Journal of State Government and Mass Media

KMF

Volume: 3 Issue: 3
July-September, 2025

KMF PUBLISHERS

www.kmf-publishers.com /jsgmm/

Journal of State Government and Mass Media

Vol 3 Issue 3 (2025)

Review Article

https://doi.org/10.5281/zenodo.16728933

OPEN

Artificial Intelligence Research in Indian Universities: Opportunities and Challenges

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To promote innovation, academic research must now incorporate artificial intelligence (AI), which has become a disruptive force in many businesses. AI research is being increasingly embraced by Indian colleges, providing opportunities to tackle domestic and international issues in fields like education, healthcare, and agriculture. This study examines the state of AI research in Indian institutions, emphasising the prospects offered by industrial collaborations, government programs, and a growing emphasis on multidisciplinary research. Significant obstacles still exist, nevertheless, such as a lack of money, gaps in the infrastructure, a lack of skilled workers, and moral dilemmas. The report highlights that to overcome these obstacles and maintain India's competitive advantage in the global AI ecosystem, academics, businesses, and policymakers must work together strategically. By tackling these issues, Indian academic institutions can establish themselves as important players in the creation of moral, inclusive, and significant AI technology.

Keywords: Artificial Intelligence, Indian Universities, AI Research, Higher Education, Interdisciplinary Research, Industry-Academia Collaboration, and AI Infrastructure.

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Introduction

Artificial Intelligence (AI) has emerged as one of the most transformative technologies of the 21st century, reshaping industries, economies, and societies globally. As AI continues to evolve, it has become increasingly crucial for academic institutions, particularly in emerging economies like India, to integrate AI research into their educational and research frameworks. Indian universities, with their diverse talent pool and strong research capabilities, have significant opportunities to contribute to AI advancements, both on a national and global scale. However, the path to AI innovation is not without challenges. This paper explores the opportunities and challenges of AI research in Indian universities, highlighting the role of AI in driving technological, economic, and social development, while addressing the obstacles that hinder its growth in India's academic landscape.

India's potential in AI research is immense, fuelled by a young, tech-savvy population, a growing digital infrastructure, and a large pool of skilled engineers and scientists. According to the Indian government's National Strategy for Artificial Intelligence, AI has the potential to contribute significantly to India's economy, with key applications across sectors such as healthcare, agriculture, education, and urban development (NITI Aayog, 2018). Indian universities, in collaboration with government bodies and industry partners, have been increasingly focusing on AI research, aiming to bridge the gap between theoretical knowledge and practical application. AI-centric programs, research labs, and collaborations are being established at major academic institutions, such as the Indian Institutes of Technology (IITs), Indian Institutes of Information Technology (IIITs), and central universities (Gupta, 2020).

However, despite the growth in AI research, several challenges hinder the realisation of its full potential in Indian universities. These include inadequate funding for cutting-edge AI research, a lack of interdisciplinary collaboration, limited access to quality datasets, and the shortage of AI-trained faculty (Suri, 2021). Moreover, the ethical and societal implications of AI, such as privacy concerns and the impact on employment, remain underexplored in Indian academic settings. Addressing these challenges will require a comprehensive approach that involves strengthening research infrastructure, fostering interdisciplinary cooperation, and developing policies that ensure ethical AI development.

This paper aims to analyse the current landscape of AI research in Indian universities, assess the growth opportunities, and discuss the challenges that need to be overcome for India to emerge as a global leader in AI research and innovation.

Literature Review

The rapid advancements in Artificial Intelligence (AI) have sparked significant interest in academic research across the globe, with India being no exception. Indian universities are increasingly integrating AI research into their educational programs and research agendas. However, while there is significant potential, challenges such as limited funding, lack of interdisciplinary collaboration, and insufficient infrastructure hinder the full-scale development of AI in Indian academia. This literature review aims to synthesise current research on AI in Indian universities, focusing on the opportunities and challenges that shape AI research in this context.

One of the primary opportunities for AI research in Indian universities lies in the country's large and growing pool of engineering talent. India has been a significant contributor to the global AI workforce, with a large number of its professionals working in multinational companies and start-ups (Rai & Kumar, 2020). As such, academic institutions are uniquely

positioned to capitalise on this talent base, driving innovation and expanding AI research. The government's push for digitisation and initiatives like the National Strategy for Artificial Intelligence (NITI Aayog, 2018) have further incentivised universities to invest in AI-focused programs and research centres.

AI's applicability across sectors like agriculture, healthcare, and urban development offers further research opportunities. Indian universities have already established AI research groups in various fields, such as precision agriculture (Ghosh & Sharma, 2019) and health diagnostics (Saha et al., 2020). For example, the Indian Institutes of Technology (IITs) have developed AI-based solutions to improve the agricultural supply chain and optimise crop production, offering both research potential and solutions to pressing national challenges. Additionally, AI can play a vital role in addressing India's social and economic challenges, including poverty alleviation and improving healthcare accessibility, making it an area ripe for academic exploration.

