BBDNIIT

techno inspire@IT

An Annual Magazine from Department of Information Technology

Vol. 7, Issue I, 2026

Department of Information Technology

Babu Banarasi Das

Northern India Institute of Technology

Chief Patrons

Mrs. Alka Das
Hon'ble Chairperson, BBD Educational Group

Mr. Viraj Sagar Das
Hon'ble President, BBD Educational Group

Ms. Sonakshi Das
Hon'ble Vice President, BBD Educational Group

Patrons

Mr. R. K.Agarwal
Chief Executive Director, BBDEG

Prof (Dr.) Shailendra Kumar Saraf
Director (Pharmacy), BBDNIIT

Prof (Dr.) V. K. Singh
Director (Engg.), BBDNIIT

Chief-Editor

Prof (Dr.) Bhawesh Kumar Thakur
Professor & Head,
Department of Information Technology, BBDNIIT, Lucknow

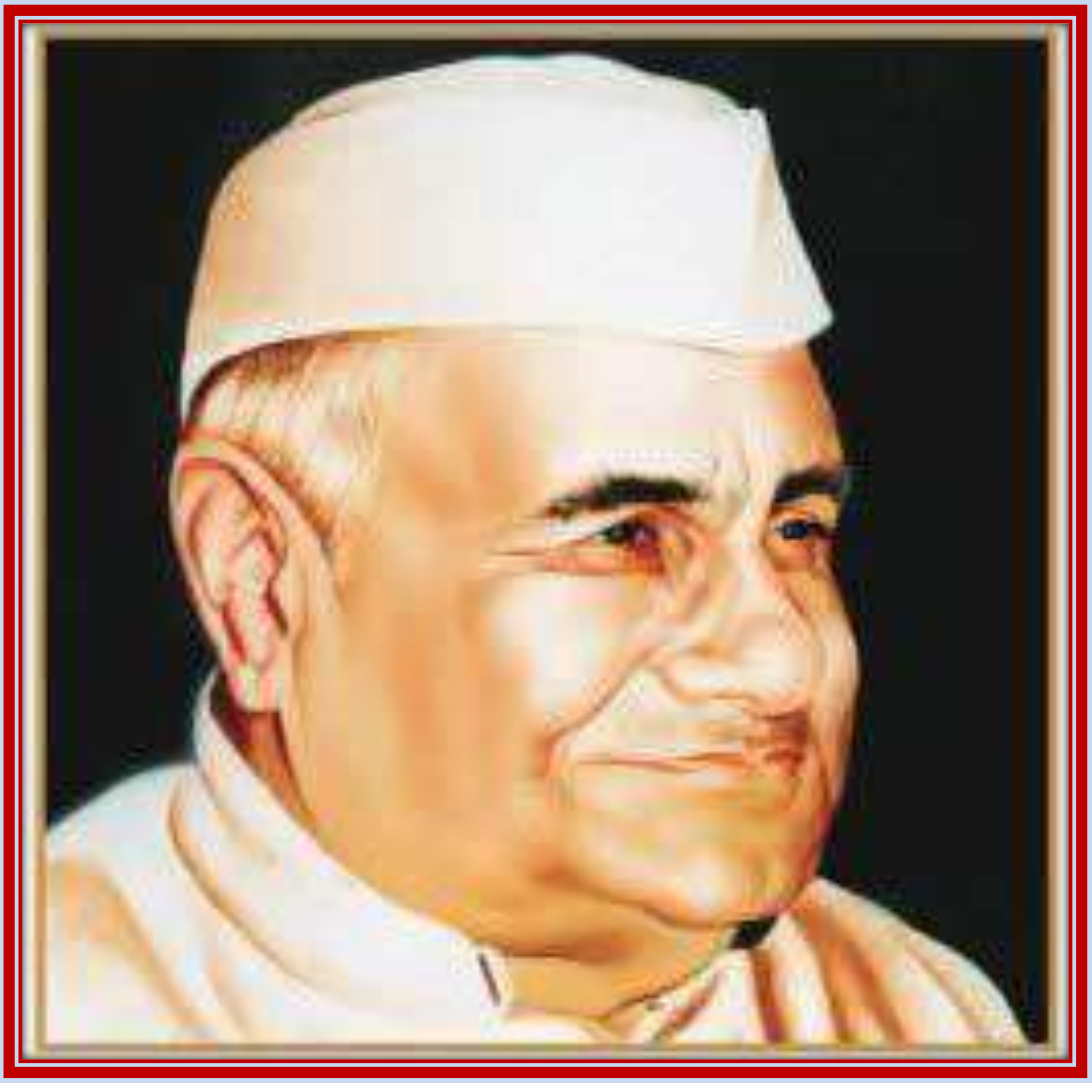
Faculty Editors

- **Mr. Praveen Sachan,** Assistant Professor, IT
- **Ms. Neelam Chakravarti,** Assistant Professor, IT
- **Mr. Reetesh Gupta,** Assistant Professor, IT
- **Dr. Priya Sharma,** Assistant Professor, IT

Student Editors

- **Mr. Himanshu Kumar Singh,** IT, Fourth Year
- **Ms. Shailja Shukla,** IT, Fourth Year
- **Mr. Utkarsh Rathore,** IT, Third Year
- **Ms. Priyam Tyagi,** IT, Third Year
- **Mr. Asmit Singh,** IT, Second Year
- **Ms. Khushi,** IT, Second Year

Genesis



Late Babu Banarasi Das Ji
(1912 – 1985)
Ex Chief Minister, Govt. of Uttar Pradesh

"To provide an open opportunity to the young generation for evolving their core competencies and to build their career as world class professionals with broad based foundation, in-depth knowledge & versatile personality to meet the challenges of Global Economy…" – Babuji's Vision

Hon'ble Founder

Late Dr. Akhilesh Das Gupta

(1961 – 2017)

Ex-Member of Parliament (Rajya Sabha)

Hon'ble Founder & Ex-Chairman, BBD Group

"We not only make technocrats at BBD, we churn out citizens of the world, perfect in all respect, be it leadership, competence, confidence, communication, moral or knowledge…" – *Dr. Akhilesh Das Gupta's Vision*

A distinguished political leader, philanthropist, educationist and social worker, Dr. Akhilesh Das is the pride of Lucknow city. He has established himself as a worthy son of his illustrious father Late Babu Banarasi Das Ji.

Public Life

He has obtained MBA, LLB & Ph.D. (Human Resource Management) degrees; Dr. Akhilesh Das decided to follow his father's footprints by choosing Social Service as his primary goal. In his distinguished public life spanning well over three decades, Dr. Das was first elected as the Mayor of Lucknow in year 1993

and became one of the youngest Mayors of the world. Subsequently, he was elected as a ***Member of Parliament (Rajya Sabha)*** *in November 1996 and was re-elected for a second term in November 2002 till November 2008. Dr. Das has been elected again as a Member of Parliament (Rajya Sabha) for a third consecutive term in 2008 till 2014.*

Dr. Das has been a member of many important parliamentary committees and National level apex advisory & statutory bodies including the AIMS. He has been a member of the Executive Committee of AICTE. He had been the Chairman Parliamentary Standing Committee for Industries. He also served with distinction as the Union Minister of State for Steel and made a place for himself as one of the foremost National leaders.

Contribution to Sports

Dr. Akhilesh Das was an enthusiastic sports person. He underwent an exhaustive training in England as a Junior Badminton player. Later, he represented and captained the U.P. State Badminton team for many years and won many National & International tournaments including the National Doubles Championship. His love for other sports is no less. He has been instrumental in organizing and facilitating many National level tournaments in various sports. He was the president of the U.P. Olympic Association & Chairman of Badminton Association of India.

Contribution to the Cause of Education

*As a social thinker, Dr. Das realized the need of Quality Technical & Professional education for the overall growth and upliftment of the masses and development of the State of Uttar Pradesh. Accordingly, Babu Banarasi Das Educational Society (****BBDES****) was founded through which the torch for higher professional education was lit in Lucknow, the Capital of U.P. The first institution in the series, Babu Banarasi Das Institute of Technology & Management (****BBDITM****), Lucknow was established in 1998 and Babu Banarasi Das Northern Indian Institute of Technology (****BBDNIIT****), Lucknow in 1999, Dr. Akhilesh Das Gupta Institute of Technology & Management (****ADGITM****), New Delhi in 2003, Babu Banarasi Das Engineering College (****BBDEC****), Lucknow in 2009 and Babu Banarasi Das University (****BBDU****), Lucknow in 2011.*

Hon'ble Chairperson, BBD Group

Mrs. Alka Das

A lady with spirit, determination and zeal, Mrs. Alka Das has been the driving force behind her husband Dr. Akhilesh Das. She is the daughter of Late Justice D. P. Gupta, who held high positions in the State of Rajasthan, as its Governor and Chief Justice. She was brought up on Gandhian ideals and philanthropic traditions.

