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SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
(Deemed to be University u/s 3 of UGC Act, 1956)
DELHI-NCR CAMPUS, GHAZIABAD (U.P)

VIGYAN DARPAN

"INDIGENOUS TECHNOLOGIES FOR VIKSIT BHARAT"

Cover Designed by:
Manav Singh Shekhawat
RA2211056030015

Volume 1 | Issue 1 October 15, 2024

Editorial Board

Editorial Page

"Indigenous Technologies for Viksit Bharat

Dear Readers,

It is with great pride and joy that I present to you the inaugural issue of Vigyan Darpan, the Biannual Science magazine dedicated to celebrating the spirit of inquiry and innovation among our students.
The inaugural issue aims to highlight the rich heritage of indigenous knowledge that can significantly contribute to India's development.
As we embark on this journey, I invite you to engage with the content and consider the profound impact of indigenous innovations on our society.
Let us celebrate our heritage while envisioning a brighter future.
Warm regards,

Dr. Sanjay Viswanathan
Director
SRM IST, Delhi NCR Campus, Ghaziabad

Dear Readers,

We are excited to present the inaugural issue of Vigyan Darpan, a magazine dedicated to exploring Indigenous Technologies for a Viksit Bharat.
In the journey towards a Viksit Bharat—a developed India—the integration of indigenous technologies stands as a cornerstone of sustainable development. As we navigate the complexities of modern challenges, it is crucial to draw inspiration from the rich tapestry of traditional knowledge that has flourished in our diverse communities for centuries.
We hope you enjoy the insights and discoveries within these pages
Warm regards,

Dr. R. P. Mahapatra
Dean
SRM IST, Delhi NCR Campus, Ghaziabad

Dear Readers,

Welcome to Vigyan Darpan, a platform where science and technology converge. Our inaugural issue marks the beginning of an exciting journey to explore the wonders of the scientific world. The pursuit of knowledge is a never-ending journey. As we embark on this venture, I urge our readers to embrace the spirit of inquiry and curiosity. Knowledge is power, and Vigyan Darpan is dedicated to empowering you with the latest insights and discoveries. The magazine signifies our institution's commitment to advancing scientific knowledge and technological innovation. This publication will serve as a catalyst for ideas, fostering collaboration and exchange among experts and enthusiasts alike. I extend my gratitude to the team behind Vigyan Darpan It is not just a magazine it is a movement. Congratulations team on spearheading this initiative and inspiring others to explore the wonders of science and look forward to witnessing the impact of this initiative.
Warm regards,

Dr. Navin Ahlawat
Dean (S&H)
SRM IST, Delhi NCR Campus, Ghaziabad

Editorial Page

"Indigenous Technologies for Viksit Bharat"

Dear Readers,

I am excited to introduce the inaugural issue of our magazine VIGYAN DARPAN, featuring a collection of insightful contributions from our students on indigenous technologies for Viksit Bharat.
Our contributors have explored diverse topics, from sustainable agriculture and water management to renewable energy and traditional health systems. Their fresh perspectives not only showcase the relevance of indigenous solutions but also inspire a deeper appreciation for our scientific heritage.
I encourage you to dive into the work of these young contributors and appreciate the thoughtful insights they provide.
Thank you for your support, and I look forward to your feedback.
Warm regards,
Dr. Garima Pandey
Co-Editor-in-Chief

Dear Reader,

It is an absolute pleasure to welcome you to the first issue of our departmental magazine 'VIGYAN DARPAN' with the theme "Indigenous Technologies for VIKSIT BHARAT." Our aim is to bring the SRM-IST, NCR thoughtful Institution by spreading inspiration, information, and perspectives of the students. We are thankful to our students for showing great excitement for compiling this issue. This issue discussed various modern technologies as resolving todays 'problems and innovative ideas for more strengthening and making our country "VIKSIT BHARAT".
We gladly welcome any comments and critiques you may have as a reader.
Warm regards,
Dr. Sunil Kumar Yadav
Editor

Oldest Indian Nanomedicine: Ayurvedic Bhasma

In recent years, nanomedicine has become one of the most prominent fields of interdisciplinary science. Remarkably, the concept of nanomedicine in the form of Bhasma has been prevalent in India since *Charakasamhita*. Bhasma (ash) is prepared through the incineration of certain metals, minerals, or herbs, which involves various processes such as Sodhana (purification), Reaction phase, and Marana (incineration). Bhasma is considered medicinally important as it enhances therapeutic effects, assists in detoxification, and offers critical nutrients. For instance, Swarna Bhasma (ash of gold) has been reported to enhance immunity, reduce general weakness, and treat anemia. Hareek Bhasma (diamond ash) is useful in treating cancer and increasing immunity.
Dr. Karishma Tiwari
Editor

Atmanirbhar Bharat: A Foundation for Viksit Bharat

Atmanirbhar Bharat is a strategic initiative aimed at enhancing indigenous technologies to build a foundation for Viksit Bharat. it emphasizes reducing import dependency while promoting local industries across various sectors, including agriculture, healthcare, and manufacturing. By revitalizing traditional practices like organic farming, sustainable architecture, and indigenous healthcare systems, this initiative harnesses India's rich cultural heritage to address contemporary challenges. The synergy between Atmanirbhar Bharat and indigenous technologies fosters innovation, boosts employment, and strengthens self-sufficiency. Moreover, India can ensure sustainable growth, enhancing its global competitiveness and ultimately working towards the vision of a developed nation, where self-reliance and sustainability are at the forefront of progress.
Dr. Ravi Tomar
Editor

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Science and Technology Development in India

Introduction

India has had a strong focus on science and technology, realizing that it is a key element for economic growth. India ranks third among the most attractive investment destinations for technology transactions in the world. With more and more multinational companies setting up their R&D centers in India, the sector has seen an uptrend in investment in recent years.

The government has introduced multiple policies aimed at projecting India as a science and technology powerhouse and promoting both public and private sector involvement in the R&D practice. As a result, India's gross expenditure on R&D (GERD) has been consistently increasing over the years. The government has also implemented several fellowship schemes to nurture the human capacity for advanced research in the country.Spending in the Indian information technology (IT) sector is projected to reach US$ 138.9 billion in 2024, compared to US$ 122.6 billion last year, with a double-digit growth rate of 13.2%.

Market size

The engineering R&D and product development market in India is forecast to post a CAGR of 12% to reach US$ 63 billion by 2025, from US$ 31 billion in 2019. As per the Economic Survey 2022, India's gross domestic expenditure on R&D (GERD) as a percentage of GDP stood at 0.66%.