Despite these opportunities, several challenges limit the advancement of AI research in Indian universities. One major issue is the lack of sufficient funding for AI research projects. While the Indian government has introduced several initiatives to support AI research, many universities still struggle to secure the necessary financial resources to maintain high-quality, cutting-edge research (Suri, 2021). Moreover, the absence of long-term, stable funding mechanisms limits the capacity of universities to sustain AI research over time.

Another challenge is the shortage of qualified AI researchers and faculty. While India produces a significant number of graduates in engineering and technology, the number of faculty with specialised expertise in AI remains low (Suri, 2021). As AI is a highly interdisciplinary field, the gap in qualified faculty members across areas like machine learning, natural language processing, and robotics hampers the depth and breadth of AI research in Indian universities. Further complicating the issue is the lack of collaboration between Indian universities and the industry. AI research often requires access to proprietary datasets and computational resources, which can be difficult for universities to obtain independently. Industry-academic collaborations have been found to enhance research outcomes (Saha et al., 2020), but the pace of such partnerships is still slow. The lack of robust partnerships limits the practical application of AI research and its transition into real-world solutions.

Another area of concern, often underexplored in Indian academic discourse, is the ethical and societal implications of AI technologies. While AI has the potential to improve quality of life, it also raises concerns about privacy, security, and employment displacement (Ghosh & Sharma, 2019). Indian universities are slowly beginning to address these concerns, with some research centres focusing on ethical AI development (Saha et al., 2020). However, more comprehensive research is needed to ensure that AI solutions are developed in an ethically sound manner, balancing technological innovation with social responsibility.

AI research in Indian universities holds great promise, offering solutions to national and global challenges while contributing to the development of cutting-edge technologies. However, the full potential of AI research in India is constrained by challenges such as inadequate funding, a shortage of qualified researchers, and limited industry-academic collaboration. Moreover, addressing the ethical implications of AI remains a critical area for future research. For India to emerge as a leader in AI, it must invest in building a more robust academic ecosystem

that bridges these gaps and fosters interdisciplinary, ethical, and practical AI research.

Objective of the Study

The objective of this study is to explore the current state of Artificial Intelligence (AI) research in Indian universities, focusing on both the opportunities and challenges. Specifically, the study aims to:

- To identify key opportunities for AI research in sectors like healthcare, agriculture, and urban development.
- To assess challenges such as limited funding, shortage of qualified faculty, and lack of industry-university collaboration.
- To analyse the impact of national policies on AI research and propose strategies for enhancing research capabilities.
- To provide actionable recommendations to improve funding, infrastructure, and collaboration to boost AI research in Indian universities.

The study aims to offer insights into how Indian universities can better leverage AI to drive innovation and contribute to sustainable development.

Research Methodology

The current research project is entitled "Artificial Intelligence Research in Indian Universities: Opportunities and Challenges". As part of the investigation into the current condition of artificial intelligence research in Indian universities, the study will employ an exploratory research approach. This architecture was selected so that it would be possible to conduct an in-depth investigation of the opportunities and problems that academic institutions confront in the field of artificial intelligence. To detect trends in artificial intelligence research, funding sources, and the policy landscape in Indian institutions, a comprehensive study of existing academic papers, government reports, and industry publications will be carried out.

Result and Discussion

The study found that while Indian universities have significant potential for AI research, challenges such as insufficient funding, limited faculty expertise, and a lack of industry collaboration hinder progress. However, opportunities exist in sectors like healthcare, agriculture, and urban development, with government initiatives like the National AI Strategy offering crucial support. Effective policy implementation and increased collaboration are key to overcoming these barriers.

Opportunities for AI Research at Indian Universities

Indian universities are well-positioned to take advantage of the growing global demand for Artificial Intelligence (AI) innovations. There are several key opportunities for AI research in these institutions that can contribute to both academic progress and societal development.

Collaboration with Industry and Startups: Indian universities can create strong partnerships with AI-focused startups and established industries, which can provide funding, real-world problems to solve, and opportunities for students to engage in practical AI applications. Research in AI can be aligned with industry needs in sectors such as fintech, healthcare, agriculture, and retail. These collaborations can lead to innovations in AI-driven products, processes, and services.

AI for Healthcare Solutions: With the growing demand for affordable healthcare solutions, Indian universities have the opportunity to research AI applications in diagnostics, predictive medicine, and personalised treatment. Areas of focus could include using machine learning for early detection of diseases (e.g., cancer, diabetes), AI-based telemedicine,

medical imaging, and drug discovery. India's vast healthcare challenges make it an ideal testing ground for AI-based innovations that could impact millions.

Agriculture and Precision Farming: Agriculture is a key sector for India's economy, and AI has the potential to revolutionise it. Research opportunities in universities could focus on AI-based tools for precision farming, which optimise irrigation, pest control, and crop yield prediction. Universities can also research AI-based solutions for crop disease detection, supply chain optimisation, and resource management in rural areas, thereby enhancing agricultural productivity and sustainability.

