REMEMBERING NATIONAL SONG

As the echoes of "Vande Mataram" resonate across generations, it serves as a timeless reminder of India's journey toward freedom, unity, and national pride. Written by Bankim Chandra Chatterjee in the late 19th century, this immortal song transcends language and region, symbolizing the soul of the Indian nation. Remembering our National Song is not merely an act of nostalgia but a reaffirmation of the values and emotions that once inspired millions to rise against colonial rule.

When Vande Mataram first appeared in Bankim Chandra's novel "Anandamath" in 1882, it was more than poetry-it was a clarion call. Its verses evoked the image of the motherland as divine, nurturing, and sacred. During India's struggle for independence, the song became a unifying force. It was sung in protests, at public gatherings, and on the lips of countless freedom fighters who faced oppression with courage and conviction. Leaders like Mahatma Gandhi, Subhas Chandra Bose, and Rabindranath Tagore held the song in high regard, recognizing its power to awaken patriotic fervor in the hearts of millions.

Today, in an era of rapid modernization and global influences, remembering our national song is an act of cultural preservation. Vande Mataram is not just a historical relic-it represents the moral and emotional fabric that binds our diverse nation. Its words remind us that India's strength lies in her unity amid diversity, and in her ability to honor the motherland through service, integrity, and compassion.

However, remembrance should go beyond ceremonial singing. Educational institutions and cultural organizations must ensure that young Indians understand the meaning, history, and significance of the song. Knowing Vande Mataram by heart is valuable, but understanding the spective and emotion behind it is what gives it true depth. It teaches us gratitude toward our land, respect for our heritage, and responsibility toward our future. At a time when divisions based on language, region, or ideology occasionally cloud the national spirit, Vande Mataram stands as a reminder of what unites us. Its melody transcends boundaries, speaking directly to the soul of every Indian. Remembering it is, therefore, not just about patriotism-it is about rekindling the spirit of unity and selfless love that shaped our nation.

Vande Mataram-The First Proclamation of Cultural Nationalism

■ AMIT SHAH

In the long and inspiring journey of our nation's history, there have been many defining moments when songs and art became the soul of movements, shaping collective emotion into action. Be it the war songs of Chhatrapati Shivaji Maharaj's army, the patriotic anthems sung during the freedom struggle, or the songs of resistance sung by the youth during the Emergency, songs have always awakened collective consciousness and unity in Bharatiya society.

Among them stands 'VandeMataram', Bharat's national song, whose story did not begin on a battlefield but in the calm yet resolute mind of a scholar, Bankim Chandra Chattopadhyay. In 1875, on the auspicious day of Jagaddhatri Puja (Kartik Shukla Navami or Akshaya Navami), he composed a hymn that would become the eternal anthem of the nation's freedom. In those sacred lines, he drew inspiration from Bharat's deepest civilisational roots, from the Atharva Veda's declaration "Mata bhumih putro aham prithivyah" ("The earth is my mother, and I am her son") to the Devi Mahatmya's invocation of the Divine Mother.

Bankim babu's words were both a prayer and a prophecy. 'VandeMataram' was not merely a national song or the lifeblood of the freedom movement. It was Bankim Chandra's first proclamation of Cultural Nationalism. It reminded us that Bharat is not just a geographical territory, but a geo-cultural civilisation, united not by boundaries drawn on a map but by shared culture, memory, sacrifice, valour and motherhood. This is not merely land; it is a tirtha, a sacred soil sanctified by devotion and duty.

As Maharshi Aurobindo described, Bankim was a sage of modern Bharat who reawakened the soul of the nation through his words. His Anandamath was not just a novel; it was a mantra in prose that stirred a sleeping nation to rediscover its divine strength. In one of his letters, Bankim babu wrote, "I shall have no objection if all my works are lost in the Ganga; this one hymn alone will live through eternity. It will be a great song and will win the hearts of the people." These words were prophetic. Written during one of the darkest hours of colonial rule, 'VandeMataram' became the dawn-song of awakening, a hymn that fused cultural pride with civilisational nationalism. Only an individual brimming with devotion to the motherland could have written such lines.