Mrs. Das is a Management expert and a legal luminary who has a long involvement with issues of social justice and women empowerment in our country. She is a legal consultant to several reputed organizations and an active Social Worker. She is connected with many National Social & Educational Organizations. She is also a Life Member of the "Rajasthan High Court Bar Association". The establishment of Northern India Engineering College, Lucknow was an initiative taken by her to provide quality professional education to match the International Standards.

As a Co-founder of Babu Banarasi Das Group of Educational Institutions, Mrs. Das has made a fertile attempt to nurture a generation of self-made and highly motivated students with an inbuilt commitment to do something constructive for the Country.

Hon'ble President, BBD Group

Mr. Viraj Sagar Das

Vice- President, Badminton Association of India
President, Uttar Pradesh Olympic Association

"Education is the most powerful weapon which you can use to change the world" *– Nelson Mandela*

Babu Banarasi Das Educational Group has its roots lying deep in quality education practices that equip each student with broad outlooks to prepare them for this futuristic world. We are committed to providing the education that fulfils the needs of today's world. Today, education is not limited to textbook courses and its practical implementation. Education has been through a major transformation where apart from the syllabus, it has become imperative to inculcate some extra skills in the students so that they could truly succeed in their lives. We encourage our students to perform well in their academics and also to take active participation in all the co-curricular activities in order to develop interpersonal skills, take up challenges, and be self-dependent and most importantly, have a good time while learning.

Vision of the Institute

"To establish a multi-disciplinary environment with excellence in technical education and research for developing competent professionals who meet the challenges of industrial and societal development with human values and ethics."

Mission of the Institute

M1. *To provide an excellent environment with supporting infrastructure to prepare globally competent professionals acceptable to industry and society*

M2. *To inculcate a spirit of research, innovation and entrepreneurship by exposing multi-disciplinary approach*

M3. *To motivate aspiring graduates to solve real life problems with zeal of lifelong learning*

M4. *To imbibe a healthy environment which helps to develop intellectual capabilities among graduates to transform them into professionals with human values and ethics*

About the Department

The Department of Information Technology offers Bachelor's degree in Information Technology. This degree program prepares graduates for successful, profitable and lifelong careers in IT and ITES fields. Information Technology students study software systems through innovative classroom instructions, supported by laboratories equipped with the state of-the-art hardware and software. The department ensures that the students are introduced to both fundamental and advanced knowledge in areas such as Networking technology, Computer Security and software engineering, Cloud Computing, Data Analytics etc.

Salient Features of the department are as follows.

- State of the Art Computing Facilities
- ICT in Teaching and Learning
- Teacher as Mentor
- Research & Publications with Social Impact
- Supportive Learning for Placements
- Professional Development for Industrial Engagement

Various activities conducted by the department for the students are as follows.

- Value Added Courses
- Career Oriented Add-On Courses
- Special Training for Competitive Examination
- Expert Lectures for Industry Interaction
- Report Writing & Paper Presentation
- Personality Development & Soft Skill Training

Vision of the Department

"To be a dynamic and premier center for imparting transformative education with quality teaching-learning to excel students in the field of Information Technology and to meet the expectations of the industry and society with moral values and ethics."

Mission of the Department

M1: To provide cutting edge knowledge based education through compatible infrastructure to develop professionals who cater the need of Industry and society at large.

M2: To motivate graduates for achieving excellence in academics, industry and entrepreneurship to serve the society.

M3: To inspire students for transformation in industry and society with their noble values and professional ethics.

Program Educational Objectives (PEOs)

The Program Educational Objectives of the U.G. program in the Department of Information Technology are:

After 4 years of completing this program, the students:

PEO-1: Graduates will be able to apply procedural and programmatic knowledge with innovative skills to provide solutions in a technology-driven era.

PEO-2: Graduates will possess professional competency to be employable, entrepreneur and inclination towards higher education with a zeal for life-long learning.

PEO-3: Graduates will be a valuable asset for society by exhibiting their professional engineering quality with moral values and ethics.

Program Specific Objectives (PSOs)

PSO-1: The graduates should have ability to provide engineering solutions in the field of Image Processing, Machine Learning, Cloud Computing and Data Sciences using available IT tools and techniques.

PSO-2: The graduates should have ability to employ inter-disciplinary approaches to design and develop IT solutions for real world problems.

Program Outcomes (POs)

Information Technology (IT) Graduates will be able to:

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Message from the Director (Engg.)

It gives me immense pleasure to present **Volume 7, Issue I (2026)** of the **Annual Magazine of the Department of Information Technology, BBDNIIT, Lucknow**. This publication reflects the creativity, enthusiasm, and intellectual engagement of our faculty members and students who have voluntarily contributed their ideas, experiences, achievements, and creative expressions. Such initiatives provide a valuable platform for knowledge sharing and encourage a culture of innovation and collaboration.

I congratulate the editorial team and all the faculty and student contributors for their sincere efforts in bringing out this edition. I am confident that the magazine will inspire our students to think creatively, explore emerging technologies, and pursue excellence in academics, research, and professional development. I extend my best wishes to the Department of Information Technology for continued growth, innovation, and success.

Regards
Prof. (Dr.) V. K. Singh
Director (Engg.)
Babu Banarasi Das Northern India Institute of Technology, Lucknow

Message from Head of Department

It gives me immense pleasure to present **Volume 7, Issue I (2026)** of the **Annual Magazine of the Department of Information Technology, BBDNIIT, Lucknow**. This edition is a reflection of the academic achievements, technical activities, creative pursuits, and vibrant spirit of our department. It provides a glimpse into the continuous efforts of our faculty and students towards learning, innovation, research, and professional growth.

I am especially pleased to acknowledge the voluntary contributions of our faculty members and students, whose ideas, experiences, technical insights, and creative expressions have enriched this publication. Their enthusiasm and willingness to share their knowledge truly represent the collaborative and inclusive spirit of our department.

I congratulate the editorial team and all the contributors for their sincere efforts in bringing out this edition. I hope this magazine inspires everyone to embrace new technologies, nurture creativity, and strive for excellence. I extend my best wishes to all members of the Department of Information Technology for continued growth and success.

Regards
Prof. (Dr.) Bhawesh Kumar Thakur
Head, Department of Information Technology
Babu Banarasi Das Northern India Institute of Technology, Lucknow

Faculty Contribution

Students Contribution

Faculty Contribution

Design Thinking for IT Professionals: From Problem Solving to Human-Centered Innovation

Mr. Praveen Sachan
Assistant Professor, Department of Information Technology

Introduction
The Information Technology (IT) industry is evolving at an unprecedented pace. Artificial Intelligence (AI), cloud computing, Internet of Things (IoT), big data, cyber security, and emerging digital platforms are transforming the way organizations operate and interact with users. However, technological capability alone does not guarantee the success of a software product or digital service. Many technically excellent solutions fail because they do not adequately address the actual needs, expectations, and experiences of their users.

This is where **Design Thinking** becomes highly relevant for IT professionals. Design Thinking is a human-centered approach to problem solving and innovation that combines people's needs, technological possibilities, and organizational requirements [1]. Rather than beginning with the question *"What technology can we build?"*,

Design Thinking encourages professionals to ask *"What problem are we trying to solve, and for whom?"*

For IT professionals, Design Thinking is therefore not merely a design methodology. It is a mindset that promotes empathy, creativity, collaboration, experimentation, and continuous learning.

What is Design Thinking?
Design Thinking has its roots in design practice and has evolved into a widely used approach for addressing complex and ambiguous problems. IDEO describes it as a human-centered approach to innovation that balances **desirability, feasibility, and viability** [1].

- **Desirability:** Do users actually need or want the solution?
- **Feasibility:** Can the solution be developed using available technology and resources?
- **Viability:** Can the solution provide sustainable value for the organization?

These three perspectives are particularly important in IT projects. A technically feasible application may not be useful to users, while an attractive product may not be technically or economically sustainable.

The Stanford d.school commonly presents Design Thinking through five interconnected modes: **Empathize, Define, Ideate, Prototype, and Test** [2]. These stages should not be considered a rigid sequence. IT teams may move backward and forward between them as new information and user feedback emerge.

Five Stages of Design Thinking for IT Professionals

1. Empathize: Understand the User
The first step is to understand the people who will use the technology. IT professionals often begin projects with functional requirements such as login, search, payment, reporting, or data processing. Design Thinking asks them to go deeper and understand the user's context, frustrations, motivations, and expectations.
Techniques such as user interviews, observation, surveys, journey mapping, and persona development can help developers understand users more effectively.
For example, suppose an IT team is developing a **college student portal**. Instead of assuming that students simply need access to marks and attendance, developers can interact with students and discover problems such as difficulty finding information, excessive navigation, unclear notifications, or poor mobile usability.
Empathy helps transform assumptions into evidence-based understanding.

2. Define: Identify the Real Problem

After collecting information, the next challenge is to clearly define the problem. This stage is critical because teams sometimes spend considerable time solving the wrong problem.

A useful problem statement should focus on the user rather than the technology. For example:

"Students need a simple way to access important academic information from their mobile devices without navigating through multiple pages."