There are 143,695 startups (as of August 2024) *from 350 startups in 2014*. India has witnessed an investment of over Rs. 1,000 crore (US$ 120.21 million) in Space Startups in the last nine months between April to December 2023. IT spending in India will grow 10.7% YoY to reach US$ 124.6 billion in 2024, as forecasted by Gartner. India's bio economy was valued at US$ 137 billion in 2022 and aims to achieve US$ 300 billion mark by 2030.The science and technology sector has became India's top employment generator.

Under the Interim Budget 2024-25, the government announced an allocation of Rs. 8,029 crore (US$ 966 million) to the Department of Science and Technology and Rs. 16,604 crore (US$ 2 billion) to the Ministry of Science and Technology.

Framework for assessing the economic effect of AI for selected G20 countries in its latest AI research studies and forecasts that AI will raise India's annual growth rate by 1.3% by 2035. India's National Artificial Intelligence Strategy prepared by NITI Aayog outlined a way forward to harness the potential of Artificial Intelligence (AI) in different fields. State University Research Excellence (SERB-SURE) to create a robust R&D ecosystem in state universities and colleges; Fund for Industrial Research Engagement (SERB-FIRE) to support research and development to solve critical problems that are relevant to industries in a public-private partnership mode.

The Road Ahead

India ranks third among the most innovative lower-middle-income economies in the world. Rising per capita income in India will bring a boom in R&D investment in the country with multiple foreign players shifting R&D bases to India India plans to move forward with developing its science and technology sector by collaborating with other countries. India has active bilateral science and technology (S&T) programs of cooperation with more than 45 countries, including dedicated programs for Africa, ASEAN, BRICS, EU and neighboring countries. India also collaborated with Denmark and agreed to a five-year plan to implement a green strategic partnership for enhancing partnerships in various areas, including science and technology. India is aggressively working towards establishing itself as a leader in industrialization and technological development. Significant developments in the nuclear energy sector are likely as India looks to expand its nuclear capacity. Nanotechnology is expected to transform India's pharmaceutical industry. The agriculture sector is also likely to undergo a major revamp with the government investing heavily in a technology-driven green revolution.

References *- Media Reports, Press Releases, Press Information Bureau (PIB), Union Budget 2022-23/ 2023-24*

Dr. Navin Ahlawat
Editor-in-Chief
VIGYAN DARPAN

1. Science for Viksit Bharat

https://images.moneycontrol.com/static-mcnews/2023/08/Chandrayaannew-770x433.jpg?impolicy=website&width=770&height=431

India has always been one of the leading countries in science, medicine and research. From discovering 0 by the famous Aryabhata to providing covid vaccines to the world. Producing great mathematicians who could solve the most complex mathematics equations in the world such as Srinivasa Ramanujan and the human calculator Miss Shakuntala Devi. When we talk about Indian science, how can one forget the missile man of India, Dr A.P.J Abdul Kalam and his work in the development of India's ballistic missile and space programmes which bolstered India's defense capabilities. Sir C.V Raman and his phenomenal work in the field of light scattering. This 'Raman effect' got him the India's Highest Civilian Award, Bharat ratna. National Science Day is celebrated on 28th of February every year to mark the discovery of Raman effect. In the space sector, ISRO's indigenous technologies have brought global acclaim. Chandrayaan, Mangalyaan, and the upcoming Gaganyaan are examples of how homegrown space technology is putting India at the forefront of space research, at a fraction of the global cost. Chandrayaan 3 is also said to have possibly landed on the oldest buried crater of the moon. In the defense sector, India has made significant strides through initiatives like "Make in India." The development of indigenous systems such as the Light Combat Aircraft (Tejas), the Agni missile series, and the INS Arihant nuclear submarine underscores India's capability to create advanced military technologies. This strengthens national security while reducing reliance on foreign defense imports. The major break through in healthcare such as the development of the covid vaccines. India also shared the 162.9 million of its covid vaccines to 96 other countries saving millions of lives.

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2. Addressing Electrical Problems in India with AI-Enhanced Solar Tracking Systems

In India the lack of reliable electricity restricts the access to the essential services such as education and healthcare. Frequent power outages and insufficient electricity supply disrupts overall development. A promising solution is the implementation of AI-enhanced solar tracking systems. Unlike fixed solar panels, these systems use machine learning algorithms to continuously adjust their orientation based on real-time data which reads every minute of the day, maximizing sunlight exposure throughout the day. By analysing weather conditions and the sun's trajectory, AI can optimize energy capture, increasing output by 30% to 50% compared to traditional installations.

https://oluwafemidiakhoa.medium.com/the-future-of-solar-energy-in-the-ai-era-afcc07c07d00

Additionally integrating energy storage solutions like lithium-ion batteries allows communities to store excess energy for night time use. The AI system can monitor battery levels and consumption patterns to optimize energy distribution. By using AI-enhanced solar tracking technologies, communities can significantly improve their access to electricity, empowering residents and increases sustainable economic growth while addressing critical energy challenges.

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3. Indigenous Technologies for a Viksit Bharat: A Vow towards Self-Reliant India

The dream of a Viksit Bharat, which stands for a developed India, has more to do with indigenous technologies. They exhibit the history of innovations that have existed in the country. At one extreme, it spans from an ancient scientific-oriented country to the present day where there are modern technologies in energy, self-feeding health systems and agriculture that assure all Indians that the country will remain self-sufficient. The country due to effective leadership in solar energy and electric vehicle technology has also set a course for a more sustainable development. The influx of low-cost, high-quality drugs from Indian pharma industry, especially because of the speedy development of COVID-19 vaccines, is an illustration of how India can devise solutions to issues on a global scale from within its borders. Also, the inclusion of Ayurveda, which is a traditional method of treatment, within the confines of modern hospital structures shows how India thinks differently about the problems in other regions of the world. Even so, indigenous technologies are sure to provide Indians, especially those from rural India, with cheaper alternatives, for instance, mobile healthcare applications and efficient irrigation systems. Less than a decade later, a slew of innovative campaigns such as Aatmanirbhar Bharat- the Self-Reliant India agenda came up that encouraged research and innovation by funding such initiatives and enabling the positive output of joint efforts by start-ups, academia, and industries. The native technology will be one of the main drivers needed to make India self-sufficient and prosperous in years to come. Bringing up indigenous innovations will not only help to raise India to a position that no other nation can occupy but also help each citizen to progress at a respectable pace.

