## AI-BASED WARFARE – SCIENCE & TECHNOLOGY

NEWS: **China's PLA** is advancing rapidly in AI-driven warfare under the **umbrella of "intelligentized warfare."**

- AI is being integrated in **all levels of military operations:** autonomous drones, smart surveillance, precision targeting, and strategic decision-making.
- The **"agentic" age** implies autonomous agents making **independent battlefield decisions**—redefining traditional command-control hierarchies.

WHAT'S IN THE NEWS?

### Technological Lag in Military AI

- India is currently **behind major powers like China and the US** in the development and deployment of **autonomous AI systems**.
- While China is **rapidly integrating AI across multiple military domains**, India's progress remains fragmented and slow.
- This technological lag could lead to a **strategic disadvantage** in future conflict scenarios dominated by AI-driven decision-making and autonomous weapons.

### Energy Constraints

- AI-based warfare is highly **energy-intensive**, requiring **massive computational power** and **uninterrupted energy supply** to operate data centers, servers, and intelligent machines.
- India's existing **energy grid is not optimized** to support the 24x7 operational requirements of military-grade AI systems.
- Inadequate power infrastructure can **limit the scale, reliability, and response time** of AI systems during critical operations.

### Infrastructure Gaps

- India lacks the **civilian and dual-use infrastructure** (like data centers, high-performance computing hubs, and cloud systems) needed to support advanced AI applications.
- In contrast, countries like **China and the US** have invested heavily in AI infrastructure, giving them a **significant strategic edge**.
- The absence of a robust AI backbone makes **deployment and scalability** of AI technologies in defense more challenging for India.

**China-Pakistan Collaboration: A Strategic Risk**

- China is actively **exporting AI-based military systems** to Pakistan, including surveillance technologies, autonomous drones, and ISR platforms.
- This transfer of AI capabilities may **alter the military balance** in South Asia and pose **new security threats** for India along both western and northern borders.

**The Nature of AI Warfare**

- AI is transforming key military functions such as **surveillance, drone swarming, ISR (Intelligence, Surveillance, Reconnaissance)**, robotics, and **precision-strike capabilities**.
- China's developments include:
    - **DeepSeek AI** for autonomous targeting and decision-making.
    - **Swarm drones** for overwhelming defenses through simultaneous attacks.
    - **BeiDou satellite system** for precision navigation independent of GPS.
- Integration of **generative AI and autonomous feedback loops** indicates a shift towards **machine-led warfare** with minimal human oversight.

**Volume of Data as a New Warfront**

- AI-based warfare involves processing **vast volumes of real-time data** from multiple sensors, satellites, and systems.
- The speed and accuracy of action depend on the **ability to store, sort, and act on data without human delay**.
- Nations that can **harness this data advantage** will dominate future wars—not just through weaponry but via **information supremacy**.

**Energy as a Strategic Limiting Factor**

- Advanced AI systems require **continuous high-energy inputs**, especially for high-performance computing, robotics, and secure data transfers.
- India's **current energy planning does not prioritize military AI needs**, creating a **vulnerability in future conflict environments**.
- Without **smart grids, nuclear microreactors, and energy resilience**, India cannot support sustained AI operations during wartime.

**Role of the Private Sector and Dual-Use Ecosystem**

- Effective AI warfare demands a **synergized ecosystem**, involving:
    - **Private data centers and energy providers**
    - **Semiconductor and robotics startups**
    - **AI-driven cloud platforms**
- India must embrace **civil-military fusion**, leveraging **public-private partnerships** to build **dual-use infrastructure** that serves both civilian and military needs.

**India's Institutional Response**

- The **DRDO-CAIR (Centre for AI and Robotics)** was established as early as 1986, focusing on:
    - **Autonomous mission planning**
    - **Sensor fusion and AI-based targeting**
- However, its progress has been **slow and siloed**, lacking integration with **ISRO, academia, and private firms**.
- Senior officials have acknowledged the need for **fast-tracking innovation**, creating **converged AI frameworks**, and building **scalable deployment platforms**.

**Strategic Imperatives for India**

- India must:
    - **Scale up investments** in AI, cloud infrastructure, and semiconductors.
    - **Address energy bottlenecks** by investing in **smart grids, modular nuclear reactors**, and **AI-optimized energy systems**.
    - Promote **cross-sectoral synergy** between defense research, civilian tech, and academia.
    - Recognize the **integration of AI and energy infrastructure** as a **core component of national security strategy**.

**Conclusion: Data & Energy as Future Battlegrounds**

- India risks **strategic irrelevance** in future AI-led warfare if it fails to build a resilient **data-energy ecosystem**.

- The **future battlefield will be dominated** by nations that can process data at speed and scale, backed by **reliable energy and infrastructure**.
- **Technological superiority alone is not enough**—India must invest in the **logistics, energy, and institutional architecture** that underpin effective AI warfare.

Source: https://indianexpress.com/article/business/the-new-battlefield-ai-based-warfare-in-the-agentic-age-multi-domain-ops-and-energy-as-a-big-constraining-factor-10110296/