This is more useful than saying:

"We need to develop a mobile application."

The first statement defines a **problem**, while the second immediately jumps to a **solution**.

For IT professionals, effective problem definition can improve requirements engineering and reduce ambiguity in software projects. Research on the integration of Design Thinking with software development indicates that Design Thinking techniques can support problem understanding and innovative solution generation [3].

3. Ideate: Generate Multiple Solutions

Once the problem is defined, the team generates possible solutions. The objective is not to immediately identify one "perfect" idea but to explore multiple possibilities.

Brainstorming, mind mapping, sketching, "How Might We" questions, and collaborative workshops can be used during this stage.

For instance, if students struggle to receive important academic notifications, possible ideas could include:

• A personalized notification dashboard • Mobile push notifications • WhatsApp or chatbot integration	• An AI-based academic assistant • A single consolidated student timeline • Voice-based information retrieval

The IT professional's technical knowledge becomes particularly valuable here. However, technical feasibility should not suppress creativity too early. The team should first explore possibilities and then evaluate them against constraints.

4. Prototype: Build to Learn

One of the most important principles of Design Thinking is **prototyping**. Instead of investing months in developing a complete product, teams can create a simplified representation of an idea and obtain feedback quickly.

A prototype can be:

• A paper sketch • Wireframe • UI mock-up • Clickable Figma prototype	• Low-code application • Proof-of-concept program • Chatbot prototype • Minimum Viable Product (MVP)

For example, before developing an entire student portal, an IT team could create a clickable prototype containing only the dashboard, attendance, examination schedule, and notifications. Students can interact with it and identify usability problems before actual development begins.

This approach reduces the cost of failure because mistakes discovered during prototyping are generally less expensive to correct than mistakes discovered after deployment.

5. Test: Learn from Real Users

The final stage involves putting the prototype in front of users and observing their responses. Testing is not simply about checking whether the software works technically. It is also about understanding whether the solution works **for the user**.

Developers can ask:

- Can users complete the intended task?
- Where do they become confused?
- Which features are unnecessary?
- What additional needs have emerged?
- Does the solution solve the original problem?

The results may lead the team back to the Define, Ideate, or Prototype stage. Thus, Design Thinking is inherently iterative.

Why Design Thinking Matters in IT

1. Better User Experience

Modern users expect digital products to be simple, fast, accessible, and intuitive. Design Thinking places user experience at the center of development and can help IT teams build products that are easier and more enjoyable to use.

2. Improved Requirements
Traditional software projects may sometimes depend heavily on predefined requirements. However, requirements can change as users understand the system and its possibilities. Design Thinking provides techniques for discovering hidden requirements and validating assumptions early.
A systematic mapping study of Design Thinking in software development found that Design Thinking has been used as a user-centered approach within software development activities, particularly for understanding problems and proposing innovative solutions [3].
3. Encourages Innovation
Innovation requires the willingness to explore alternatives. Design Thinking encourages divergent thinking before converging on a practical solution. This is valuable for IT professionals working in areas such as AI, IoT, cybersecurity, fintech, healthcare technology, and educational technology.
4. Reduces Development Risk
Developing a complete product without validating its concept can be expensive. Early prototypes and user testing allow teams to identify weaknesses before substantial resources are committed.
5. Strengthens Collaboration
Successful IT projects involve developers, designers, testers, business analysts, managers, domain experts, and users. Design Thinking encourages multidisciplinary collaboration rather than isolated technical decision-making.

Design Thinking and Agile Development
Design Thinking and Agile development can complement each other effectively. Design Thinking focuses strongly on **understanding the right problem and validating the desired solution**, while Agile provides an iterative framework for developing and delivering software.
A practical IT workflow could therefore be:
Empathize → Define → Ideate → Prototype → User Test → Agile Development → Continuous Feedback
For example, an IT team may use Design Thinking to identify user needs and develop a validated prototype. The validated requirements can then be converted into user stories and developed through Agile sprints.
This combination creates a useful balance between **creativity and disciplined execution**.

Design Thinking in the Age of Artificial Intelligence
The emergence of Generative AI makes Design Thinking even more relevant. AI tools can generate software code, interfaces, images, content, test cases, and alternative solutions at remarkable speed. However, generating a solution is not equivalent to identifying the right problem.
IT professionals must therefore combine **AI capabilities with human judgment**. AI can help teams rapidly explore ideas and create prototypes, but humans remain responsible for understanding context, evaluating consequences, considering ethics, and determining whether a solution genuinely benefits users.
This becomes particularly important in applications involving healthcare, education, finance, employment, and public services, where technology can directly influence people's lives.
Design Thinking can help ensure that AI systems are not developed merely because they are technically possible, but because they address meaningful human needs.

Essential Design Thinking Skills for IT Professionals
Future IT professionals should develop a combination of technical and human-centered capabilities. Important skills include:

1. **Empathy and active listening** – understanding users without making assumptions.
2. **Problem framing** – converting vague challenges into meaningful problem statements.
3. **Creative thinking** – generating multiple possible solutions.
4. **Prototyping** – rapidly converting ideas into tangible representations.
5. **Communication** – presenting technical concepts in understandable language.
6. **Collaboration** – working effectively with multidisciplinary teams.
7. **Critical thinking** – evaluating ideas against evidence and constraints.
8. **Adaptability** – responding positively to feedback and changing requirements.

These skills complement programming, database management, networking, cloud computing, AI, and other technical competencies.

Conclusion
Design Thinking provides IT professionals with a powerful approach for moving from **technology-centered development to human-centered innovation**. It encourages professionals to understand users, define meaningful problems, explore alternatives, build prototypes, test assumptions, and continuously improve solutions.

In an environment where technologies change rapidly, the ability to learn and adapt is becoming as important as technical expertise. A successful IT professional is not simply someone who can write efficient code; it is someone who can understand a problem, communicate with people, collaborate across disciplines, experiment with ideas, and create technology that delivers meaningful value.

The future of IT will therefore require a combination of **technical excellence, creativity, empathy, and responsible innovation**. Design Thinking provides a practical bridge between these capabilities. By adopting this mindset, IT professionals can become not only better developers and engineers, but also better problem solvers and innovators.

References

[1] IDEO, "Design Thinking: Human-Centered Innovation," IDEO Design Thinking. Available at: IDEO Design Thinking

[2] Stanford d.school, "Design Thinking Bootleg," Hasso Plattner Institute of Design, Stanford University. Available at: Stanford d.school Design Thinking Bootleg

[3] J. Hehn and D. Mendez, "Combining Design Thinking and Software Requirements Engineering to create Human-centered Software-intensive Systems," arXiv, 2021. Available at: Combining Design Thinking and Software Requirements Engineering

[4] J. Liedtka, "Perspective: Linking Design Thinking with Innovation Outcomes through Cognitive Bias Reduction," *Journal of Product Innovation Management*, vol. 32, no. 6, pp. 925–938, 2015.

[5] T. Brown, *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation*. New York: Harper Business, 2009.

[6] H. Rittel and M. Webber, "Dilemmas in a General Theory of Planning," *Policy Sciences*, vol. 4, pp. 155–169, 1973.

[7] M. I. Castillo López, A. L. Eslava Cervantes, G. de la Cruz Martínez, and J. L. Ortega Arjona, "Agile, User-Centered Design and Quality in Software Processes for Mobile Application Development Teaching," 2023.

The Future of Information Technology: Top 10 Technologies Shaping 2030

Mr. Alok Kumar Singh
Assistant Professor, Department of Information Technology

Introduction

Information Technology is entering a transformative decade. The traditional boundaries between computing, communication, artificial intelligence, robotics, cybersecurity and physical infrastructure are rapidly disappearing. By 2030, computing will increasingly become intelligent, distributed, autonomous and deeply integrated into everyday life.

The future of IT will not be defined by a single technology. Instead, it will emerge from the convergence of several technologies working together. Artificial Intelligence (AI) will provide intelligence, edge computing will bring processing closer to users and devices, 6G will provide advanced connectivity, quantum computing will address specialized computational problems, and cybersecurity technologies will protect increasingly complex digital ecosystems.

Gartner's recent technology outlook similarly emphasizes AI-native development, AI supercomputing, multiagent systems, domain-specific AI, physical AI, confidential computing and proactive cybersecurity as major strategic directions for the coming years [1]. Against this background, the following ten technologies are likely to have a significant influence on IT by 2030.

1. Generative AI and Autonomous AI Agents

Generative AI has already transformed software development, content creation, education, healthcare and business analytics. The next stage is the evolution from conversational AI systems to **autonomous AI agents** capable of planning tasks, using tools, interacting with applications and completing multi-step workflows.

Multiagent systems can divide complex tasks among specialized AI agents that collaborate to achieve a common objective [1]. For example, one agent could analyze customer requirements, another could generate software code, a third could perform testing, and another could monitor security.

By 2030, AI is likely to become an integral component of software engineering rather than merely a separate application. IT professionals will increasingly work alongside AI systems, making skills such as prompt engineering, AI governance, model evaluation and human-AI collaboration essential.