Image Source: AI Generated

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4. Indigenous Technologies for Viksit Bharat

Complementary metal-oxide semiconductor (CMOS) cameras have become the modern imaging technology.

https://techovedas.com/explained-what-is-cmos-technology

Their popularity stems from several key advantages over traditional imaging sensors, such as charge-coupled devices (CCDs). CMOS sensors are semiconductor image sensors that convert light into electrical signals. CMOS sensors contain rows of photodiodes coupled with individual amplifiers to amplify the electric signal from the photodiodes. This structure not only enables CMOS sensors to operate on less electrical power than CCDs but also enables speedier and easier reading of electrical charges. CMOS can be manufactured at a relatively lower cost. A CMOS camera uses a sensor made of millions of tiny photodiodes, each corresponding to a pixel in the final image. When light hits these photodiodes, they generate electrical signals that are processed by an array of transistors built into the sensor itself. Advantages of CMOS over traditional CCDS are that they consume relatively less power, have faster readout speeds, have integration capability, and are cost-effective. CMOS cameras can improve urban safety through better surveillance systems. This supports initiatives for smart city development. CMOS technology can advance telemedicine and remote diagnostics through high-quality imaging systems in clinics and hospitals, facilitating better healthcare delivery, especially in rural areas.

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5. An Indigenous Technologies for Viksit Bharat

https://billionbricks.org/blog/toward-sustainability-3-famous-green-buildings-in-india

If India has to become a Developed India (Viksit Bharat), then it is critical that we work on integrating indigenous technologies into our engineering practices. They help us achieve sustainable development and promote solutions which are grounded in local traditions and knowledge. Cultural practices, indigenous wisdom such as Water harvesting systems of yore, Organic farming methods, renewable energy solutions. These approaches can be adopted by engineering students, in order to design solutions that are not only efficient, but also have local relevance and sustainability. To take an example, students could learn about bioengineering from studying traditional medicinal plants and discover sustainable building with local materials for low ecological footprints. Also, as part of the advancement of sectors like solar energy that have the support of traditional energy systems, to guarantee autonomous energy in rural areas. Students from engineering can work towards in making new indigenous technologies more widespread to bring in development for the community, bridging this gap of modern vs traditional wisdom. This would result into not only building the technological skills but also making feel a sense of responsibility towards social problems leading to real "Acche Din" for India. When used by future engineers, these technologies will ensure solutions made by them are inclusive, sustainable and in sync with India's rich heritage.

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6. Indigenous Technologies for Viksit Bharat: Bridging Tradition and Innovation

As India strives for Viksit Bharat, or a Developed India, leveraging indigenous technologies is crucial. These traditional practices, honed over generations, offer sustainable solutions in various sectors, including agriculture, energy, health, and crafts. In agriculture, techniques like crop rotation and organic farming enhance biodiversity and food security, while indigenous seeds foster resilience against climate change. The shift towards renewable energy can be powered by local resources, such as solar and biomass, which can be integrated with modern technologies for greater efficiency. Traditional health systems like Ayurveda and Siddha emphasize preventive care and utilize locally available remedies, providing affordable healthcare options. Moreover, indigenous architectural methods promote eco-friendly housing solutions that respect local climates.

Supporting local artisans revives traditional crafts, fostering economic development and cultural preservation. However, challenges such as funding and recognition remain. To realize the vision of Viksit Bharat, a multi-stakeholder approach is essential, involving government, educational institutions, and communities. By embracing indigenous wisdom alongside modern innovation, India can achieve sustainable development that enriches both its economy and cultural heritage.

https://agtecher.com/wp-content/uploads/2023/12/Synecoculture-1024x546.jpg (symbiotic agriculture)

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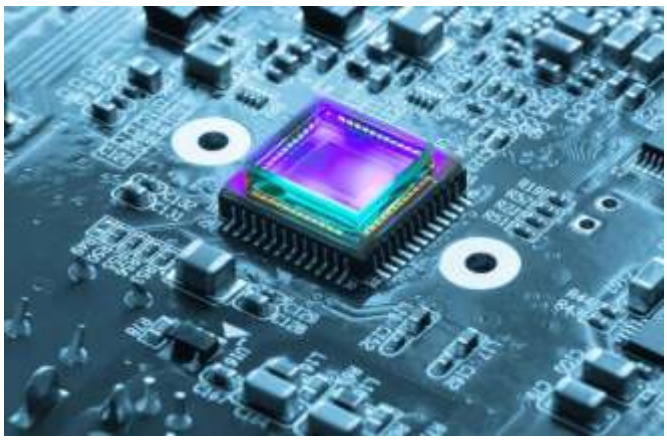
7. High-Quality Imaging on a Budget: The Rise of CMOS Cameras



https://www.shutterstock.com/image-photo/photosensitive-sensor-on-printed-circuit-600nw-1291716007.jpg

Ever wonder how your smartphone captures the perfect selfie while helping farmers monitor crops? Enter CMOS cameras—the multitasking wonders of modern technology! These devices function like Swiss Army knives for imaging, from spotting wildlife to enhancing classroom learning. If only they could also find your keys or decode your cat's antics. A CMOS camera (Complementary Metal-Oxide-Semiconductor) uses a CMOS sensor to convert light into electrical signals, enabling rapid image processing and high-quality images in various lighting conditions. Unlike CCD cameras, which read pixels sequentially, CMOS sensors read multiple pixels simultaneously, resulting in faster performance and lower energy consumption.

CMOS cameras enhance precision farming by monitoring crops, improve STEM learning in education, and aid wildlife conservation in Yellowstone by tracking animal populations, enabling researchers to study behaviours without disturbance. CMOS cameras are affordable and energy-efficient, delivering high-quality imaging for agriculture, education, and conservation. Despite challenges in low light and noise, ongoing advancements are improving performance and image quality. CMOS cameras significantly impact various fields by enhancing accessibility, efficiency, and sustainability.

"***If only our cameras could help us find missing socks as easily as they track endangered species!"***

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8. Empowering Viksit Bharat: The Role of Indigenous Technologies

Indigenous Technologies herald not only a new era but also a chance for scientific community and general people to cooperate, work together, and advance India's welfare both at home and abroad. It highlights the necessity of addressing issues that are important to mankind as a whole while highlighting the value of turning India into Atmanirbhar through science. These technologies demonstrate the ability of homegrown inventions to solve pressing issues and spur economic development. They are designed to improve a range of industrial processes.

Thermal Camera: The thermal Smart camera has an inbuilt DPU to run various AI-based analytics. The indigenised technology is targeted for applications across multiple domains including Smart cities, Industries, Defence, Health & others. The field implementation, testing, and validation of this camera was done for Road traffic applications.

CMOS imaging system: With a potent on-board computing engine, the Industrial Vision Sensor iVIS 10GigE is a CMOS-based vision processing system designed to handle the demands of machine vision applications.