In 1896, Rabindranath Tagore set 'VandeMataram' to melody and sang it at the Calcutta Congress session, giving the hymn its voice and immortality. It transcended barriers of language and region, echoing across Bharat. In Tamil Nadu, Subramania Bharati rendered it in Tamil and in Punjab, revolutionaries sang it in defiance of British rule.

During the partition of Bengal in 1905, when rebellion swept across the province, the British banned public recitations of 'VandeMataram'. Yet on 14 April 1906, in Barisal, thousands defied the order. When the police charged upon the peaceful crowd, men and women alike stood bleeding on the streets, shouting 'VandeMataram' in unison.

From there, this sacred chant travelled with the revolutionaries of the Ghadar Party to California. It echoed in the ranks of the Azad Hind Fauj as Netaji's soldiers marched from Singapore. It rang through the Royal Indian Navy mutiny of 1946, when Indian sailors hoisted the tricolour on British warships. From Khudiram Bose to Ashfaqulla Khan, from Chandrasekhar Azad to Tiruppur Kumaran, the sloganechoed as one. It was no longer just a song; it had become the collective voice of Bharat's soul. Mahatma Gandhi himself admitted that 'VandeMataram' had "the magical power to stir even the most dormant blood." It united liberals and revolutionaries, scholars and soldiers alike. As Maharshi Aurobindo declared, it was "the mantra of Bharat's rebirth."

On October 26, during his Mann Ki Baat address, Prime Minister Shri Narendra Modi reminded the nation of Vande Mataram's glorious legacy. To mark 150 years of this immortal hymn, the Government of India has decided to organise nationwide programs for a year starting November 7. Through these celebrations, the full version of 'VandeMataram' will resonate across the nation once again, inspiring the youth to internalise the idea of 'Cultural Nationalism'.

As we celebrate Bharat Parv and pay homage to Sardar Vallabhbhai Patel on his birth anniversary, we are reminded of how Sardar's unification of Bharat was the living embodiment of the spirit of 'VandeMataram'. This song is not merely a remembrance of the past but also a call to the future. Even today, Vande Mataram inspires our vision of a Viksit Bharat 2047, a confident, self-reliant and resurgent Bharat. It is the anthem of our civilisational self-belief and it is now our responsibility to transform that spirit into action.

'VandeMataram' is the song of freedom, the spirit of unyielding resolve and the first mantra of Bharat's awakening. Words born from the soul of a nation never die; they live on, resonating through ages and generations. This sacred chant will continue to echo through eternity, reminding us to view our history, our culture, our values and our traditions through the visionof Bharatiyata (Indianness).

Vande Mataram!

(The writer is Union Home Minister and Minister of Cooperation)

Artificial Intelligence & Agricultural Extension Education

■ DR POONAM PARIHAR

Artificial Intelligence (AI) is rapidly emerging as a transformative force in agriculture. With the global population exploding exponentially which thrusts on the importance of nutritional security of the rising demographics. Traditional agricultural extension systems, which are essential for guiding farmers, are strained, particularly in developing countries with numerous smallholder farms. AI offers a solution by providing data-driven support to farmers and extension services. It enables precision farming through technologies like drones and sensors, optimizing resource utilization and crop yields.

AI-powered crop surveillance detects diseases, pests, and nutrient deficiencies, offering timely recommendations. Chatbots and virtual assistants provide instant access to agricultural information, overcoming barriers like limited extension workers and remote locations. Data analytics, language processing, and market analysis harness AI's power to make informed decisions, adapt to climate change, and improve farm management. AI supports training and education, ensuring farmers stay updated on best practices. However, challenges include the high cost of AI installation, resistance from farmers, the need for digital education, potential technical glitches, and the irreplaceable human touch in extension services. Real-life examples like the M-Velanmai initiative in India, the Plantix app from Germany, and an early warning system for pest management demonstrate AI's impact in agriculture. These innovations empower farmers, enhance productivity, and contribute to global food security. AI's potential to reshape agriculture is undeniable, making it a crucial tool for the future of farming.