2. AI-Native Software Development

Software development is moving from traditional coding toward **AI-assisted and AI-native development**. Modern development platforms increasingly use Generative AI to generate code, create test cases, identify defects, document programs and assist in application design.

AI-native development does not mean that programmers will become unnecessary. Instead, the role of developers will evolve from writing every line of code manually to designing systems, validating AI-generated code, managing architecture, ensuring security and solving complex problems.

Gartner projects that AI-native development platforms could significantly change the structure of software engineering teams by 2030, enabling smaller teams to build applications with substantial AI assistance [1].

3. Quantum Computing

Quantum computing represents a fundamentally different approach to computation. Unlike classical computers, quantum computers use quantum phenomena and **qubits** to perform certain types of computations in ways that can offer advantages for specialized problems.

Potential applications include optimization, molecular simulation, cryptography, drug discovery, financial modeling and scientific research. Although large-scale general-purpose quantum computing is still developing, industry roadmaps indicate significant progress toward fault-tolerant quantum systems during the next decade [2].

Quantum computing will also create challenges for cybersecurity because sufficiently powerful quantum computers could threaten widely used public-key cryptographic systems. Consequently, IT professionals need to understand both quantum computing and **post-quantum cybersecurity**.

4. Post-Quantum Cryptography and Next-Generation Cybersecurity

As organizations become more dependent on cloud platforms, IoT devices, AI systems and interconnected infrastructure, cybersecurity will become even more critical.

One of the major challenges is the possibility of quantum attacks against current cryptographic algorithms. In response, the National Institute of Standards and Technology (NIST) finalized three major post-quantum cryptography standards in 2024: FIPS 203, FIPS 204 and FIPS 205 [3].

These standards provide quantum-resistant mechanisms for key establishment and digital signatures. Organizations are expected to begin migrating sensitive systems toward cryptographic algorithms that can withstand future quantum attacks.

By 2030, cybersecurity will increasingly become **proactive rather than reactive**, using AI-based threat detection, automated response, zero-trust architectures, digital identity management and post-quantum cryptography.

5. Edge Computing and Intelligent IoT

Cloud computing has transformed IT infrastructure, but sending every piece of data to centralized cloud servers is not always efficient. **Edge computing** moves computation and analytics closer to data sources such as sensors, cameras, vehicles, smartphones and industrial machines.

The combination of **Edge Computing + IoT + AI** will create intelligent environments capable of making decisions locally. For example, an autonomous vehicle may need to analyze sensor information immediately rather than sending every decision to a distant cloud server.

Edge computing will be particularly important for smart cities, healthcare, industrial automation, autonomous vehicles and real-time monitoring. The future will therefore be less about "cloud versus edge" and more about coordinated **cloud-edge-device computing** [4].

6. 6G and Intelligent Connectivity

The next generation of wireless communication, known as **6G or IMT-2030**, is expected to extend connectivity beyond the capabilities of 5G. The International Telecommunication Union (ITU) has established the IMT-2030 framework for the development of 6G technologies [5].

6G is expected to support advanced applications involving immersive communication, ubiquitous intelligence, integrated sensing and communication, digital twins and highly connected intelligent systems [5].

The importance of 6G goes beyond faster internet. Networks themselves are expected to become more intelligent and tightly integrated with AI, sensing and computing. This could support applications such as autonomous transportation, remote healthcare, smart factories and immersive extended-reality environments.

7. Digital Twins and Cyber-Physical Systems

A **Digital Twin** is a dynamic digital representation of a physical system that can use real-world data for monitoring, simulation, prediction and optimization.

Digital twins are becoming increasingly important in manufacturing, healthcare, smart cities, energy systems and transportation. NIST describes their potential to support observation, diagnosis, prediction and optimization of physical systems [6].

For example, a digital twin of a manufacturing plant can simulate production processes, identify potential equipment failures and evaluate alternative operating conditions before changes are implemented in the physical facility.

By 2030, digital twins are likely to become closely integrated with IoT, AI, edge computing and simulation technologies, creating sophisticated **cyber-physical systems**.

8. Robotics and Physical AI

AI is moving beyond screens and software into the physical world. **Physical AI** combines artificial intelligence with robots, autonomous machines, drones and intelligent devices capable of sensing and acting in physical environments.

The International Federation of Robotics reported that more than 542,000 industrial robots were installed worldwide in 2024, demonstrating the continuing expansion of robotics [7].

By 2030, robots may become increasingly common in manufacturing, logistics, agriculture, healthcare, construction and domestic environments. Humanoid robots and collaborative robots could work alongside humans rather than operating only in isolated industrial environments.

This development will create demand for professionals with interdisciplinary knowledge of AI, robotics, computer vision, embedded systems, control systems and cybersecurity.

9. Confidential Computing and Privacy-Preserving Technologies

As organizations process increasingly sensitive data in cloud and distributed environments, protecting information only while it is stored or transmitted is no longer sufficient. **Confidential computing** aims to protect data while it is being processed.

Hardware-based Trusted Execution Environments (TEEs) can isolate sensitive workloads and reduce exposure even within shared computing infrastructure [1].
Privacy-preserving technologies will become increasingly important in healthcare, financial services, government and collaborative AI. Techniques such as federated learning, secure multiparty computation, homomorphic encryption and confidential computing can help organizations extract value from data while reducing unnecessary exposure of sensitive information.

10. Spatial Computing and Immersive Digital Experiences
Spatial computing combines technologies such as Augmented Reality (AR), Virtual Reality (VR), Mixed Reality (MR), computer vision, 3D interfaces and spatial interaction.
Rather than interacting with computers primarily through flat screens, users will increasingly interact with digital information within physical or simulated environments.
Applications could include virtual laboratories, medical training, remote industrial assistance, immersive education, architectural visualization and collaborative engineering. The IT industry will therefore need professionals capable of working with 3D environments, computer vision, graphics, human-computer interaction and AI.

Preparing IT Professionals for 2030
The transformation toward 2030 also changes the skills expected from IT graduates. Programming will remain important, but it will be only one component of professional competence.
Students should develop expertise in:

• Artificial Intelligence and Machine Learning • Cloud and Edge Computing • Cybersecurity and post-quantum security • Data engineering and analytics • IoT and embedded systems	• Software architecture and DevOps • Human-AI interaction • Robotics and automation • Ethical and responsible technology • Communication, collaboration and problem-solving

Continuous learning will be essential because the technologies that are emerging today may evolve significantly before 2030.

Conclusion
The future of Information Technology is not simply about faster computers or more powerful software. It is about creating an intelligent, connected, autonomous and secure digital ecosystem.
Generative AI and autonomous agents will transform software and knowledge work. Quantum computing may redefine specialized computation. 6G and edge computing will enable highly responsive connected systems. Digital twins and robotics will bridge the digital and physical worlds, while post-quantum cryptography and confidential computing will strengthen digital trust.
For students and professionals in Information Technology, 2030 should therefore not be viewed merely as a destination but as a direction for continuous learning and innovation. The most successful IT professionals will be those who combine **strong technical foundations with adaptability, creativity, ethical awareness and interdisciplinary thinking**.

References
[1] Gartner, “Top Strategic Technology Trends for 2026,” Gartner, 2025–2026.
[2] IBM, “IBM Quantum Roadmap: Quantum 2030,” IBM Technology Atlas, updated 2026.
[3] National Institute of Standards and Technology (NIST), “Announcing Approval of Three Federal Information Processing Standards (FIPS) for Post-Quantum Cryptography,” 2024.
[4] C. Mahmoudi, A. Battou and F. Mourlin, “Formal Definition of Edge Computing: An Emphasis on Mobile Cloud and IoT Composition,” National Institute of Standards and Technology (NIST), 2018.
[5] International Telecommunication Union (ITU), “Recommendation ITU-R M.2160-0: Framework and Overall Objectives of the Future Development of IMT for 2030 and Beyond,” 2023.
[6] G. Shao and M. M. Helu, “Framework for a Digital Twin in Manufacturing: Scope and Requirements,” *Manufacturing Letters*, vol. 24, pp. 105–107, 2020.
[7] International Federation of Robotics (IFR), “World Robotics 2025 – Industrial and Service Robots,” 2025.
[8] G. Shao, D. Kibira and S. P. Frechette, “Digital Twins for Advanced Manufacturing: The Standardized Approach,” NIST, 2024.
[9] Y. Liu and D. Moody, “Post-Quantum Cryptography, and the Quantum Future of Cybersecurity,” *Physical Review Applied*, 2024.
[10] International Telecommunication Union (ITU), “IMT-2030: Technical Requirements for the 6G Future,” 2026.

Artificial General Intelligence: The Next Frontier of Intelligent Computing

Mr. Reetesh Gupta
Assistant Professor, Department of Information Technology

Introduction

Artificial Intelligence (AI) has moved from being a research concept to becoming an integral part of modern computing. Machine learning, deep learning, computer vision, natural language processing and Generative AI are now being used in healthcare, education, finance, transportation, cybersecurity and software development. However, most existing AI systems remain specialized: they can perform particular tasks extremely well but do not possess the broad adaptability and general-purpose intelligence associated with humans.