Fleet Management System: The objective of FlexiFleet is to improve fleet operators' and transportation agencies' operational efficiency. It not only tracks the position of vehicles but also sends out notifications for various scenarios such as driving too fast, braking suddenly, ignition, idling and rash driving Let us once pledge to support and foster indigenous technologies as engines of development and prosperity for Viksit Bharat.

https://eliteextra.com/8-essential-features-of-fleet-management-software

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Year/ Branch: 2nd/ CSE CORE

9. Contribution of Indigenous technologies to “Viksit Bharat

https://vajiramandravi.com/upsc-daily-current-affairs/mains-articles/traditional-indian-medicines

For development and sustainable growth, one must harness indigenous technologies, As the country strides towards becoming a "Viksit Bharat," or a developed nation, embracing indigenous technologies is vital. These traditional systems, crafted over millennia, offer solutions that are sustainable, cost-effective, and highly relevant in today's quest for eco-friendly development. These technologies offer innovative solutions to modern challenges while preserving India’s cultural identity.

Agriculture: The Heartbeat of Viksit Bharat: From ancient water management systems like stepwells and rainwater harvesting to time-tested agricultural practices like mixed cropping, vermicultre and organic farming which reduce the dependence upon chemical extensive methods, which provides better soil health and food security, makes the India more sustainable.

Traditional Healing: A Treasure Trove of Knowledge: The realm of traditional medicine, particularly Ayurveda, illustrates the richness of indigenous technologies. with a focus on holistic healing, Ayurveda utilizes locally sourced herbs and natural remedies, promoting health and well-being. In an era of increasing health concerns, integrating these practices into mainstream healthcare could offer sustainable solutions.

Through the fusion of ancient wisdom and modern science, we unlock the potential for a truly inclusive and resilient "Viksit Bharat," that honors the past while building a sustainable and prosperous future, where tradition and innovation work hand in hand to shape a better future, reflecting its cultural richness and environmental responsibility.

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10. Viksit Bharat: Empowering Through Indigenous Technologies

The Indian journey in becoming a Viksit Bharat is in every way a marked departure from what the globalization notion has originated in the global arena. All the product and technology thrust of India need necessarily bank on indigenous technologies that cater uniquely to the country. India’s drive toward becoming a Viksit Bharat rests on indigenous innovations in each and every sector that can mold self-reliance for the country to fight local issues. Applications of precision farming are crop care AI, using AI, to enhance yield with reduced resources utilization, and drip irrigation/solar powered pumps, which help the farmer irrigate his crops more efficiently. Indigenous seeds add to the Indian farmer's arsenal in combating climate change. Health care: There will be quality health care delivered at remote areas through telemedicine applications like e-Sanjeevani. And affordable medical devices locally developed to ensure there is no reliance on expensive imported medical equipment. India's manufacturing sectors-by advancements in 3D printing and defense production under Make in India, are definitely supporting the country's economic growth. ISRO's indigenous satellite launch capabilities and its space missions like Chandrayaan have placed India on the world map in space exploration. Renewable energy technologies of solar and wind power are creating possibilities for the country's energy independence. Thus, indigenous technologies form the foundation of progress toward self-reliance in India and help the nation achieve its vision for Viksit Bharat.

https://www.linkedin.com/pulse/ai-robotics-agriculture-transforming-future-farming-andrea-stefanachi-ijqpe/

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11. Indigenous Technologies: A Catalyst for Viksit Bharat

Indigenous technologies are vital for achieving India's vision of Viksit Bharat by 2047. They empower local communities, reduce dependency on foreign innovations, and enhance self-reliance.

Empowerment and Socio-Economic Development: Traditional agricultural practices like Zero Budget Natural Farming improve food security and farmer livelihoods. In healthcare, indigenous vaccines like Covaxin exemplify local capabilities in addressing health crises. Renewable energy initiatives, such as the Solar Rooftop Scheme, promote sustainable energy solutions.

Sustainable Practices: Indigenous knowledge fosters environmental resilience through traditional water conservation techniques like rainwater harvesting and check dams, which combat water scarcity.

https://aimodels.org/neuromorphic-computing/challenges-future-directions-neuromorphic-computing/challenges-future-directions-neuromorphic-computing.png

Digital Transformation and Governance: The digital revolution enhances governance through e-governance initiatives like Digital India, making services accessible online. Programs such as PM Kisan Samman Nidhi streamline processes and reduce corruption.

Challenges and Future Directions: Despite these advancements, challenges remain, including the need for robust policy support, investment in education, and increased public awareness of indigenous technologies.

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12. Harnessing Ancient Wisdom with Modern Tech

www.mdpi.com

Ayurveda, one of the world's oldest holistic healing systems, is experiencing a remarkable resurgence as modern technology breathes new life into its ancient practices. With its origins dating back over 5,000 years, Ayurveda emphasizes natural remedies and the harmony of body, mind, and spirit. Today, cutting-edge advancements like artificial intelligence (AI), biotechnology, and telemedicine are transforming how this age-old knowledge is applied in modern healthcare. AI-driven diagnostic tools are now capable of crafting personalized Ayurvedic treatment plans by analysing individual health profiles, while contemporary research continues to validate the therapeutic benefits of Ayurvedic ingredients like Turmeric and Ashwagandha. Additionally, the rise of digital platforms has brought Ayurveda to the global stage, enabling virtual consultations and personalized treatments across borders. This seamless blend of ancient healing with modern innovation not only enhances wellness in today's fast-paced world but also addresses modern health issues such as chronic illness, mental well-being, and immune health. Ayurveda's integration with technology is shaping a future where holistic healthcare, grounded in both tradition and innovation, becomes accessible to all, offering sustainable, personalized solutions for global wellness. This forward-thinking approach makes Ayurveda an invaluable asset in the modern health landscape, positioning it as a key player in the future of holistic healthcare.

Name: Vivek Sharma
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13. Brahmos: The Indian defense project and India's fastest cruise missile

www.snafu-solomon.com

India has traditionally been a land of research and development. One such research that attracts our attention today is the Brahmos aerospace project between India and Russia (1998-2024) DRDO from India and NPO Mashinostroyeniya. The project is named after the 2 prominent rivers of the Brahmaputra and The Moskva of Russia. Its main objective was to develop supersonic missiles based on ramjet technologies without a single moving part in the missile, While the project gave many considerable results which initially parent to the main Brahmos missile example Brahmos NG, Brahmos-II (under development), UCAV variant (Under development). Also, Initially, Russia supplied 65% of the Brahmos components, including its ramjet engine and radar seeker. Currently 65% of the missile is manufactured in India and there are plans to increase this to 85% by replacing the components with an Indian made seeker and booster. India has continued to maintain a lead in this missile project now hoping to supply this indigenous technology to Russia, Brazil, Phillipines, etc. DMSRDE developed initial fuel for brahmos replacing imported fuel from Russia and new planting facilities to be established in Uttar Pradesh. The missile currently possesses Air to air, water to water, anti-ship, air to land, anti-aircraft carrier, land to land. Currently the range of Brahmos missile is 290 kilometers to 900 kilometers varying from platform of launch and it's a supersonic cruise missile that can travel at Mach 2.8. India is also developing the BrahMos-II, a hypersonic scramjet-propelled missile with a range of 1,500 kilometers and a speed of Mach 8.