AI in Education and Skill Development: AI can transform education by offering personalised learning experiences and automating administrative tasks. Indian universities can research AI applications in creating adaptive learning platforms, virtual tutors, and AI-powered assessment tools. Additionally, AI research in universities can focus on developing systems to address India's skill gap by creating personalised skill development platforms and analysing learning patterns to improve education outcomes.

Smart Cities and Urban Development: As urbanisation grows in India, the need for smart cities becomes more critical. Indian universities have the opportunity to research AI applications in urban planning, traffic management, waste management, energy optimisation, and environmental monitoring. Research could focus on building AI-powered solutions for sustainable urban development, predictive maintenance of infrastructure, and AI-enabled public transportation systems.

AI for Governance and Policy Making: Indian universities can engage in research related to AI for governance, focusing on how AI can be leveraged for policy-making, improving transparency, and enhancing government services. AI can help in data-driven decision-making, optimising resource allocation, improving public service delivery, and predicting trends such as traffic congestion, climate change, or social unrest.

Ethical AI and Responsible AI Research: As AI technology evolves, ethical concerns become paramount. Indian universities can position themselves as leaders in researching the moral implications of AI, focusing on data privacy, fairness, accountability, and transparency. With India's diverse population and socio-political context, universities can explore AI ethics within the Indian framework, addressing concerns such as algorithmic bias and privacy issues in sensitive sectors like healthcare and finance.

AI for Environmental Sustainability: AI can be pivotal in addressing environmental challenges such as climate change, water scarcity, and pollution. Research in AI for ecological monitoring, resource conservation, and climate change modelling presents a significant opportunity. Indian universities can explore AI applications for optimising renewable energy sources, predictive weather models, and AI-based systems for waste management and recycling.

Robotics and Automation: With the global rise in robotics and automation, Indian universities have the opportunity to engage in research on AI-based robotics for applications in industries like manufacturing, logistics, healthcare, and defence. Research could focus on designing intelligent robots for tasks such as surgical assistance, warehouse automation, and autonomous vehicles, which could have transformative impacts on India's industrial and technological landscape.

AI Research Capacity Building: Indian universities can invest in building AI research infrastructure by establishing AI research centres and labs equipped with advanced tools and datasets. In addition, there is a growing need to develop human capital through AI-focused programs, including undergraduate, postgraduate, and Ph.D. courses in AI and related fields. Universities can also establish collaborative research networks with international institutions to share knowledge, tools, and techniques.

AI for Financial Services and Fintech: India's rapidly expanding fintech ecosystem provides a rich environment for AI research in areas such as fraud detection, credit scoring, algorithmic trading, and customer service automation. AI can improve the efficiency and security of financial transactions by leveraging predictive analytics, deep learning, and machine learning models. Indian universities can partner with financial institutions to explore innovative AI applications, focusing on creating more intelligent, more accessible financial systems, particularly for underserved populations in rural areas. Research could also address AI's role in financial inclusion, personalising banking experiences and improving financial literacy through AI-driven tools.

AI in Public Health and Disease Surveillance: In addition to healthcare diagnostics, Indian universities can lead AI research in public health, focusing on early disease detection, epidemic prediction, and real-time surveillance systems. By leveraging large-scale data analysis, AI can track and predict the spread of infectious diseases, such as COVID-19 or dengue, in real-time, enabling timely interventions. Universities can research AI models that process public health data to improve disease prevention strategies and resource distribution, particularly in remote or underserved regions.

AI in Natural Disaster Management and Climate Change: India is frequently affected by natural disasters such as floods, earthquakes, and cyclones, which necessitate effective disaster management systems. AI can play a critical role in predicting and mitigating the impact of such events. Research opportunities exist for AI applications in disaster forecasting, damage assessment, and post-disaster recovery planning. By integrating AI with satellite data, universities can help develop advanced early-warning systems and disaster response models to save lives and protect assets. Similarly, AI can be used to model and predict the effects of climate change, creating more resilient strategies for climate adaptation in vulnerable regions.

AI in Cybersecurity: With the increasing digitalisation of India's economy, cybersecurity has become a critical concern. AI can be harnessed to build more robust, intelligent security systems capable of detecting vulnerabilities, responding to threats in real time, and preventing cyberattacks. Indian universities can research AI-powered cybersecurity solutions, focusing on network intrusion detection, automated threat intelligence, and data protection. The growing need for AI to combat emerging cyber risks presents universities with an opportunity to build interdisciplinary expertise in AI and cybersecurity, bridging technology with legal, ethical, and regulatory considerations.

AI for Humanitarian and Social Impact Projects: India faces complex social challenges related to poverty, education, gender inequality, and rural development. AI can be leveraged to address these issues by creating tools that support social enterprises, NGOs, and government agencies. For example, AI could be used to improve the delivery of social welfare schemes by predicting and identifying vulnerable populations, optimising resource allocation, and enhancing the effectiveness of social programs. Indian universities

could focus on developing AI technologies that benefit marginalised communities, such as AI-enabled educational tools for rural students or AI for improving access to basic services like clean water and sanitation.

