances**

   - **Wearable Fitness Devices**

   - **Industrial Monitoring and Automation**

   - **Agricultural Sensors**

   - **Connected Vehicles**

About Internet of Everything (IoE)

1. **Definition**:
   IoE is a broader framework that connects **people, processes, data, and things** to create a more **intelligent and adaptive digital environment**.

2. **Difference from IoT**:

   - While **IoT focuses on machine-to-machine (M2M)** communication,
     IoE includes human-to-machine (M2P) and **human-to-human (P2P)** interactions.

   - IoE emphasizes **holistic cognition** through enhanced **interconnectivity and automation**.

3. **IoE Use Scenarios**:

   - **Smart Cities** (citizen data + smart infrastructure)

   - **E-Governance** (integrating citizen feedback with service delivery)

   - **Smart Healthcare** (real-time analytics + doctor-patient interactions)

Source: https://www.pib.gov.in/Pressreleaseshare.aspx?PRID=2133312