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14. Digital India: Indigenous Innovations in IT and Software

India has become a powerhouse in IT , not only as an outstanding service hub but also paving the way to innovation with indigenous technologies. This transformation in India has been possible due to the Government of India's initiative known as "Digital India" and the flourishing ecosystem of IT companies, entrepreneurs, and startups. Development of indigenous technologies such as Artificial Intelligence, blockchain, and digital payments is setting the slate and bringing sterling recognition to India's economy, solidifying it in the global technological arena. India's IT hub emerged in the 1990s when the country positioned itself as the leader in software development and IT services. Companies like TCS and Infosys were the forerunners of this movement by offering qualitative yet cost-effective IT solutions to clients across the world. This success ignited not only India & economy but an IT revolution that had wide-ranging effects. Leaders in AI, data science, cybersecurity, and cloud computing, Indian companies have emerged with several of the world's largest IT firms, a thriving start-up ecosystem, and talented human resources, making India an IT superpower. India is advancing in Artificial Intelligence and blockchain technology.

Image Source: AI Generated

Indian start-ups and IT giants are using AI in healthcare, agriculture, and education. AI-powered tools help optimize crop yields, assist doctors in diagnostics, and facilitate personalized learning for students. Blockchain, known for secure and transparent transactions, is gaining traction with the Indian government exploring its use for land records, supply chain transparency, and electoral processes. Indian companies are creating indigenous blockchain solutions to build a comprehensive digital trust ecosystem across sectors.

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15. Exploring Indigenous Technology for Viksit Bharat's Future

Image Source: AI Generated

India's indigenous technologies have played a pivotal role in the country's development, and their significance cannot be overstated. These technologies, rooted in India's rich history and culture, have continued to evolve and contribute to various sectors, including agriculture, healthcare, and infrastructure. From ancient practices to modern innovations, indigenous technologies showcase the ingenuity and resourcefulness of the Indian people. The history of indigenous technologies in India dates back centuries, with remarkable advancements in fields such as metallurgy, textiles, and medicine. Traditional knowledge systems, such as Ayurveda and yoga, have gained global recognition for their effectiveness and holistic approach to health and wellness. These time-tested practices have not only endured but have also been integrated with modern scientific principles, leading to the development of innovative healthcare solutions. In contemporary times, India has made significant strides in harnessing indigenous technologies to address current challenges and foster sustainable development. The government has been proactive in promoting research and development in this area, leading to the emergence of initiatives that aim to preserve traditional knowledge while leveraging it to create modern solutions. Infrastructure and skill development to further harness the capabilities of indigenous technologies. Government initiatives have played a crucial role in nurturing innovation and self-reliance through various programs and policies. The establishment of dedicated research institutions and the provision of financial support for indigenous technology projects have been instrumental in driving progress. Furthermore, collaborations between educational institutions, industry stakeholders, and indigenous communities have facilitated knowledge exchange and technology transfer, contributing to a more inclusive and sustainable development framework.

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16. The Digital Pulse of Healthcare-Electronic Health Records

India, also known as the “Pharmacy of the World”, has revolutionized healthcare, enhancing patient care and increasing efficiency. Generation after generation with the development of EHRs, patients are able to access their health update regularly. These are real-time versions of patients' records and provide a comprehensive report of an individual’s overall health. Electronic Health Records (EHRs) help track patient’s clinical progress, facilitate improved healthcare decisions, and provide evidence-based care. It provides a centralized and accessible medical history.

Each person has personalized healthcare due to which there is an improvement and early detection of any disease if present. It provides a streamlined clinical workflow by using automated documentation and has standardized and even improved the consistency of the reports.

https://biomedicalodyssey.blogs.hopkinsmedicine.org/2018/09/electronic-health-records-shape-the-medical-student-experience/

Barriers: Electronic Health Records are unquestionably an upgrade to the traditional system of paper-based tracking. Nevertheless, the success of this technology is entirely based upon its effective implementation. From technical challenges to user experience challenges, some ample risks and complications need to be addressed and any such error in technology will directly result in patient harm. Thus with the evolving technology, it’ll be crucial to address the full potential of healthcare technology.

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17. Indigenous Technologies for a Viksit Bharat

https://storymaps.arcgis.com/stories/5b0cb26c909848d1b04cee19a6e8fcbe

As India embarks on its journey towards becoming Viksit Bharat, or Developed India, the revival and integration of indigenous technologies emerge as pivotal components in this transformative narrative. These technologies, deeply rooted in local traditions and practices, offer innovative solutions to contemporary challenges, fostering sustainable development and cultural preservation. At the forefront of this movement is agriculture, where indigenous practices like zero-budget natural farming are redefining the future of food production.

By eliminating dependence on chemical fertilizers and promoting natural ecosystems, these methods enhance soil health, increase crop resilience, and empower farmers economically. The resurgence of these industries creates unique, culturally rich products that resonate with consumers both locally and globally. By supporting artisans and promoting handmade goods, India can tap into the growing market for sustainable and ethically produced products. This not only preserves traditional skills but also fosters a sense of pride in cultural heritage, bridging generations.

Traditional practices such as rainwater harvesting, check dams, and community-managed irrigation systems demonstrate a profound understanding of local ecosystems. Herbal remedies and natural treatments can serve as complementary solutions to modern healthcare, especially in rural areas where access to medical facilities is limited. By integrating traditional knowledge with modern medicine, we can create a more inclusive healthcare system that respects cultural wisdom.

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18. Indigenous Technologies for Viksit Bharat

Viksit Bharat" symbolizes the transformative journey of India towards progress and development. It embodies the aspirations of a nation poised for change, embracing innovation and growth across all facets of society. "Viksit Bharat" reflects India's commitment to uplifting its socio-economic structure. Initiatives such as the National Rural Employment Guarantee Scheme (NREGA) and Pradhan Mantri Jan Dhan Yojana focus on poverty alleviation and empowering marginalized communities.

Image Source: AI Generated

These programs provide financial security and create livelihood opportunities, ensuring inclusive growth. Recognizing technology's role in progress, "Viksit Bharat" emphasizes its application in healthcare, agriculture, and governance. Initiatives like Digital India and Bharat Net aim to bridge the digital divide, enabling wider access to technological tools. By leveraging technology, India seeks to drive innovation, improve services, and boost economic growth. "Viksit Bharat" also underscores the significance of environmental sustainability. Initiatives like the National Clean Air Programme and Swachh Bharat Abhiyan promote cleaner and greener living environments, ensuring a healthier and more sustainable future for generations to come.