AI in Language Processing and Localisation: India's linguistic diversity presents both challenges and opportunities for AI research. AI-driven natural language processing (NLP) tools can facilitate better communication across India's many languages and dialects. Research in AI could focus on developing multilingual chatbots, real-time translation tools, and automated content generation in regional languages. By focusing on the challenges specific to Indian languages, universities can contribute to the development of language models that improve digital accessibility and enhance communication across diverse regions.

AI for Ethical, Legal, and Policy Frameworks: As AI adoption increases, ethical considerations become increasingly important. Indian universities can take a leading role in developing frameworks for the ethical use of AI, with a focus on transparency, accountability, privacy, and fairness. Research in AI ethics can address specific challenges faced in the Indian context, such as data privacy in a highly diverse society, algorithmic bias, and the regulation of AI applications. Furthermore, universities can contribute to policymaking by collaborating with government agencies to establish AI governance structures and legal frameworks that ensure the responsible use of AI technologies.

AI in Manufacturing and Industry 4.0: India's manufacturing sector stands to benefit significantly from AI technologies, particularly through the advent of Industry 4.0, which involves the integration of AI, IoT, and automation into manufacturing processes. AI research in Indian universities can explore the development of smart factories, predictive maintenance, autonomous robots, and supply chain optimisation tools. By focusing on AI's potential to enhance productivity and sustainability in the manufacturing sector, universities can help drive India's transformation into a global leader in AI-driven industrial innovation.

AI and Autonomous Systems: Autonomous systems, including self-driving cars, drones, and robotics, represent one of the most promising frontiers for AI research. Indian universities have an opportunity to lead in the research and development of autonomous systems tailored for local contexts. This could include autonomous delivery systems for rural areas, drone-based monitoring for agriculture or environmental conservation, and AI-powered autonomous vehicles that address traffic congestion in urban areas. Research in this area could also focus on developing AI algorithms that ensure the safety and efficiency of these systems in the Indian context.

AI and Blockchain Integration: Another emerging opportunity for AI research in Indian universities is the intersection of AI and blockchain technologies. Blockchain can provide decentralised and secure data storage, while AI can analyse and optimise these data sets. Research could focus on how AI and blockchain can be integrated to enhance data security, supply chain transparency, and digital identity management. Indian universities can explore blockchain-based AI applications in fields such as finance, government services, healthcare, and logistics, providing innovative solutions for secure data processing and information sharing.

Indian universities have a wealth of opportunities to advance AI research in a variety of fields. By aligning research efforts with both local and global technological trends, universities can drive innovation that addresses pressing challenges in healthcare, agriculture, urban development, and beyond. To fully

harness these opportunities, however, Indian universities must focus on interdisciplinary collaboration, strong industry partnerships, investment in AI infrastructure, and capacity building to train the next generation of AI researchers and practitioners. These research opportunities not only promise to advance AI technologies but also offer tangible solutions to many of the social, economic, and environmental challenges facing India today.

Challenges for AI Research at Indian Universities

While AI research holds immense potential, Indian universities face several challenges in establishing themselves as global leaders in this field. Despite the growing interest in AI, these challenges need to be addressed to harness the opportunities that AI fully presents.

Lack of Adequate Research Infrastructure: One of the primary challenges facing AI research in Indian universities is the lack of adequate research infrastructure. AI research requires specialised equipment, computing power, access to large datasets, and advanced software tools, much of which is not readily available at many Indian universities. Supercomputers, AI labs, and high-performance computing resources are still limited, particularly in government-funded institutions. Without access to these resources, conducting cutting-edge AI research becomes a significant hurdle.

Insufficient Funding and Investment: AI research demands substantial financial investment, particularly in terms of infrastructure, faculty recruitment, and international collaborations. However, funding for AI research in Indian universities is often insufficient. While there is growing governmental support for AI, such as initiatives like the National AI Strategy, private sector investment in university-level AI research remains limited. Research grants from both public and private sectors are not always easily accessible, and this financial constraint hinders the ability of universities to attract and retain top talent, conduct large-scale experiments, or collaborate internationally.

Limited Access to Quality Data: AI research thrives on the availability of high-quality, diverse datasets. However, data access remains a significant issue in India due to legal, ethical, and infrastructural barriers. Many datasets in key sectors like healthcare, agriculture, and education are either unavailable, incomplete, or fragmented. Moreover, data privacy concerns and strict regulations around data sharing limit the scope for AI research. Without comprehensive and high-quality data, AI models cannot be trained effectively, which limits the outcomes of research efforts.

Lack of Skilled Faculty and Researchers: AI research requires faculty members with specialised knowledge in machine learning, neural networks, natural language processing, robotics, and other subfields of AI. There is a shortage of qualified AI researchers and faculty members in Indian universities, as AI is a relatively new and highly specialised field. Moreover, AI talent is often attracted to industry positions that offer higher salaries and better resources. This makes it challenging for universities to maintain a competitive edge in AI research, as they cannot always provide the same incentives or facilities as the private sector.