This limitation leads to one of the most ambitious goals in computer science: **Artificial General Intelligence (AGI)**. AGI refers broadly to AI systems capable of performing a wide range of cognitive tasks, learning from experience, adapting to unfamiliar situations and applying knowledge across different domains. Unlike narrow AI, an AGI system would not be designed only for one particular task. The precise definition of AGI remains debated, and researchers have proposed frameworks that evaluate AI systems according to their breadth, performance and autonomy [1].

The development of AGI could represent a fundamental transition in computing—from machines that execute predefined or learned tasks to systems capable of flexible problem solving across many domains.

From Narrow AI to AGI

The evolution of AI can broadly be understood through three stages.

Artificial Narrow Intelligence (ANI) refers to systems designed for specific tasks. Examples include recommendation systems, spam filters, image classifiers and voice assistants. Modern Generative AI systems are considerably more versatile than traditional narrow AI, but they can still exhibit limitations in reliability, reasoning, memory and real-world autonomy.

Artificial General Intelligence (AGI) represents a hypothetical or emerging class of systems with much broader cognitive capabilities. An AGI would ideally be able to learn new tasks, transfer knowledge between domains, reason about unfamiliar problems and operate effectively in changing environments.

Beyond AGI, some researchers discuss **Artificial Superintelligence (ASI)**—systems whose intellectual capabilities substantially exceed those of humans across most or all cognitive domains. ASI remains speculative and should be distinguished from current AI capabilities.

A useful framework proposed by researchers at Google DeepMind considers AGI as a progression of levels based on **performance, generality and autonomy**, rather than treating AGI as a simple yes-or-no milestone [1].

What Makes AGI Different?

An AGI system would need capabilities extending beyond generating fluent responses. Important characteristics could include:

1. Generalization

The system should be able to apply knowledge learned in one context to new and unfamiliar situations.

2. Reasoning

AGI should be capable of logical, causal and abstract reasoning rather than merely recognizing statistical patterns.

3. Learning and Adaptation

A general intelligence should continuously learn from new information and experiences without requiring complete retraining for every new task.

4. Memory

Long-term memory would allow an AGI system to retain relevant knowledge, experiences and interactions and use them appropriately later.

5. Multimodal Understanding

Human intelligence integrates language, vision, sound, spatial information and physical interaction. Future AGI systems may similarly need to combine text, images, audio, video, sensor data and other modalities.

6. Planning and Autonomy
AGI would need to break complex goals into smaller tasks, plan actions, evaluate results and modify its strategy when circumstances change.
These capabilities make AGI considerably more challenging than building a system that performs well on a fixed benchmark.

Are Today's Generative AI Systems AGI?
This question has attracted considerable debate. Large Language Models (LLMs) and multimodal AI systems have demonstrated impressive capabilities in coding, mathematics, writing, reasoning assistance and information processing. However, capability across many tasks does not automatically establish general intelligence.
Researchers have emphasized that current systems can display uneven or "jagged" capabilities—performing exceptionally well on some tasks while failing unexpectedly on others [2]. This highlights an important distinction between **breadth of capability** and **reliable general intelligence**.
Consequently, it is more appropriate to view today's advanced AI systems as important steps toward increasingly general-purpose AI rather than assuming that AGI has already been achieved.

Technologies Driving the Development of AGI
AGI is unlikely to emerge from a single algorithm. It will probably require the integration of several technologies.

Large and Multimodal Foundation Models
Foundation models provide broad representations learned from massive datasets. Multimodal models extend these capabilities across text, images, audio and video. These technologies provide a foundation for more general-purpose AI systems.

AI Agents
Agentic AI systems can plan tasks, use external tools, interact with software and execute multi-step workflows. Increasingly capable agents could provide an important bridge between passive AI assistants and autonomous intelligent systems.
Reinforcement Learning
Reinforcement learning enables systems to learn through interaction and feedback. It has demonstrated the ability to develop sophisticated strategies in games and scientific environments and may contribute to future systems capable of learning through experience.
Robotics and Embodied AI
Human intelligence is strongly connected to interaction with the physical world. Embodied AI combines AI with robotics, sensors and physical environments, potentially allowing machines to learn through perception and action.
Advanced Computing Infrastructure
Training and operating highly capable AI systems requires enormous computational resources. GPUs, specialized AI accelerators, high-bandwidth networking, distributed computing and potentially future neuromorphic or quantum technologies may contribute to the development of increasingly capable systems.
Potential Applications of AGI
The potential applications of AGI are extensive.
Healthcare
AGI could assist doctors and researchers by integrating medical literature, patient information, diagnostic images and scientific knowledge. It could help identify patterns, suggest research directions and accelerate drug discovery.
Education
An AGI-based educational assistant could provide personalized instruction, adapt explanations to individual learners, identify knowledge gaps and generate customized learning activities.
Scientific Discovery
Perhaps one of the most significant applications could be scientific research. AGI systems could analyze large datasets, formulate hypotheses, design experiments, simulate complex systems and collaborate with researchers.
Software Engineering
AGI could transform software development by understanding requirements, designing architectures, writing code, testing applications, identifying vulnerabilities and maintaining systems. The programmer's role could increasingly shift toward system design, verification, governance and human-AI collaboration.
Business and Industry
Organizations could use highly capable AI systems for strategic analysis, supply-chain optimization, financial modeling, customer support, process automation and decision assistance.

These possibilities explain why AGI is attracting significant research and investment. OpenAI, for example, describes its mission in terms of ensuring that AGI benefits all humanity and highlights potential benefits including scientific discovery and increased human capabilities [3].

Challenges on the Road to AGI

Despite rapid progress, substantial challenges remain.

Reliability and Hallucination

AI systems can produce confident but incorrect information. An AGI intended for critical applications would require much stronger reliability and verification mechanisms.

Common-Sense Reasoning

Humans possess extensive implicit knowledge about physical and social environments. Reproducing such robust common-sense reasoning remains difficult.

Continual Learning

An AGI should learn new information without forgetting previously acquired knowledge or developing undesirable behaviors.

Alignment and Control

A highly capable autonomous system must reliably pursue objectives consistent with human intentions and constraints. The problem becomes more challenging as systems become more capable and autonomous.

Bias and Fairness

AI systems learn from data that may contain historical, cultural and societal biases. Responsible AGI development will require rigorous evaluation and governance.

Security and Misuse

Highly capable AI could potentially be misused for cyberattacks, misinformation, fraud or other harmful activities. Security must therefore be integrated into the development lifecycle rather than added after deployment.

Economic and Employment Disruption

AGI could automate a wide variety of cognitive tasks. While it could create new industries and increase productivity, it may also transform existing occupations and require significant workforce reskilling.

NIST's AI Risk Management Framework and its Generative AI Profile emphasize the importance of identifying, evaluating and managing risks throughout the AI lifecycle [4]. Similar principles will become even more important for future general-purpose systems.

AGI and the Future of IT Professionals

The emergence of increasingly capable AI will not eliminate the importance of IT professionals; instead, it will change the nature of their work.

Future professionals will need strong foundations in:

- Programming and algorithms
- Artificial Intelligence and Machine Learning
- Data engineering
- Cloud and distributed computing
- Cybersecurity
- AI system evaluation
- Human-AI interaction
- Responsible and ethical AI
- Software architecture
- Critical and computational thinking

IT professionals will increasingly become **AI system designers, evaluators, integrators and governors**. The ability to understand what AI systems can and cannot do will be as important as the ability to develop them.

For students, this means that learning programming remains essential, but education should increasingly combine technical knowledge with mathematics, statistics, ethics, communication, problem solving and interdisciplinary thinking.

Responsible Development of AGI

AGI should not be considered merely a technological race. Its development raises questions about safety, governance, accountability, privacy, employment, inequality and access.

The benefits of highly capable AI should be broadly distributed, while systems should remain subject to appropriate human oversight. Developers and organizations must establish mechanisms for evaluation, monitoring, transparency, security and responsible deployment.

The objective should not simply be to create increasingly powerful AI, but to create AI that is **reliable, safe, beneficial and aligned with human values**.

Conclusion

Artificial General Intelligence represents one of the most ambitious frontiers in Information Technology. While there is no universally accepted definition or confirmed timeline for achieving AGI, rapid advances in foundation models, multimodal AI, agentic systems, reinforcement learning, robotics and computing infrastructure are moving AI toward increasingly general capabilities.

The significance of AGI extends far beyond technology. It could transform education, healthcare, scientific research, software engineering and industry. At the same time, it introduces profound challenges involving safety, security, employment, governance and human control.

For the IT community, AGI should therefore be viewed not simply as a future machine but as a **new paradigm of computing**. The professionals who will shape this future must combine technical excellence with creativity, ethical responsibility and an understanding of human needs.