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19. Indigenous Technologies for Viksit Bharat: Bridging Tradition and Innovation

https://skill-lync.com/blogs/harnessing-sustainable-energy-and-green-technologies-for-a-brighter-future

Introduction: India's vision of "Viksit Bharat" (Developed India) emphasizes harnessing indigenous technologies that blend local wisdom with modern advancements. These technologies can address contemporary challenges while promoting sustainability.

Agriculture: Traditional practices like crop rotation and organic farming enhance soil health and resilience against climate change. Initiatives such as Zero Budget Natural Farming empower farmers to adopt sustainable methods.

Renewable Energy: Indigenous solutions, including solar cookers and biogas plants, provide clean energy and reduce reliance on centralized power. Solar microgrids in rural areas exemplify this empowerment.

Water Management: When combined with modern technology, traditional techniques like rainwater harvesting and check dams can effectively tackle water scarcity.

Medicinal Practices: Indigenous knowledge of herbal medicine offers valuable resources for healthcare, promoting holistic health solutions. By recognizing and integrating these indigenous practices, India can create a more inclusive, resilient society. The journey toward Viksit Bharat is about modernization and honoring the past while building a sustainable future.

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20. Mobile Clinic: Your Neighbour in Need

If there had been a mobile clinic back then, Dashrath Manjhi might not have needed to carve a mountain! In India, healthcare access is often a distant dream for rural communities. And now, mobile clinics serve as a happy sign. These clinics bring essential medical services directly to villages. They provide a range of services at everyone's doorstep such as vaccination, routine check-ups, addressing chronic conditions, providing maternal care and what not. Telemedicine further enhances healthcare delivery by allowing patients to consult with specialists from the comfort of their homes and thus bridging the distance between rural patients and urban healthcare expertise, ensuring timely medical advice and support.

https://www.coroflot.com/mithunaynical/Design-of-a-mobile-medical-clinic-to-function-in-remote-areas

The combination of mobile clinics and telemedicine fosters a sense of community and support, transforming the healthcare landscape in Bharat and moving closer to a future where quality healthcare is a right, not a privilege. As these services continue to evolve, they remind us that technology, when rooted in compassion, has the power to transform lives. With all this paving the way, a healthier India is not just a vision- it's an emerging reality.

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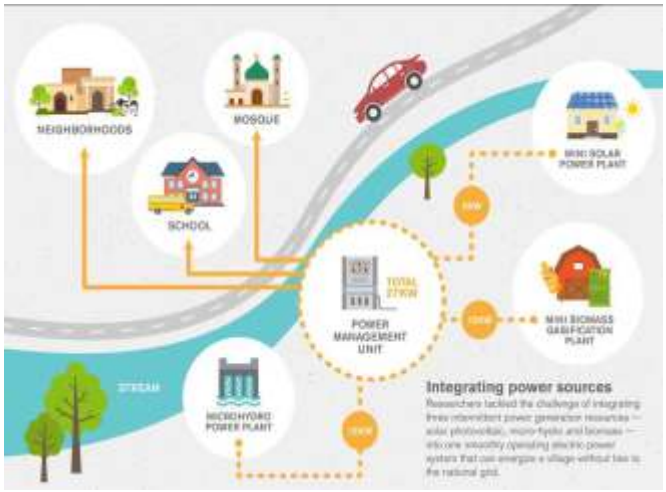
21. Empowering Remote Communities: The Power of Micro-Hydel Projects



https://uspcase.asu.edu/2018/10/23/empowering-off-grid-communities/

Micro-hydel projects are small-scale hydroelectric power systems designed to generate electricity from the flow of streams and rivers, typically producing up to 100 kilowatts (kW) of power. Developed by local communities, NGOs, and state governments in India's hilly regions, these projects address the challenge of providing electricity to remote, off-grid areas where extending traditional power grids is difficult and costly. Micro-hydel plants harness the kinetic energy of flowing water to turn turbines connected to generators, producing clean, renewable electricity. Unlike larger hydropower projects, micro-hydel plants require minimal damming, resulting in a lower environmental impact and preserving the natural ecosystem. These projects are particularly effective in mountainous regions like Himachal Pradesh, Uttarakhand, and the Northeastern states, where small streams are abundant. They enable energy self-sufficiency for rural communities, providing reliable power for homes, schools, and small businesses, reducing reliance on diesel generators and improving the quality of life. Community involvement in the operation and maintenance of micro-hydel projects fosters local ownership and skills development. By offering a sustainable energy solution, micro-hydel projects contribute to rural development, help mitigate climate change, and support India's renewable energy goals.

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22. Embracing Zero Waste Living: A Path to Sustainability

"One of the first conditions of happiness is that the link between man and nature shall not be broken." As environmental concerns rise, many individuals are seelxing ways to reduce their ecological footprint. One of the most impactful approaches is zero waste living, a lifestyle aimed at minimizing waste and promoting sustainability. By adopting practices that prioritize resource conservation, zero waste living not only benefits the planet but also fosters a more mindful and intentional way of life. Zero waste living is a philosophy that encourages individuals to refuse, reduce, reuse, recycle, and rot. This fraine world, often referred to as the "5 Rs," which are REFUSE, REDUCE, REUSE, RECYCLE ROT emphasizes the importance of reducing consumption and waste generation at the source, rather than relying solely on recycling and disposal methods. There are many benefits of Zero living that are:- protects the environment, saves money, promotes self-sufficiency, increase health, builds community, etc.
We can start Zero living in many ways: Assess Your Waste, Set Realistic Goals, Educate Yourself, Make Small Changes, and Connect with Community. Zero waste living is more than just a trend; it's a commitment to a sustainable future. By embracing the principles of the 5 Rs and making mindful choices, individuals can significantly reduce their waste and contribute to a healthier planet. Whether you're just starting or looking to deepen your commitment, every small step counts in the journey toward zero waste. Together, we can create a more sustainable world for ourselves and future generations.
"The Earth is what we all have in common."

https://www.ohs-consultant.com/2024/01/embracing-zero-waste-lifestyle-path-to.html

Name: Misthi Maheshwari
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23. Revival of indigenous Crafts

India's rich cultural heritage encompasses a stunning array of traditional crafts, from handloom textiles to exquisite pottery and metalwork. Reviving these indigenous crafts is essential for sustaining livelihoods and fostering economic empowerment and cultural pride. By promoting handcrafted products, India can showcase its diversity while uplifting local artisans.