Interdisciplinary Research Challenges: AI research in India often remains siloed in computer science departments, with limited collaboration across disciplines. AI has applications in various fields such as healthcare, agriculture, social sciences, and law, and addressing real-world challenges requires interdisciplinary research. However, universities often have structural and institutional barriers that make it challenging to facilitate collaboration between AI researchers and experts from other fields. For instance,

bridging the gap between AI engineers and domain experts (e.g., medical professionals, social scientists) is not always easy, and interdisciplinary teams may struggle with communication and integrating knowledge from different areas.

Outdated Curriculum and Limited Training Opportunities: The curriculum at many Indian universities is often obsolete, particularly in the rapidly evolving field of AI. Traditional engineering programs may not sufficiently equip students with the practical skills required for AI research and development. Additionally, the lack of specialised programs focused on AI means that students often have to rely on online courses or boot camps, which can lack the depth and hands-on research experience that university-level programs can provide. Universities also struggle to provide adequate training to current faculty members, which can impede the growth of AI expertise.

Ethical and Legal Challenges: AI research in India is often limited by the lack of a comprehensive framework addressing ethical concerns such as data privacy, algorithmic fairness, transparency, and accountability. The Indian government is still in the process of developing robust regulations on AI use, and this regulatory uncertainty poses challenges for AI researchers. Moreover, issues related to bias in AI models, particularly in sensitive domains like healthcare and criminal justice, require deeper exploration. Indian universities need to create research initiatives focused on AI ethics, but they often lack the interdisciplinary resources or frameworks to address these concerns effectively.

Industry-Academic Disconnect: While India has a rapidly growing AI industry, there is often a disconnect between academic research and industry needs. Industry is often more focused on solving immediate, practical problems using AI, while universities may prioritise fundamental research that is longer-term and more theoretical. This lack of alignment can lead to a mismatch between university research and the technology needs of the industry. There is also limited collaboration between academia and industry in terms of joint projects, internships, or real-world applications of research, which hinders the translation of research into commercial AI solutions.

Political and Bureaucratic Hurdles: The bureaucratic red tape and political challenges in India can slow down the progress of AI research. The allocation of research grants, the establishment of AI centres, and approvals for international collaborations can often be delayed due to lengthy approval processes. Political instability and inconsistent policies in certain states can also negatively impact research funding and resource allocation. These challenges prevent researchers from focusing on their work and hinder the smooth functioning of AI research programs.

AI Research Funding and Grant Management Issues: Though there is growing recognition of the importance of AI research in India, the management of AI research funding remains a challenge. Grant disbursement can be slow, and universities may face difficulties in aligning funding with their specific research goals. Additionally, a lack of clear guidelines on how to allocate resources for interdisciplinary AI research projects adds to the challenges. The absence of a comprehensive funding mechanism for AI research across sectors and fields further limits the scope and scale of potential research.

Inadequate Focus on AI in Rural Development: Although India's rural areas can greatly benefit from AI applications in sectors like agriculture, healthcare, and education, research in AI for rural development is often limited. AI-focused projects tend to concentrate on urban issues or larger industries, neglecting the unique challenges faced by rural areas. The potential

for AI to address problems such as crop management, rural healthcare, and education is immense. Still, universities often lack the necessary incentives, expertise, and collaborations to create AI-driven solutions specifically tailored to rural needs.

AI research in Indian universities has vast potential, but it is hindered by several challenges, ranging from infrastructure gaps to a shortage of skilled personnel. Addressing these issues will require significant investment, interdisciplinary collaboration, curriculum reform, and stronger ties between academia and industry. With the right strategies in place, Indian universities can overcome these obstacles and play a pivotal role in advancing AI research that contributes not only to the nation's technological growth but also to its socio-economic development.

Impact of National Educational Policies (NEP) on AI Research in Indian Universities

The National Educational Policy (NEP) 2020 introduced several reforms aimed at transforming India's education system, with a focus on improving quality, accessibility, and inclusivity in education. One of the most significant aspects of NEP is its emphasis on enhancing the integration of technology in teaching and research, which has a direct bearing on fields like Artificial Intelligence (AI). The impact of NEP on AI research in Indian universities can be seen across various domains, from curriculum development and faculty training to interdisciplinary study and industry-academia collaboration.

Curriculum Reform and Skill Development: NEP 2020 advocates for a more flexible and multidisciplinary approach to education, allowing for the integration of AI and related technologies into the curriculum. By encouraging the introduction of AI, machine learning (ML), data science, and computational thinking into undergraduate and postgraduate programs, the policy is expected to enhance the research potential of universities in these fields. AI and related technologies are now being positioned as essential components of university curricula, not just in computer science and engineering, but across various disciplines like healthcare, agriculture, economics, and social sciences.

The NEP's call for a shift toward competency-based education and the development of problem-solving skills is crucial for AI research. Indian universities, under the guidance of NEP, are now encouraged to foster creativity and critical thinking in AI research, rather than just focusing on theoretical knowledge. This approach is expected to produce a more versatile generation of researchers who are well-equipped to tackle real-world AI challenges, with an emphasis on practical applications.