The central question is no longer only *"Can we build more intelligent machines?"* It is also *"How can we ensure that increasingly intelligent machines remain trustworthy and beneficial to society?"* The answer to this question will ultimately determine whether AGI becomes one of humanity's greatest technological achievements.

References

[1] M. R. Morris, J. Sohl-Dickstein, N. Fiedel, T. Warkentin, A. Dafoe, A. Faust, C. Farabet, and S. Legg, "Levels of AGI for Operationalizing Progress on the Path to AGI," *arXiv preprint arXiv:2311.02462*, 2023.

[2] D. Hendrycks, D. Song, C. Szegedy, H. Lee, Y. Gal, E. Brynjolfsson, S. Li, A. Zou, et al., "A Definition of AGI," *arXiv preprint arXiv:2510.18212*, 2025.

[3] OpenAI, "Planning for AGI and Beyond," 2023; updated information on OpenAI's AGI mission and approach, 2025–2026.

[4] C. Autio, R. Schwartz, J. Dunietz, S. Jain, M. Stanley, E. Tabassi, P. Hall, K. Roberts, et al., *Artificial Intelligence Risk Management Framework: Generative Artificial Intelligence Profile*, NIST AI 600-1, National Institute of Standards and Technology, 2024.

[5] B. Xu, "What is Meant by AGI? On the Definition of Artificial General Intelligence," *arXiv preprint arXiv:2404.10731*, 2024.

[6] T. Feng, C. Jin, J. Liu, K. Zhu, H. Tu, Z. Cheng, G. Lin, J. You, et al., "How Far Are We From AGI: Are LLMs All We Need?" *arXiv preprint arXiv:2405.10313*, 2024.

Demis Hassabis: From Chess Prodigy to Pioneer of Artificial Intelligence

Ms. Neelam Chakravarty
Assistant Professor, Department of Information Technology

Introduction

The history of technology is often shaped by individuals who refuse to accept the limits of what machines can do. **Sir Demis Hassabis** is one such remarkable individual. His journey—from a childhood fascination with chess and computer games to becoming a pioneering artificial intelligence (AI) researcher, entrepreneur and Nobel Laureate—offers valuable lessons for today's generation of Information Technology students.

Hassabis is the co-founder and CEO of **Google DeepMind**, an organization whose research has contributed significantly to modern AI. In 2024, he was awarded the **Nobel Prize in Chemistry**, jointly with John Jumper, for developing an AI model capable of predicting the complex three-dimensional structures of proteins. The Nobel Committee recognized this work as a solution to a 50-year-old problem in science [1]. His journey demonstrates that the most influential technological breakthroughs often emerge when curiosity, interdisciplinary learning, persistence and ambition come together.

The Early Spark: Chess and Curiosity

Born in London in 1976, Demis Hassabis developed an extraordinary interest in chess at a very young age. He began playing chess at the age of four and reached master level by the age of 13 [1]. But chess was more than a game for him. It stimulated a deeper question: **How does intelligence work?**

Years later, Hassabis explained that his early experiences with chess made him think about how the human mind plans, solves problems and generates ideas [2]. This curiosity eventually became central to his professional life.

His story provides an important lesson for students: **a hobby can become the starting point of a career when it is pursued with curiosity and reflection**. Students should not underestimate activities such as chess, programming, mathematics, gaming or robotics. Such activities can develop logical thinking, pattern recognition, strategic planning and problem-solving abilities.

Discovering the Power of Programming

As a teenager, Hassabis became fascinated with computers. He taught himself programming and began experimenting with computer games and artificial intelligence. His interest in games eventually led him into the professional video-game industry.

At a remarkably young age, he worked at Bullfrog Productions, where he was involved in the development of the successful computer game *Theme Park*. His early experience demonstrated that programming could be used not merely to calculate numbers but to create interactive worlds and intelligent behavior.

This was an important step in his development because it combined **computer science, mathematics, creativity and psychology**. Instead of seeing programming as simply writing instructions, Hassabis began viewing computers as systems capable of simulating aspects of intelligence.

For today's IT students, this is particularly relevant. Programming should not be learned merely to pass examinations. It should be used as a tool for **creating, experimenting and solving problems**.

From Computer Science to Neuroscience

Hassabis studied Computer Science at **Queens' College, University of Cambridge**, graduating with a first-class degree. However, his curiosity about intelligence did not end with computer science. After working in the games industry, he moved toward neuroscience and completed a PhD in Cognitive Neuroscience at **University College London (UCL)** in 2009 [3].

His research focused on human memory and cognition.

This transition is one of the most inspiring aspects of his career. A computer scientist studying neuroscience might seem unusual, but Hassabis recognized that understanding the human brain could provide insights into building intelligent machines.

His journey illustrates the importance of **interdisciplinary education**. Modern AI is not restricted to computer science. It draws upon mathematics, statistics, neuroscience, psychology, linguistics, physics, biology and philosophy.

For students, the message is clear: **do not restrict your learning to the boundaries of your degree syllabus**.

Founding DeepMind

In 2010, Hassabis co-founded DeepMind with Shane Legg and Mustafa Suleyman. The company's long-term ambition was to understand intelligence and recreate it in machines [4].

DeepMind adopted an interdisciplinary research philosophy, combining machine learning, neuroscience, mathematics, engineering, simulation and computing infrastructure [4].

The organization initially used games as environments for developing and testing AI systems. Games provided controlled environments where an AI could learn, make decisions, receive feedback and improve.

This approach contributed to the development of **deep reinforcement learning**, combining deep neural networks with reinforcement learning techniques. One early milestone was DeepMind's system DQN, which learned to play multiple Atari games directly from screen pixels while optimizing its score [4].

The important lesson is that a seemingly simple environment can become a laboratory for solving much larger scientific problems.

AlphaGo: The Moment AI Surprised the World

DeepMind's most famous early achievement came in 2016 when **AlphaGo** defeated world champion Go player Lee Sedol in Seoul.

Go is an ancient strategy game with an enormous number of possible moves. Its complexity had long made it a significant challenge for AI research. AlphaGo's victory was therefore more than a sporting event—it demonstrated that machine learning systems could discover strategies that were not explicitly programmed by humans [4].

One particular move, popularly known as **"Move 37,"** became famous because it was unexpected and demonstrated the system's ability to find unconventional strategies [5].

However, Hassabis did not consider winning games to be the final objective. Games were a means of developing increasingly capable AI systems. After AlphaGo, DeepMind increasingly focused on problems with direct scientific and societal importance.

This provides an important lesson for students: **choose challenging problems not simply because they are interesting, but because solving them can create wider impact.**

From Games to the Building Blocks of Life: AlphaFold

Perhaps the most remarkable stage of Hassabis's career was the transition from game-playing AI to biological science.

Proteins are fundamental molecules of life, and their three-dimensional structures are closely related to their functions. Predicting a protein's structure from its amino-acid sequence had remained a difficult scientific challenge for decades.

DeepMind developed **AlphaFold**, an AI system designed to predict protein structures. AlphaFold2 achieved a breakthrough in 2020, demonstrating highly accurate predictions and transforming computational structural biology [6].

The achievement had enormous scientific significance. The 2024 Nobel Committee noted that AlphaFold2 enabled researchers to predict the structures of essentially all of the approximately 200 million proteins known to science [1]. The AlphaFold Protein Structure Database has made these predictions broadly available to researchers worldwide [7].

In October 2024, Demis Hassabis and John Jumper were jointly awarded half of the **Nobel Prize in Chemistry**, while David Baker received the other half for computational protein design [1].

The recognition was extraordinary because Hassabis's original field was computer science, yet his AI research ultimately made a major contribution to chemistry and biology.

What Can IT Students Learn from Demis Hassabis?

1. Follow Curiosity, Not Just Career Trends

Hassabis did not begin with a plan to become a Nobel Laureate. His journey developed through questions about games, intelligence, computers, memory and science.

Students should cultivate curiosity beyond prescribed curricula. Ask **why**, **how** and **what if**.

2. Build Strong Fundamentals

Today's AI landscape changes rapidly. New frameworks, models and tools appear constantly. However, fundamental knowledge of programming, algorithms, mathematics, statistics, data structures and computer systems remains valuable.

A student who understands fundamentals can adapt to new technologies much more easily.

3. Think Across Disciplines

Hassabis combined computer science with neuroscience and later applied AI to biology. This interdisciplinary approach was central to his success.

Future IT professionals should explore domains such as healthcare, agriculture, climate science, finance, education and biotechnology. The greatest AI opportunities may emerge at the intersection of **technology and domain knowledge**.

4. Work on Difficult Problems

DeepMind deliberately pursued difficult challenges. AlphaGo addressed game intelligence, while AlphaFold addressed a fundamental scientific problem.

Students should not always choose projects merely because they are easy to implement. A challenging problem can provide much greater learning and research value.

5. Learn Through Failure and Experimentation

AI research involves experimentation, failed approaches and continuous improvement. Students should therefore develop a mindset in which failure becomes feedback rather than defeat.

A failed project can teach more than a successful project if the student understands why it failed.

