

INDEPENDENCE DAY SPECIAL

EMINENT WRITERS ON THE DREAM OF A DEVELOPED INDIA IN 2047



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THE WEEK

DEFENCE STARTUPS
NEW-AGE COMPANIES
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THE UNMAKING OF SHEIKH HASINA

Revolution in Bangladesh
Implications for India

astonishment. Pushing further, they proposed developing a groundbreaking 1-gigapixel camera. Today, this startup collaborates with NASA and Lockheed Martin demonstrating their high competence. An incredible journey indeed!

Startups revolutionised defence innovation with unprecedented speed, scale and cost-effectiveness. Previously, defence R&D projects spanned years or decades, costing hundreds to tens of thousands of crores. Some iDEX startups delivered innovations in just 12 to 18 months, often with grants as low as ₹1.5 crore.

Startups came forward in hordes, partly driven by the thrill of solving military challenges and partly by a sense of national duty, enabling the armed forces to address a multitude of issues simultaneously. In August 2022, a whopping 75 challenges were introduced for underwater technologies, followed by another 75 in October 2022 for space-based technologies. These fields were new terrain for startups, yet the challenges attracted a significant number of participants.

Within a year, prototypes were developed in response to the naval challenges and showcased by the Indian Navy in September 2023. The scale and speed of the startup defence innovation ecosystem was so remarkable that it seemed surreal!

Defence startups have proven their solutions to be on par with, if not superior to, the best. A winner of an iDEX challenge in quantum communication achieved quantum key distribution over 150km on fibre, when the best achieved in the world was 90 km. This breakthrough not only made their solution nearly 60 per cent cheaper but also significantly more efficient. Recognised among the world's top quantum communication companies, this startup attracted interest from global giants like Google and Amazon for integrating their technology into cloud platforms. Following the US govern-



ment's move to adopt post-quantum cryptography solutions, this startup developed a compatible solution and started offering it in the US.

Several startups stemming from iDEX have already entered international markets or are poised to do so. The surge of defence innovation by Indian startups has been so impactful that the US department of defence collaborated with India for joint challenges. Within a year, two rounds of these collaborative challenges have already been initiated. Indian defence startups are now competing alongside their US counterparts, advancing cutting-edge technologies outlined in these challenges.

The remarkable success can be partly attributed to India's substantial talent and capabilities in digital technologies. But, iDEX's success is also because of the proactive policy support provided by the government. Major policy decisions like earmarking of 75 per cent of capital acquisition budget for domestic industry and positive indigenisation lists, which banned import of hundreds of platforms and thousands of sub-systems and components, increased the demand for startup-developed products.

Breaking from past norms where the government typically claimed

ownership of intellectual property from public-funded research, iDEX allows startups to retain their IP, encouraging them to explore opportunities in civil and export markets.

Given that defence startups operate in a monopsonistic environment—the armed forces being the sole buyers—they needed a procurement mechanism to sell their innovations. The government introduced the Make-2 route within the defence acquisition process to facilitate this. The armed forces' adoption of spiral development and their active hand-holding of startups throughout the developmental cycle have significantly bolstered innovation.

While iDEX provides partial funding to startups, they need to secure the rest from other sources. Efforts were made to encourage venture capitalists to support defence startups at DefExpo 2022 in Gandhinagar. But, few VCs stepped forward.

To address this shortfall, the Mounttech Growth Fund was established. VC has been instrumental in driving innovation globally. If the Mounttech Growth Fund can inspire other VCs to invest in technology and IP creation, it could mark a pivotal moment in India's evolution into a product nation and a developed economy. **1**

Tobacco's Toll on the Lungs: Unraveling the Complexities of Lung Cancer Pathogenesis

Lung cancer remains a formidable foe in the realm of oncology, claiming millions of lives each year worldwide. Beneath its grim statistics it is a maze of intricate pathophysiological details that illuminate its unrelenting course and provide hope for new therapeutic approaches.

Lung cancer is caused by multiple etiologies like genetic mutations, environmental exposures, and intricate cellular signaling pathways. While cigarette smoking remains the predominant risk factor, other factors such as exposure to radon, asbestos, and air pollution contribute significantly to its development. These environmental insults trigger a cascade of events within the lung tissue, leading to cellular damage, inflammation, and ultimately leading to cancer.

Genetic abnormalities that cause uncontrollable cell growth and disturb normal cellular function are central to the molecular landscape of lung cancer. Targeted therapy has been transformed by the identification of oncogenes like EGFR, ALK, and ROS1, which provide patients with individualized therapeutic options based on their unique mutations. Furthermore, the relevance of genomic integrity in the pathophysiology of lung cancer has been underlined by the function of tumor suppressor genes like RB and TP53 in preserving genomic stability.

Moreover, the tumor

microenvironment plays a pivotal role in tumor growth and metastasis. Interactions between cancer cells, immune cells, and stromal components create a dynamic milieu that fosters tumor progression and therapeutic resistance. Emerging immunotherapies aimed at harnessing the immune system's power to recognize and eradicate cancer cells have shown remarkable efficacy in subsets of lung cancer patients, heralding a new era in cancer treatment.

Furthermore, the heterogeneity of lung cancer poses a significant challenge in unraveling its complexities. Histological subtypes such as non-small cell lung cancer (NSCLC) and small cell lung cancer (SCLC) exhibit distinct molecular profiles and clinical behaviors, necessitating tailored approaches to diagnosis and treatment. Advances in molecular profiling techniques, including next-generation sequencing and liquid biopsy, offer unprecedented insights into tumor biology and hold promise for personalized medicine strategies.

In the quest to decipher the intricacies of lung cancer pathogenesis, interdisciplinary collaboration and innovative research methodologies are paramount. From unraveling the molecular underpinnings of oncogenic addiction to elucidating the role of the



tumor microenvironment in therapeutic resistance, each discovery brings us one step closer to conquering this formidable disease.

As we navigate the complexities of lung cancer pathogenesis, let us remain steadfast in our pursuit of knowledge and innovation, fueled by the collective determination to alleviate the burden of this devastating illness.

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