Interdisciplinary Research: NEP 2020 promotes the idea of a multidisciplinary approach to education, which is particularly relevant to AI research. AI technologies are not confined to the field of computer science; they have applications in sectors like healthcare, agriculture, environmental science, and economics. The NEP emphasises breaking down silos in education and research, encouraging collaboration across disciplines. This is especially important for AI, as its successful application in sectors such as healthcare, rural development, and urban planning requires contributions from various academic fields.

As a result, universities are now more likely to foster interdisciplinary AI research projects that combine knowledge from multiple domains. For instance, AI researchers may collaborate with medical professionals to develop AI-driven diagnostic tools or with agricultural scientists to create AI models for crop prediction. Such interdisciplinary collaborations, encouraged by NEP, can lead to breakthroughs in AI

applications that are tailored to India's unique socio-economic and cultural context.

Focus on Research and Innovation: NEP 2020 has highlighted the need for a stronger emphasis on research and innovation in higher education. It advocates for the creation of research universities and centres of excellence to support high-impact research in areas such as AI. In line with this, the policy encourages Indian universities to not only focus on teaching but also invest heavily in research output, particularly in emerging fields like AI.

The policy's recommendation for enhancing research funding, establishing global research collaborations, and improving access to high-end research facilities can provide a significant boost to AI research in universities. Increased government support for AI research, as envisaged by NEP, is expected to address some of the current challenges faced by universities, such as inadequate infrastructure, lack of resources, and limited research opportunities.

Faculty Development and Training: A key aspect of NEP 2020 is the emphasis on continuous faculty development and the professional growth of educators. To foster a conducive environment for AI research, the policy advocates for the regular training of faculty members in new technologies, including AI. This would not only help faculty stay abreast of the latest developments in AI but also enhance their ability to teach and mentor students effectively in the field.

By encouraging universities to create AI-focused training programs and collaborate with international AI experts, NEP aims to bridge the gap between AI research and education. Faculty members will be better equipped to guide students in AI research, helping them produce innovative solutions to complex problems. This focus on faculty development aligns with the global trend of developing AI expertise at the academic level, thereby improving the overall research output in the field.

Public-Private Partnerships and Industry Collaboration: NEP 2020 stresses the need for universities to foster greater collaboration with the private sector, industry, and international institutions. For AI research, this is particularly important, as private companies and industries are often at the forefront of AI innovations. Collaborative projects between universities and AI-focused sectors can lead to the development of cutting-edge AI technologies that address real-world problems.

Industry partnerships can provide universities with access to the latest tools, datasets, and expertise, which is vital for AI research. Moreover, these collaborations can help bridge the gap between academic research and industry applications, ensuring that AI innovations are not only theoretically sound but also practically relevant and scalable. By incentivising such public-private collaborations, NEP helps align academic research with the needs of the industry, thereby contributing to the growth of the AI ecosystem in India.

Promotion of Global Collaboration: NEP 2020 advocates for the internationalisation of higher education, emphasising the importance of research collaborations with global institutions. This approach is particularly significant for AI research, where international collaboration often plays a key role in advancing innovation. By encouraging Indian universities to collaborate with top universities and research institutions across the world, NEP opens avenues for AI research partnerships that bring in global expertise and share international best practices. Global collaborations are especially crucial in AI research, given the rapid pace of technological advancements. These partnerships can offer Indian universities access to new ideas, methodologies, and

research networks, which can enrich AI research and help them compete at the international level.

Ethical and Responsible AI Research: Another critical aspect of NEP 2020 is its focus on ethical practices and social responsibility in education. For AI research, this means emphasising the moral implications of AI technologies, such as data privacy, algorithmic bias, and transparency. NEP's emphasis on ethics and social responsibility is critical in ensuring that AI research is conducted in a way that benefits society and adheres to the highest standards of integrity.

In the Indian context, where AI applications can have profound impacts on sectors such as healthcare, education, and governance, ensuring that AI research follows ethical guidelines is essential. By promoting research in AI ethics, fairness, and accountability, NEP aligns with global trends towards responsible AI development.

The National Educational Policy (NEP) 2020 is poised to play a transformative role in AI research in Indian universities. By fostering interdisciplinary research, enhancing curriculum design, encouraging global collaborations, and improving faculty expertise, NEP lays the groundwork for the next generation of AI research and innovation. However, for the policy's promises to be fully realised, universities will need to address the existing challenges, such as infrastructure deficits, funding shortages, and data accessibility issues. When these challenges are overcome, AI research in India can reach new heights, contributing significantly to the nation's technological and socio-economic advancement.

Recommendations to Improve Funding,
Infrastructure, and Collaboration to Boost AI
Research in Indian Universities

India has a significant potential to become a global leader in Artificial Intelligence (AI) research. However, to realise this potential, universities must address key challenges related to funding, infrastructure, and collaboration.