6. Use Technology for Social Good

Hassabis's career increasingly demonstrates the potential of AI to contribute to scientific discovery. Google DeepMind describes its mission as developing AI responsibly to benefit humanity and emphasizes applications in science, medicine and other areas [4].

For the next generation of IT professionals, technical success should therefore be accompanied by **ethical responsibility**.

The Future: AI as a Tool for Scientific Discovery

Hassabis believes AI could become a powerful tool for scientific discovery. Google DeepMind's recent work extends beyond games and protein structures into areas including weather prediction, mathematics, robotics, computer science and biology [4].

His vision is particularly relevant for today's students. The next generation of AI researchers may not simply develop chatbots or recommendation systems. They may use AI to discover medicines, design materials, understand climate systems, improve energy technologies and address complex societal problems.

This means that the future of AI will increasingly depend on people who understand both **computation and the world in which computation is applied**.

Conclusion

The biography of Demis Hassabis is not merely the story of a brilliant AI researcher. It is a story of **curiosity, interdisciplinary learning, persistence and purposeful innovation**.

A child who began with chess became fascinated by the nature of intelligence. A young programmer entered the world of game development. A computer scientist studied neuroscience. An entrepreneur founded DeepMind. His research produced AlphaGo, changing perceptions of machine intelligence, and AlphaFold, helping solve a longstanding problem in biology. In 2024, this journey culminated in the Nobel Prize in Chemistry.

For today's IT students, perhaps the greatest lesson is not to try to become "the next Demis Hassabis." Instead, it is to develop the qualities that made his journey possible: **curiosity to ask important questions, courage to explore unfamiliar fields, discipline to master fundamentals, patience to solve difficult problems, and responsibility to use technology for the benefit of society**.

The future of Information Technology will be shaped by students who can look beyond existing applications and ask a more ambitious question:

"What important problem can I help technology solve?"

That question may be the beginning of the next great innovation.

References

[1] The Royal Swedish Academy of Sciences, *The Nobel Prize in Chemistry 2024: Computational Protein Design and Protein Structure Prediction*, Nobel Prize, 2024.

[2] University of Cambridge, "Nobel laureate and Cambridge University alumnus Sir Demis Hassabis heralds a new era of AI drug discovery," 2025.

[3] Queens' College, University of Cambridge, "The Future of AI and Scientific Discovery – An Interview with Sir Demis Hassabis," 2025.

[4] Google DeepMind, "About Google DeepMind: Our Mission and Journey."

[5] D. Hassabis, "From games to biology and beyond: 10 years of AlphaGo's impact," Google DeepMind, 2026.

[6] J. Jumper et al., "Highly accurate protein structure prediction with AlphaFold," *Nature*, vol. 596, pp. 583–589, 2021.

[7] Google DeepMind, "Demis Hassabis & John Jumper awarded Nobel Prize in Chemistry," 2024.

Students Contribution

“Technology and the Human Spirit: Why This Is the Best Time to Be an Engineer”

By Adarsh Tiwari
B.Tech, Information Technology, 3rd Year
Babu Banarasi Das Northern India Institute of Technology

There is a quiet myth that circulates in every engineering college: that the "real" breakthroughs happen somewhere else — in Silicon Valley boardrooms, in the labs of MIT or Stanford, in cities most of us will only ever see in photographs. It is a comforting myth for those who want an excuse to stop trying, and a dangerous one for those who actually want to build something. The truth is far more exciting:

we are living through the single most accessible era of technological creation in human history, and geography has almost nothing to do with who gets to participate.

Consider where we stand today. Artificial intelligence, which a decade ago required a research lab, a supercomputer, and a PhD to even experiment with, is now available to any student with a laptop and an internet connection. Large language models can help debug code, explain a research paper, or generate a first draft of a project report at 2 a.m. when the deadline is looming. Cloud platforms let a second-year student deploy a web application to millions of potential users without owning a single server. Open-source repositories on GitHub contain the collective genius of the world's best engineers, free for anyone willing to read the code. The barrier to entry that once separated a student at a premier institute from a student at a lesser-known college has not disappeared entirely — but it has thinned to almost nothing. What separates them now is not access. It is intent.

This is worth sitting with, especially for those of us studying at institutions that don't always make it into the glossy rankings. It is easy to believe that where you study determines what you become. But technology's history is full of counter-examples. Jan Koum, co-founder of WhatsApp, grew up in poverty in Ukraine and taught himself networking from used manuals. Sundar Pichai came from a modest household in Chennai with no telephone until he was twelve, and went on to lead Google. These are not fairy tales; they are proof that curiosity, consistency, and the courage to keep learning outperform pedigree in the long run. The tools available to a curious student today — freely available courses, open datasets, cloud credits for students, hackathons that welcome anyone with an idea — are more powerful than anything those pioneers had when they started.

For those of us in Information Technology specifically, this moment carries a particular kind of responsibility and opportunity. We are not just consumers of technology; we are being trained to be its architects. Every year, the field moves faster:

cloud computing has matured into an entire ecosystem of serverless architecture and edge computing; cybersecurity has grown from an afterthought into one of the most in-demand specializations in the world; and artificial intelligence has moved from being a chapter in a textbook to being the substrate on which entire industries are being rebuilt. Automation, once feared as a job-destroyer, is increasingly understood as a job-transformer — eliminating repetitive work while creating enormous demand for people who can design, supervise, and improve intelligent systems. The engineers of the next decade will not simply write code; they will need to understand ethics, data, human behavior, and business, all at once. This is a heavier demand than what was asked of engineers a generation ago — but it is also a far more interesting one.

None of this progress, however, is inevitable for any individual. Technology creates possibility; it does not create discipline. The student who spends three years scrolling through tutorials without ever finishing a project will not be rescued by having access to ChatGPT or AWS free tier credits. The tools amplify effort — they do not replace it. This is perhaps the most important, and least comfortable, truth for a college magazine to print: your resources have never been better, but your results still depend entirely on what you choose to do with your evenings and weekends.

So what does that mean practically, for a fellow B.Tech student reading this between two exams? It means building things, not just studying about them. It means picking a small, unglamorous project — a scraper, a simple app, a contribution to an open-source repository — and actually finishing it, because a finished small project teaches more than an abandoned ambitious one. It means treating every internship application, every hackathon, every rejection as data rather than judgment. The path from a "tier-3" college to a meaningful engineering career is not mythical; it has been walked by thousands of students before us, and it runs directly through consistent,

unglamorous, daily effort rather than through any single stroke of luck.

There is also something deeply human in all of this that is worth remembering amid the talk of algorithms and architectures. Technology, at its best, has always been in service of people — connecting a farmer to market prices, giving a rural student access to a world-class lecture, letting a grandmother in a village video-call her grandchildren studying in another city. As students of Information Technology, we are not just learning to write code; we are learning a language that can solve real problems for real people, many of whom look a great deal like our own families and neighbors. That responsibility should temper any cynicism about the field with a sense of purpose.

We are, all of us in this department, standing at a genuinely remarkable juncture: the tools of world-changing engineering sitting one browser tab away, available to anyone patient enough to learn them. The only real question left is whether we will treat this decade as spectators or as builders. I would rather be the latter — and I suspect, given the energy in our classrooms and labs, so would most of you.

“10 Movies Every Engineering Student Should Watch: Stories of Innovation, Resilience & Success”

By Pradhumn Singh
B.Tech, Information Technology, 3rd Year
Babu Banarasi Das Northern India Institute of Technology

Here are 10 motivational movies that many engineering students find inspiring because they emphasize problem-solving, innovation, teamwork, perseverance, and resilience:

1.) 3 Idiots (2009)

Shows the importance of learning for understanding rather than just grades. Great for engineering students dealing with academic pressure.

2.) The Social Network

The story of building a tech startup. Inspires entrepreneurship and innovation.

3.) The Imitation Game

Based on the life of Alan Turing. Highlights logic, mathematics, and persistence.

4.) October Sky

A student's journey from a mining town to building rockets. A classic for aspiring engineers.

5.) The Martian

Demonstrates engineering, science, and creative problem-solving under pressure.

6.) Hidden Figures

The true story of mathematicians at NASA whose work helped enable space missions. Inspires teamwork and determination.

7.) Ford v Ferrari

Focuses on engineering design, testing, and innovation in motorsports.

8.) A Beautiful Mind

An inspiring story about mathematical brilliance and perseverance.

9.) Apollo 13

Shows engineers solving life-or-death problems with limited resources.

10.) Moneyball

While not about engineering, it demonstrates data-driven thinking, innovation, and challenging conventional wisdom.

“Technology for Tomorrow”

By Avinash Yadav
B.Tech, Information Technology, 3rd Year
Babu Banarasi Das Northern India Institute of Technology

Technology is not just changing our world—it is creating the future. Every innovation, from Artificial Intelligence and Robotics to Cloud Computing and Cybersecurity, brings new opportunities to solve real-world problems and improve lives.

As students, we are not just users of technology; we are the innovators, creators, and leaders of tomorrow. Through curiosity, creativity, and continuous learning, we can build smarter solutions for a better world.