Imagine a bustling bazaar where artisans weave stories into stunning textiles and potters shape clay into timeless treasures. Embracing the vision of "Viksit Bharat," this revival transforms into a vibrant movement, breathing new life into our cultural legacy.

Skilled weavers turn local fibers into masterpieces, their looms echoing ancestral techniques, while vibrant natural dyes reflect the hues of our landscapes. Terracotta artisans create not just pots but pieces of history, each a testament to their artistry.

https://armchairjournal.com/reviving-the-handicraft-in-india/

Digital platforms serve as modern bazaars, connecting artisans to global consumers and showcasing their unique talents. Community workshops become creative hubs, where seasoned craftsmen share their wisdom with eager learners, igniting a renaissance of skills.

This revival is about forging a sustainable future. By honoring our artisans and their crafts, we weave a narrative of empowerment and cultural pride. Let's celebrate the heartbeat of India—its indigenous crafts—and illuminate the path to a vibrant tomorrow.

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24. India Soars High as The Future Global Leader in Aviation Industry

India is poised to become a global powerhouse in Sustainable Aviation Fuel (SAF) production, thanks to its vast agricultural resources. Airbus executive Julien Manhes predicts, "India's large agricultural production puts it in the driver's seat for SAF leadership."

The International Air Transport Association (IATA) is set to launch a SAF registry in 2025, giving airlines a clear path to reduce carbon emissions. India's booming aviation sector, fueled by rising travel demand, creates a perfect storm for SAF adoption. The Indian government is leading the charge, aiming to blend 1% SAF with conventional jet fuel by 2025, ramping up to 5% by 2030. Oil Minister Hardeep Singh Puri assures that cabinet approval is the final hurdle before full-scale SAF rollout. India's agricultural bounty is a key advantage. Crops like jatropha, sugarcane, and oil palm can be transformed into SAF. Recent breakthroughs in turning agricultural waste into fuel add to the country's potential. A recent milestone saw a Delhi-to-Pune flight powered by indigenous SAF, a testament to India's innovative spirit. This fuel was developed with support from the Indian Oil Corporation and Hindustan Aeronautics Ltd.

Image Source: AI Generated

With these advancements and abundant resources, India is all set to take flight as a global leader in sustainable aviation.

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25. Eco-Friendly Building Materials

Eco-friendly building materials pave the way toward sustainable construction in the pursuit of meeting the growing demand for housing and infrastructure without deteriorating environmental conditions. Conventional building materials often lead to resource depletion, pollution, and energy inefficiency, but eco-friendly building materials can offer a better solution. This article discusses several eco-friendly materials, their benefits, and how they are useful for India's sustainable future. Eco-friendly building materials are those with minimal environmental effects in their production, use, and disposal. These materials are usually from renewable resources, energy-friendly, and non-toxic to human health and the ecosystem. The adoption of such materials is essential to solve issues with climate change, resource scarcity, and urbanization. Bamboo, known as "green steel" due to its significant strength-to-weight ratio, is one of the eco-friendly materials. It can grow fast, mature in 3-5 years, and absorb more carbon dioxide compared to many other trees. It is used in various construction applications, from structural beams to floors. Bamboo can be harvested without killing the plant, promotes regrowth, has a low carbon footprint, and adds great aesthetic character to spaces. Recycled materials, such as reclaimed wood, recycled steel, and repurposed bricks, make use of less waste in the disposal phase and decrease raw material consumption. Straw bale construction, using straw bales as wall systems, is gaining popularity due to its energy efficiency, affordability, and minimal harmful residues at the end of its life cycle.

Image Source: AI Generated

Name: Sahil Kumar
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26. Roots of Innovation: Crafting a Viksit Bharat through Indigenous Technologies"

Image Source: AI Generated

India's future is being shaped by the innovative spirit deeply rooted in its past. From the brilliance of ancient Indian mathematics to the cutting-edge strides in space exploration, our indigenous technologies are leading the charge toward a Viksit Bharat. Imagine a nation where rural farmers use drones to monitor their crops, powered by solar energy harnessed from deserts. Where healthcare is revolutionized through AI-driven diagnostics, developed by our own tech startups. The Chandrayaan-3 mission, crafted entirely by Indian minds, is a shining beacon of self-reliance, showing the world that India is no longer a consumer of technology but a creator. Meanwhile, our indigenous defense systems safeguard the country, built with homegrown precision and expertise. These technologies, born from the needs and aspirations of the Indian people, are the true engines of our development. By nurturing local talent and promoting *Atmanirbhar Bharat*, we are paving the way for a future where India stands as a global leader—not just in innovation, but in creating solutions that reflect the spirit and soul of our nation. As we move forward, the convergence of tradition and innovation will empower India, unlocking boundless opportunities. Let's celebrate and cultivate these roots to shape the India of tomorrow.

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27. Samudrayan: Deep Dive in the Blue Frontier of India

India is launching its Samudrayan mission under the leadership of NIOT, a manned submersible "MATSYA 6000" that will take 3 crew members to a depth of 6,000 meters. This mission would unlock great reserves of minerals and wonderful ecosystems submerged in this ocean. With these valuable resources, India will become the 6th country to pilot a crewed under-sea expedition, and is expected to launch in 2024-25. The mission will reduce India's dependency on imports, so that more minerals are discovered, thereby opening up economic potential and strengthening domestic industries. Moreover, from the information gathered about marine biodiversity, it could lead to enhanced conservation in those areas where millions are living along the coasts and depend on the ocean for their livelihood. Effort is compensated by focusing on indigenous technological advancements towards self-reliance. Advances in deep-sea navigation, underwater robotics, and pressure-resistant engineering are of wide application-moving from renewable energy to disaster management-will further add strength to India's blue economy. Beyond being a deep-sea mission, Samudrayan is a bold foray into unlocking the vast yet untapped potential of the ocean. India is going to dive deeper and look for not just more resources but towards leading in sustainable marine exploration so that the Ocean's bounty benefits not only the present but also the generations to follow.

Image Source: AI Generated

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28. Indigenous Technologies for Developed India: Using Innovation to Forecast

The Legacy of Indigenous Creativity

India has long been a hub for innovation in fields like metallurgy, agriculture, and medicine. Ancient systems like Karez irrigation and Ayurveda prioritized human welfare and environmental harmony. This balance between nature and technology offers a pathway for sustainable development as India progresses.

Native Agricultural Tools

Agriculture has always been vital to India's economy. Techniques like organic farming, vermicomposting, and bio pesticides—reviving age-old methods—reduce chemical use, improve soil fertility, and boost crop resilience. The System of Rice Intensification (SRI), developed in Tamil Nadu, enhances crop yields while conserving water, improving livelihoods for small farmers.