Increase Government and Private Sector Funding for AI Research

a. Government Grants and Policies

The Indian government has already initiated some funding programs for AI research, but there is a need for a substantial increase in financial support for AI initiatives in universities. Specific steps can include:

- Establishing AI Research Funds: The government should create dedicated research funds for AI development, similar to existing funds for other priority areas. This could include both direct grants for university-led AI research and competitive funding opportunities that encourage innovation.
- AI-Specific Innovation Hubs: Governments should establish AI-focused innovation hubs at the university level, offering funding for experimental projects and fostering an ecosystem for new AI technologies.
- Tax Incentives: Offering tax incentives to industries that collaborate with universities on AI research could motivate greater private sector involvement in funding AI research and development.

b. Private Sector Contributions

To supplement public funding, universities should encourage private sector involvement in AI research through:

- Industry-Academia Partnerships: Fostering collaborations between AI startups, tech giants (e.g., Google, Microsoft, TCS), and universities could provide the necessary financial backing and resources for AI research. Companies could fund specific AI research labs or research fellows.

- Corporate Sponsorships and Research Grants: Encouraging large corporations to sponsor research projects or offer research grants to universities could provide much-needed financial resources.

Enhance Infrastructure for AI Research

a. Investment in Advanced Computing Facilities

AI research requires access to high-performance computing infrastructure, such as supercomputers, GPUs, and cloud computing platforms. The following steps can improve AI infrastructure in universities:

- Establish AI and Data Science Labs: Universities should create dedicated AI and Data Science labs equipped with cutting-edge hardware and software for AI research, including machine learning platforms, data storage solutions, and advanced computing clusters.
- Leverage Cloud Computing Resources: Public-private collaborations can help universities access cloud computing platforms (e.g., AWS, Google Cloud) at discounted rates, allowing researchers to access scalable computing power for AI experiments without the need for significant upfront investments in hardware.
- Upgrade Data Storage and Access: AI research is data-intensive, and universities need robust data storage solutions. Investments in high-capacity storage systems and the establishment of large-scale datasets could significantly enhance research outputs.

b. Smart Infrastructure and Tech Labs for Practical Application

- AI Testbeds for Real-World Applications: Setting up testbeds and sandbox environments where researchers can deploy their AI models and experiments for real-world application testing will help bridge the gap between theoretical research and practical implementation.
- Supporting Data Collection and Sharing: Universities should create centralised data repositories, ensuring that researchers have access to large, diverse datasets. This could involve partnerships with industry, government agencies, or international bodies to facilitate the sharing of data for AI research purposes.

Promote Interdisciplinary Collaboration and Global Partnerships

a. Encouraging Cross-Department Collaboration

AI's applications extend beyond computer science, impacting fields like healthcare, economics, agriculture, and social sciences. Promoting interdisciplinary research is critical for the holistic development of AI technologies.

- Multi-Department Research Programs: Universities should encourage interdisciplinary AI research programs that integrate expertise from different departments (e.g., medical science, agriculture, engineering, economics) to develop AI solutions tailored to diverse sectors.
- Joint Research Initiatives: Establish joint AI research centres that involve multiple departments or even universities. These collaborations can address complex challenges, such as AI in healthcare, by leveraging diverse expertise and perspectives.

b. International Collaboration

AI research thrives on global collaboration, with many of the most significant advancements happening in partnership with international universities, research institutes, and organisations.

- Global Research Networks: Indian universities should forge partnerships with top AI research institutions worldwide. These could involve joint research programs, faculty exchange, and access to international datasets, all of which could catalyse the growth of AI research in India.
- International AI Conferences and Symposia: Hosting and attending international AI conferences would help Indian researchers stay abreast of the latest global trends and foster collaborations with leading researchers worldwide. Universities should encourage faculty and students to present their work in such forums and create more opportunities for international networking.
- Collaborative Research on Global Challenges: Collaborative AI research on global challenges, such as climate change, healthcare, and sustainable development, can benefit from international expertise. Engaging with international organisations like the UN or WHO for AI research on global issues would position Indian universities as global players in the field.

c. Industry Collaboration and Commercialisation

Stronger partnerships between academia and industry can lead to practical AI applications and enhance the overall research output:

- Startups and AI Incubators: Universities should set up AI-focused startup incubators to encourage young researchers to commercialise their AI innovations. Collaboration with incubators can help translate research into products or services that can be brought to market.
- Consultancy Projects with Industry: Universities should encourage faculty and students to participate in industry consultancy projects. This would allow universities to not only gain funding but also ensure their research is relevant and directly applicable to real-world challenges.

Focus on AI Talent Development

a. Faculty Development and AI Training Programs

To improve the quality of AI research, Indian universities must invest in developing their faculty and researchers' AI skills:

- Continuous Faculty Training: Offering continuous training in AI and related technologies, both domestically and abroad, will ensure that faculty members are equipped with the latest knowledge and research methods.
- AI Research Fellowships: Government and private sector organisations can create research fellowships that allow faculty and students to focus exclusively on AI research and development. These fellowships should come with stipends, research funding, and access to global AI networks.

b. Promote AI Literacy Among Students

Universities should integrate AI education into both technical and non-technical programs to equip students across disciplines with basic AI knowledge:

- Undergraduate AI Curriculum: AI-related subjects should be introduced at the undergraduate level, even for students from non-engineering backgrounds. This will ensure that future leaders in sectors like healthcare, business, and social sciences are equipped to use AI in their respective fields.
- AI Research Internship Programs: Universities should collaborate with industries to offer AI research internships for students, helping them gain practical exposure to AI research projects and facilitating industry-academia collaboration.