Artificial Intelligence in Agriculture

Artificial intelligence (AI) is transforming agricultural extension education by providing farmers with real-time, data-driven insights and personalized recommendations that enhance productivity, optimize resource use, and support sustainable farming practices.

AI's role in revolutionizing agricultural extension

Real-time Information Dissemination: AI-powered chatbots, virtual assistants, and mobile apps provide farmers instant access to information on best agricultural practices, weather forecasts, and market prices, overcoming barriers like limited extension workers in remote areas.

Precision Farming Guidance: By analyzing data from IoT sensors, drones, and satellites, AI systems offer precise recommendations for planting, irrigation, fertilization, and pest control, which helps farmers optimize resource usage (water, pesticides, fertilizers) and minimize environmental impact.

Resource efficiency: AI helps optimize resource use, such as by using smart irrigation systems to water crops only when needed, leading to water savings and reduced costs.
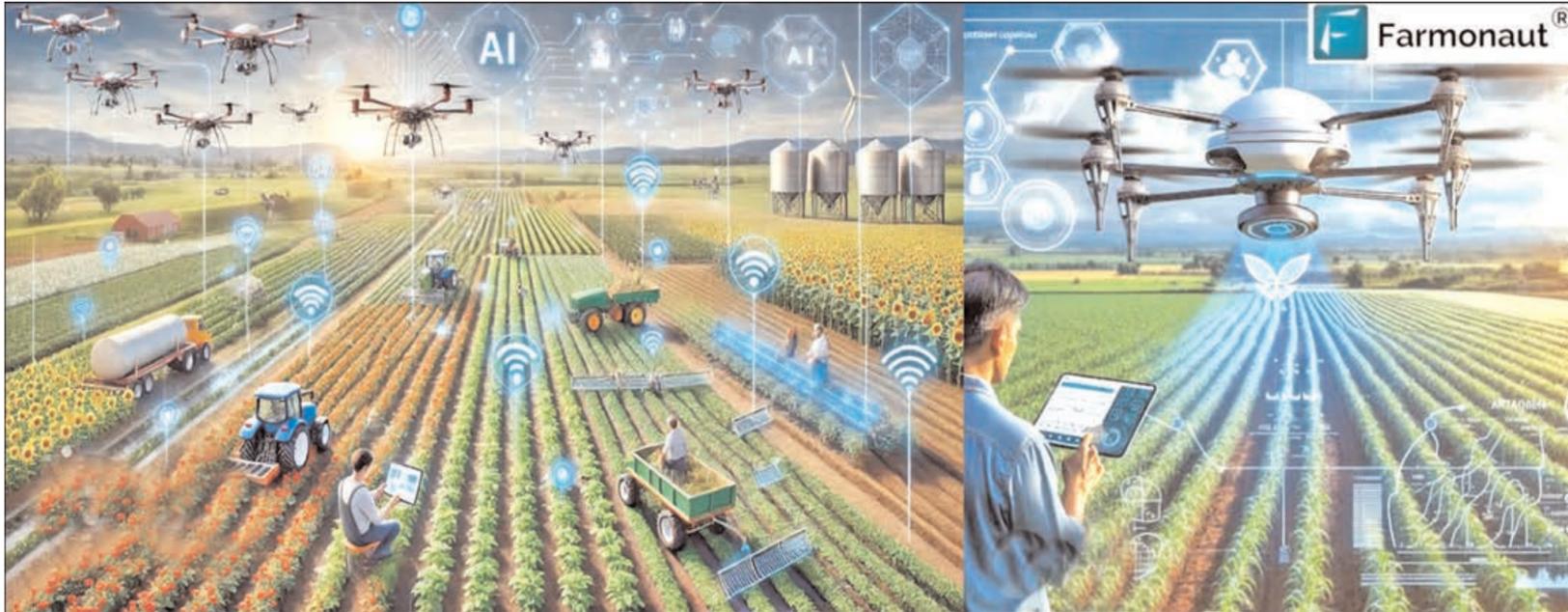
Early Detection and Management:

Image recognition and machine learning models enable the early detection and diagnosis of crop diseases, pests, and nutrient deficiencies from photos taken by farmers' smartphones, allowing for timely intervention and reduced crop losses.