Conventional medical care and treatment

Traditional systems like Siddha, Ayurveda, and Unani are regaining popularity. Blending modern and traditional medicine offers holistic, affordable healthcare. Herbal remedies and yoga promote well-being and preventive care.

Renewable Energy Sources

India's indigenous technologies, like solar power, windmills, and Gharats (watermills), support the global shift to renewable energy. Modern urban planning can integrate ancient architectural practices like passive cooling methods to enhance energy efficiency.

Indigenous Wisdom for the Environment

India's indigenous knowledge systems help preserve ecosystems and biodiversity. Initiatives like Rajasthan's Divine Groves and Nagaland's Zabo water conservation system demonstrate how traditional wisdom can support ecological balance and sustainable growth.

The Future of Viksit Bharat

To realize the vision of a developed India, the country must blend ancient knowledge with modern technologies. By supporting indigenous innovations and empowering communities, India can foster sustainable, inclusive growth while reducing reliance on foreign technologies.

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29. 3D Printing in Spacecraft Manufacturing: Building Indigenous Technologies for Viksit Bharat

India's space program, led by ISRO, is renowned for achieving impressive milestones on limited budgets. However, to further reduce costs and boost self-reliance, the adoption of **3D printing** technology offers promising solutions. This advanced manufacturing technique has the potential to revolutionize the way spacecraft and satellites are constructed, allowing India to reduce dependency on foreign suppliers while accelerating mission timelines.

3D printing offers several advantages:

Cost Efficiency: Reduced material waste and labor-intensive processes.

Rapid Prototyping: Quicker production of spacecraft components.

Weight Reduction: Lighter structures leading to lower fuel consumption.

Image Source: AI Generated

While global players like NASA and SpaceX have integrated 3D printing into their space missions, India has a unique opportunity to apply indigenous 3D printing solutions tailored to its needs. The key challenge remains developing advanced materials and ensuring safety compliance. However, with continued investment and collaboration, India can lead the way in space innovation, making 3D printing a cornerstone of its **Viksit Bharat** vision. In the future, this technology could enable deeper space exploration and more frequent, cost-effective missions.

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30. The new dawn of sustainable development in rural India

Farmers are the backbone of the Indian economy. Every technological advancement thus far, can see its applications in agriculture. Notably, the green revolution in the 1960s augmented agricultural productivity through the adoption of high-yield crops and chemical inputs. Though the green revolution was successful in handling many problems, it also resulted in several adverse effects, which ultimately fueled the rise of a new approach called 'Sustainable Development'. Sustainable development in the context of rural India today is technological solutions oriented, as evident in the recently launched AgriSURE fund for Agri Tech Startups and sustainable farming practices. The 'AgriSURE' event on 3rd September also saw the success of the AgriSURE Greenathon, a national competition which recognised and funded agri entrepreneurs. The vegan leather startup, Greensapio emerged as the winner, and Krushikranti and Ambronics were the runners-up. Greensapio aims at transforming agricultural waste like wheat and rice straw etc., through advanced technologies. In contrast, Krushikranti offers an exclusive ecommerce platform for farmers, while Ambronics developed a plantation system for horticultural crops. The above marks the new dawn, where Startups leverage cutting-edge indigenous technologies in addressing modern agricultural challenges, but also build on traditional knowledge and local resources, while preserving for future generations.

Image Source: AI Generated

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31. Indigenous Technologies for Viksit Bharat

The theme is Indigenous Technologies for Viksit Bharat, focusing on promoting and advancing indigenous technologies in India for self-sufficiency in all aspects of development. "Viksit Bharat" refers to a developed India with progressive changes in science and technology capabilities within the nation.

What is Indigenous Technology?
The term "Indigenous Technology" refers to technology developed through investigation and experimentation within a specific locality by people who have lived there for many generations. These technologies are developed based on the needs, resources, and surroundings of the people. Indigenous technologies are seen as vital for advancing culture, economic independence, and responsible development.
Sustainable Development: Because the inventions are made with all the effort to keep the Eco-system in check, there are less chances to encounter destruction of the environment.
Self-Reliance: Indigenous technologies promote self-reliance, especially in the fields of external resource and expert consultation.
Cultural Preservation: Indigenous technologies enable the sustainable preservation of the wisdom and traditions of communities around the world, which are critical for the survival and evolution of the communities in the world. Let us illustrate some indigenous technologies examples in India.
Traditional Agriculture: India also possesses an enduring cultural heritage of techniques that foster agricultural productivity including organic farming as well as crop rotation and other resource conservation agriculture practices.
Handicrafts: The country has a rich culture of affordable getting artisanal work like textile, ceramics, and wood carvings that also market the cultural industry and the economy. Challenges and Opportunities Despite the great prospects indigenous technologies hold for Viksit Bharat in terms of equity, there are a number of issues that still need to be tackled including,
Market Access: There is a need of means of reaching out to consumers who will enhance economic development and the indigenous technologies.

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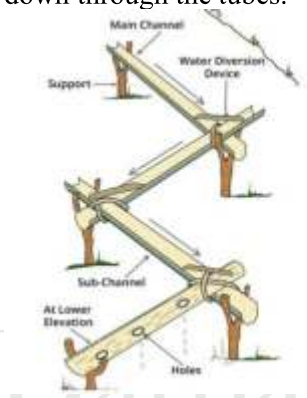
32. Smart Bamboo AI Irrigation System: Way for Efficient Farming

The Food and Agriculture Organization reports that nearly 1.2 billion people live in areas of water scarcity. As water scarcity becomes an increasing concern, especially in farming, it is essential to explore innovative solutions. One promising approach combines traditional bamboo drip irrigation, commonly used in northeastern India, with modern AI technology. Bamboo drip irrigation has been a part of farming for generations. Indigenous people skillfully craft these bamboo systems, placing them at angles to allow gravity to pull the water down through the tubes.



This efficient design ensures that water reaches the crops. The system is particularly beneficial for hilly terrains, where conventional irrigation methods can be challenging. However, without precise monitoring, farmers can struggle to determine the right amount of water needed for their crops. They may apply too much, leading to water wastage, or too little, which can harm plant growth. So, we can create an AI Monitored System to control this. Basically, this is a system equipped with sensors that monitor soil moisture levels, weather conditions, and even the health of the plants. This AI system collects data from these sensors and analyzes it to determine how much water the crops need. If the soil is too dry, AI can open valves to allow more water to flow through the bamboo system. Conversely, if it has been raining, the AI will adjust the flow to conserve water. By integrating AI, farmers can reduce water usage by 25% and increase crop yield by 20-30%, providing a sustainable model for farming.

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