Let this magazine inspire every reader to dream bigger, think differently, and embrace technology as a powerful tool to shape a brighter, more sustainable future.

“The future belongs to those who innovate today.”

“POEM”

By Rida Tanveer
B.Tech, Information Technology, 3rd Year
Babu Banarasi Das Northern India Institute of Technology

The Journey Within

We came with questions in our eyes,

Unsure of roads beneath the skies.

A campus filled with unknown faces,

Soon became familiar places.

Assignments, lectures, endless tests,

Taught us more than marks and grades.

They shaped our patience, built our will,

And showed us dreams are climbing hills.

So let tomorrow call our name,

We’ll walk ahead through sun and rain.

With hope, with strength, with courage true,

The world awaits what we will do.

“BEHIND EVERY CLICK”

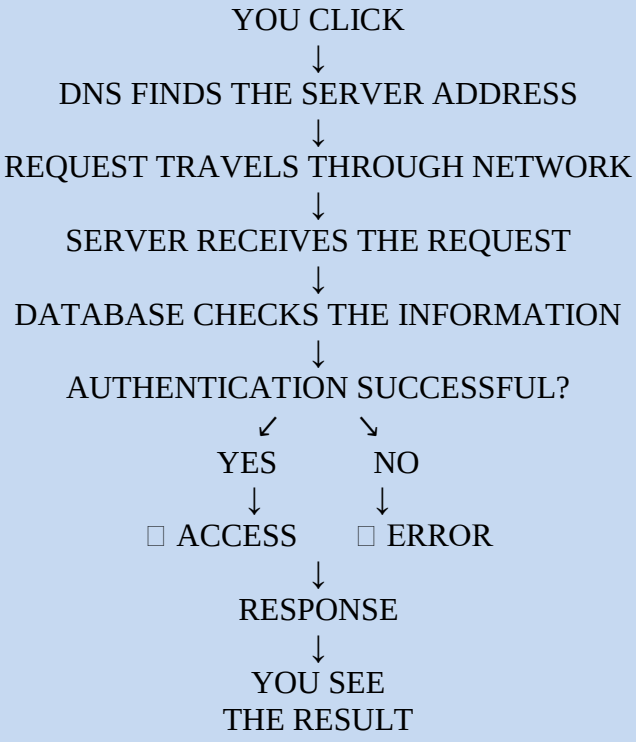
By Sargun Kaur
B.Tech, Information Technology, 3rd Year
Babu Banarasi Das Northern India Institute of Technology

The Invisible Journey of a Simple Click

“You see a button. The internet sees a journey.”

You click “Login” and within seconds, your dashboard appears. But between that click and the final screen, a whole world quietly comes alive behind the scenes.

THE JOURNEY OF YOUR CLICK



01 — FINDING THE WAY

Your browser doesn’t magically know where a website exists.
It first asks DNS (Domain Name System) to translate the name into an IP address—like turning a name into a real-world location.

«“Before your request can arrive, it must first know where to go.”»

02 — THE REQUEST TRAVELS

Your click transforms into an HTTP/HTTPS request and begins its journey through routers, cables, and networks.

One click. Countless hops. All in milliseconds.

03 — THE SERVER THINKS

The server receives your request and starts processing it like a decision-maker.

For login, it may talk to a database to verify whether your details are correct or not.

04 — THE DATABASE RESPONDS

The database acts like a memory bank, quickly checking your information and sending the result back.

Correct details → Access granted □
Wrong details → Access denied □

05 — THE ANSWER COMES BACK

The server sends the final response back to your browser, and your screen updates instantly.

What feels like a blink of an eye is actually a perfectly synchronized digital chain.
-
THE BIGGER PICTURE

YOU → DNS → NETWORK → SERVER → DATABASE → RESPONSE → YOU

«“A click may be instant, but the system behind it is always in motion.”»

NEXT TIME YOU CLICK...

Whether it’s Login, Search, Pay, Upload, or Submit, just pause for a second and think:

You’re not just pressing a button…
You’re activating an entire digital universe.

“Dreams: The First Step Towards Success”

By Saurabh Singh
B.Tech, Information Technology, 3rd Year
Babu Banarasi Das Northern India Institute of Technology

Every success story begins with a dream.

A dream is not just something we see while sleeping; it is something that keeps us awake, inspires us to work, and gives us a reason to move forward. For a student, dreams are the first blueprint of the future.

We often look at successful people and see only their achievements. We forget the sleepless nights, failures, doubts, and countless attempts behind them. **Success is not a destination—it is a journey built on patience, courage, and consistency.**

Sometimes, our dreams may seem too big. People may tell us, *“It’s impossible.”* But every great achievement once looked impossible. The difference is that some people stop when they face obstacles, while others turn those obstacles into stepping stones.

Dream big. Start small. Keep moving.

There will be days when you fail. There will be moments when you doubt yourself. But remember—**failure is not the opposite of success; it is a part of success.**
Your dream doesn't need everyone's approval. It only needs your dedication.

So, while you are still a student, dare to imagine the future you want. Learn, experiment, make mistakes,rise again, and never let temporary failure decide your permanent future.

Because one day, the dream you are working on today may become the success story that inspiressomeone tomorrow.

Dream it. Believe it. Work for it. Become it.

कॉलेज के वो दिन

By Shreyansh Dixit
B.Tech, Information Technology, 3rd Year
Babu Banarasi Das Northern India Institute of Technology

कुछ सपनों की शुरुआत थी,
कुछ अपनों से पहली मुलाकात भी।

कभी किताबों से जंग हुई,
कभी दोस्तों संग जिंदगी रंग हुई।

गलतियों ने हौसला सिखाया,
मुश्किलों ने मुस्कुराना सिखाया।

हर गलियारा एक कहानी है,
हर याद अपनी जिंदगानी है।

डिग्री तो बस एक मंजिल का पता है,
असली सफर तो दोस्तों के साथ कटा है।

कल चाहे मिले ही अलग हो जाएँ,
पर ये पल कभी बिछड़ नहीं पाएँ।

कॉलेज सिर्फ चार साल नहीं,
जिंदगी की सबसे खूबसूरत याद है।

“Beyond the Classroom: The Minds Behind Our IT Journey”

By Tanya Trivedi
B.Tech, Information Technology, 3rd Year
Babu Banarasi Das Northern India Institute of Technology

Every IT student’s journey is shaped not only by technology, but also by the teachers who make complex concepts easier to understand and encourage us to keep learning.

Bhawesh Sir — Our HOD & DBMS Professor

As our Head of Department and DBMS professor, Bhawesh Sir plays an important role in guiding our department. His teaching helps us understand the fundamentals of databases and their practical importance in the IT field. His guidance as HOD also contributes to creating a supportive environment for students.

Praveen Sir — Guiding Us Through Web Technology

Praveen Sir teaches us Web Technology, helping us understand how websites and web-based applications are built. His classes connect theoretical concepts with the practical world of web development, making the subject more relevant to our technical journey.

Reetesh Sir — Making Complex Concepts Simple

Reetesh Sir has been teaching us for the past two years. He teaches Data Structures and TAFL, subjects that can often seem challenging. What makes his teaching special is his ability to explain concepts clearly and make difficult topics easier to understand. His approach encourages students to ask questions, understand the logic behind concepts, and learn with confidence.

A Note of Gratitude

Our professors contribute much more than classroom lectures. Their patience, guidance, and way of explaining concepts help us grow not only as students but also as future IT professionals.

Thank you, Bhawesh Sir, Praveen Sir, and Reetesh Sir, for being an important part of our IT journey—inside and beyond the classroom.

“Why AI Literacy is the New IT Core” Competency

By Utakarshini srivastava
B.Tech, Information Technology, 3rd Year
Babu Banarasi Das Northern India Institute of Technology

The IT landscape is shifting from traditional software management to AI-driven operations. For IT professionals, understanding how to code or manage infrastructure is no longer the final goal. The new priority is AI literacy—the ability to critically evaluate, implements, and secures AI technologies within our organization.

Moving beyond the Hype AI literacy is not just about using Chabot’s to write emails. For our department, it means understanding the mechanics behind Large Language Models (LLMs), machine learning pipelines, and automated workflows. We must be able to distinguish between tools that offer genuine operational efficiency and those that introduce unnecessary complexity or security vulnerabilities.

The Three Pillars of Modern IT Literacy

Data Architecture Awareness: AI is only as good as the data feeding it. IT professionals must understand how data is cleaned, structured, and piped into AI models.

Security and Ethics: Deploying AI requires strict governance. We need to be experts in identifying data leaks, managing user privacy, and ensuring compliance with evolving tech regulations.

Prompt Engineering & Integration: Knowing how to effectively communicate with AI models and integrate them into existing enterprise APIs is now a core technical skill.

The Path Forward As the backbone of the organization's technology, the IT department must lead by example.

Upskilling in AI fundamentals ensures that we remain consultants and leaders, rather than just maintainers of old systems. The future of IT belongs to those who can seamlessly bridge the gap between human strategy and machine intelligence.