Predictive Analytics and Risk Management: AI models process historical data and real-time conditions to forecast disease outbreaks, yield potential, and climate risks, empowering farmers to make proactive, informed decisions and adapt to changing conditions.

Climate adaptation: AI models can help farmers adapt to climate change by providing insights into climate trends and helping them make informed choices about what crops to plant and how to manage their fields in a changing environment.

Localized and Inclusive Content: Natural Language Processing (NLP) tools can translate complex agricultural research and extension materials into various local languages and voice-based interfaces, making information more accessible to a broader range of farmers, including those with low literacy levels.

Automated monitoring: Through drones and satellite imaging, AI-powered systems can constantly monitor crops for diseases, pests, and nutrient deficiencies, allowing for early intervention.

Capacity Building for Extension Agents: AI tools are used to train extension professionals, equipping them with the necessary skills to leverage cutting-edge technologies and provide more effective guidance to farmers.

Early warnings and risk management: Predictive models can alert farmers to potential pest outbreaks, diseases, and weather events, allowing for proactive planning and mitigating potential losses.

Empowering farmers with knowledge: AI can improve farmer literacy by providing access to new technologies and best practices, helping them adapt to climate change and improve their livelihoods.

Bridging knowledge gaps: AI can act as a bridge between farmers, researchers, and policymakers, creating a feedback loop that leads to better-targeted research and policy recommendations.

Improving sustainability: By optimizing the use of water, fertilizers, and pesticides, AI helps promote more sustainable and environmentally friendly agricultural practices.

Challenges and Considerations

Cost and Accessibility: High initial investment in AI infrastructure (sensors, drones, software) and a lack of reliable internet access in many rural areas pose significant barriers to adoption, especially for smallholder farmers.

Digital Literacy: A lack of technical skills and digital education among both farmers and extension agents can hinder the effective use of AI tools, requiring targeted training programs.

Data Quality and Privacy: The effectiveness of AI models relies on high-quality data, and there are concerns regarding data privacy, security, and the ethical use of farmer data.

Need for Human Touch: While AI provides valuable data and insights, it cannot entirely replace the nuanced, on-the-ground human interaction and local knowledge provided by traditional extension agents.

High Costs: The initial investment required for AI infrastructure, such as sensors, drones, and software, can be a significant barrier for small-scale farmers.

Digital Divide and Skill Gaps: Many rural areas lack the necessary internet connectivity and reliable power supply. Additionally, both farmers and extension agents may lack the technical skills and digital literacy needed to effectively use AI tools.

Data Concerns: Issues related to data quality, availability, privacy, and security are major hurdles. There are also concerns about who owns the data collected from farms and how it is used.

Resistance to Change: Some farmers may be skeptical of new technologies and prefer traditional, experience-based farming methods.

Key Takeaway

The integration of AI into agricultural extension is a powerful tool for modernizing farming and working towards global food security and sustainability. However, its successful implementation requires collaborative efforts from governments, researchers, and the private sector to address the challenges of accessibility, cost, and digital literacy, ensuring that all farmers can benefit from these technological advancements.

AI boosts crop productivity with precision farming and IoT. AI reduces resource use, enhancing agricultural sustainability. Identifies key barriers to AI adoption and offers solutions. Forecasts AI's future role in smart seeds and blockchain integration."Artificial Intelligence in Agriculture" focuses on fundamental and applied research targeting AI in all stages of agriculture, from soil preparation to the sowing of seeds, addition of fertilizers, irrigation, weed protection, harvesting, storage, packing, and transportation.