To establish India as a leader in AI research and development, Indian universities must prioritise the improvement of funding, infrastructure, and collaboration. By increasing government and private sector funding, enhancing AI research infrastructure, promoting interdisciplinary and international collaborations, and investing in talent development, Indian universities can overcome the current limitations and unlock AI's full potential. With the right policies and investments, AI research in Indian universities can significantly contribute to solving societal challenges and driving economic growth.

Conclusion

Artificial Intelligence (AI) research in Indian universities offers vast opportunities, driven by the country's rich academic tradition and growing digital infrastructure. As AI technologies become central to global economic growth, Indian institutions have the potential to lead in sectors like healthcare, agriculture, education, and urban development (Jain, 2020; Ramaswamy et al., 2022). AI advancements, such as machine learning and robotics, could revolutionise industries and address societal challenges, such as improving healthcare outcomes and agricultural productivity (Chauhan & Singh, 2021; Sharma et al., 2021).

However, realising this potential is contingent on overcoming challenges like limited funding, inadequate infrastructure, and insufficient cross-sector collaboration. Despite growing governmental interest, funding for AI research in Indian universities remains inadequate compared to global standards (Iyer, 2021; Singh & Sharma, 2022). Additionally, while India has a strong engineering workforce, AI research across disciplines, such as healthcare, remains limited due to a lack of collaboration between faculties (Mehrotra et al., 2021).

There is also a critical gap in infrastructure, such as high-performance computing and access to large datasets, which hampers India's ability to compete globally (Rajendran, 2022). To address these challenges, increased collaboration with industry and international research bodies is essential. Policies that promote AI education, fellowships, and skill development will also strengthen research capabilities (Sethi et al., 2020; Rajan & Babu, 2021). With targeted investment and strategic partnerships, Indian universities can unlock the full potential of AI, positioning India as a global leader in AI research and innovation.

References:

Bansal, A., & Gupta, R. (2021). Interdisciplinary AI research in Indian universities: Opportunities and challenges. Journal of AI and Innovation, 13(2), 68-79.

Chauhan, S., & Singh, V. (2021). Artificial Intelligence in healthcare: Opportunities for Indian universities. Indian Journal of Medical Technology, 5(3), 102-109.

Ghosh, A., & Sharma, P. (2019). AI-based precision agriculture in India: Opportunities and challenges. Journal of Agricultural Systems, 177, 102-115. https://doi.org/10.1016/j.agsy.2019.102115

Gupta, R. (2020). Artificial Intelligence in India: Opportunities and Challenges. Springer.

Iyer, V. (2021). The funding landscape for AI research in Indian universities. AI Research and Innovation, 19(4), 124-131.

Jain, A. (2020). Artificial intelligence research at Indian universities: A review of current trends and future prospects. Indian Journal of Technology and Science, 14(1), 45-60.

Joshi, S., & Sharma, P. (2021). AI in agriculture: How Indian universities can harness machine learning for rural development. Journal of Agricultural Technology, 8(2), 91-104.

Mehrotra, R., Sharma, S., & Yadav, V. (2021). AI in healthcare: Implications for Indian universities. Journal of Health Technology, 6(2), 35-49.

NITI Aayog. (2018). National Strategy for Artificial Intelligence. Government of India. https://niti.gov.in/sites/default/files/2018-06/AI_NitiAayog_0.pdf

Rai, A., & Kumar, S. (2020). AI talent in India: Opportunities and challenges. Indian Journal of Technology, 45(4), 12-25.

Rajan, V., & Babu, A. (2021). Building a sustainable AI ecosystem in India: Role of universities and government policies. Indian Journal of Digital Economy, 11(4), 67-74.

Rajendran, R. (2022). Infrastructure challenges in AI research at Indian universities. Journal of AI Infrastructure Development, 3(1), 80-92.

Ramaswamy, S., Bhatia, N., & Thomas, P. (2022). Bridging the gap: AI research collaboration between Indian universities and international organizations. International Journal of AI Research, 17(2), 100-113.

Saha, S., Verma, R., & Kumar, V. (2020). AI in healthcare: Research developments and applications in India. International Journal of Healthcare Technology, 11(2), 34-42. https://doi.org/10.1002/ijht.2020

Sethi, S., Gupta, M., & Kumar, R. (2020). AI research and development: The need for stronger university-industry partnerships. Journal of Technology Transfer, 10(3), 56-67.

Singh, R., & Sharma, V. (2022). Funding AI research in India: The role of public-private partnerships. Indian Journal of AI & Robotics, 9(3), 123-134.

Singh, S., Kumar, P., & Yadav, R. (2022). AI infrastructure in India: Strengthening academic capabilities. Journal of AI Research and Development, 14(1), 29-41.

Suri, M. (2021). Barriers and enablers of AI research in Indian universities: A systematic review. Journal of AI and Education, 30(4), 456-478. https://doi.org/10.1007/s40593-021-00234-w