Agriculture will drive more efficient, productive, and sustainable farming through applications like precision farming, which optimizes resource use, and automation, which uses robots and drones for tasks like planting, monitoring, and harvesting. AI will also improve predictive analytics for weather, crop diseases, and pest outbreaks, and enhance supply chain management to reduce food waste and improve logistics. This will lead to increased yields, lower costs, and a reduced environmental impact.

Artificial Intelligence with Drones Artificial Intelligence with Food & Agriculture

Key applications of AI in the future of agriculture

Precision Farming: AI analyzes data from sensors, drones, and satellites to optimize the use of water, fertilizers, and pesticides, leading to increased yields and reduced waste.

Automation: AI-powered robots and self-driving tractors can automate labor-intensive tasks like planting, harvesting, and weeding with greater precision and efficiency.

Predictive Analytics: AI algorithms analyze weather patterns, soil data, and historical information to predict disease and pest outbreaks before they become widespread, and suggest the optimal time for planting and harvesting.

Crop and Soil Monitoring: AI-powered computer vision can analyze images of crops to detect diseases, pests, and nutrient deficiencies at an early stage, allowing for timely and targeted interventions. AI can also analyze soil composition to ensure the right nutrient mix.

Supply Chain Optimization: AI can improve logistics by optimizing transportation routes, monitoring storage conditions, and forecasting demand to reduce spoilage and food waste from farm to consumer.

Sustainable Practices: By optimizing resource use and minimizing chemical inputs, AI promotes sustainable farming, improves soil health, and can reduce fuel consumption and emissions.

Smart Indoor Farming: In controlled environments like vertical farms, AI optimizes light, temperature, and nutrients to increase production and efficiency while using significantly less water.

Potential impacts and considerations

Increased efficiency and yield: AI can significantly boost crop yields and reduce operational costs through optimized resource management and automation.

Improved sustainability: AI helps reduce the environmental footprint of farming by minimizing water and chemical use and improving soil health.

Labor market changes: While AI automation may reduce certain manual labor jobs, it will also create new jobs in technology, data analysis, and AI system maintenance.

Enhanced decision-making: AI provides farmers with data-driven insights to make more informed decisions, from planting to harvesting.

Other forms of AI have been used to analyze data to provide support for management decisions, such as in livestock monitoring, food traceability, genetic studies, and predicting weather and crop yield. Furthermore, AI is particularly adept at image analysis and can identify insects, weeds, and diseases.

Smart farming, also known as smart agriculture, is the adoption of advanced technologies and data-driven farm operations to optimize and improve sustainability in agricultural production.

In 2025, the evolving needs of food security, sustainability, and climate resilience are driving continuous innovation across India's vast agricultural landscape. With the emergence of dedicated agriculture innovation funds and the establishment of innovation canters, the sector is undergoing a paradigm shift.

Artificial intelligence (AI) is transforming agricultural extension education by providing farmers with real-time, data-driven insights and personalized recommendations that enhance productivity, optimize resource use, and promote sustainable practices.To ensure successful integration, a collaborative effort is needed among governments, research institutions, and private companies to develop supportive policies, provide financial incentives, and establish robust training and education programs that build the capacity of all stakeholders in the agricultural sector.AI is important to agriculture extension because it personalizes and automates advice, monitor crops with high precision, and makes information more accessible to farmers, even in remote areas. It enables data-driven decision-making for issues like pest and disease management, resource allocation, yield prediction, and market analysis, ultimately increasing productivity and sustainability.

The scope of artificial intelligence (AI) in agriculture extension education is to transform traditional farming support systems into data-driven, personalized, and efficient services by using AI tools to enhance farmer education and advisory services. This includes providing customized, localized advice via chatbots and virtual assistants, enabling extension agents to reach more farmers with the right information, and using AI-powered tools for predictive modelling, resource management, and pest/disease monitoring. The goal is to boost farmer productivity and income, improve sustainability, and address challenges like climate change through a more accessible and effective extension system.

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