CSE MESSENGER

Your Window to the Digital Revolution

Vol.
6

PANIPAT INSTITUTE
ENGINEERING & TECHNO

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Vision of the Department

Department of Computer Science and Engineering aspires to become a center of excellence for quality technical education by keeping pace with new technologies to create competent professionals.

Mission of the Department

M1: To develop professionals with analytical and technical competency for productive career in industry, academia and as entrepreneurs.

M2: To build theoretical and applied skills of faculty and student in computer science and engineering through need-based training, research and development on industrially and socially relevant issues.

M3: Continuously improve and provide state-of- the-art laboratories to keep up with the new developments in the area of computer science and engineering.

M4: Create nurturing environment through competitive events, industry interactions, global collaborations and creating concern for lifelong learning.

PROGRAM EDUCATIONAL OUTCOMES (PEOS)

PEO1 To impart an in-depth knowledge of science, mathematics, and computer science and engineering to create a foundation for building capacity and competence in using the fundamental and core knowledge.

PEO2 To facilitate and foster technical and analytical skills in students to develop innovative solutions to complex real-life problems using existing and novel technologies

PEO3 To train students with the relevant soft skills and also with a concern for lifelong learning.

PEO4 To expose them to various contemporary and social issues which will enable them become ethical and responsible citizens of the society.

About Our Department

PIET-CSE aims to encourage research and innovation in Computer Science and allied areas. The objective of the BTech program in Computer Science and Engineering (CSE) is to prepare students to undertake careers involving innovation and problem solving using computational techniques and technologies to undertake computational techniques and technologies, or advanced studies for research careers to take up entrepreneurship. In order to give due importance to applied as well as theoretical aspects of computing, the curriculum for the BTech (CSE) program covers most of the foundational aspects of computing sciences, and also develops in students the engineering skills for problem solving using computing sciences.

Most engineering programs start with general courses in Sciences and then migrate to specialized courses for the disciplines. While these courses are indeed foundational for many engineering disciplines, they can be treated as application domains (as is evidenced from the fact that most sciences and Engineering disciplines heavily use computing now) Hence, the BTech (CSE) program at PIET starts with computing-oriented courses first and allows the possibility of doing science courses later. Besides being better suited for a CSE program, it also enables the possibility of students seeing newer applications and possibilities of using computing in these subjects.

Message From Director's Desk

Our annual technical magazine of the CSE Department, *CSE Messenger*, serves as a platform to unleash the hidden writing talents of our students, offering them a valuable opportunity to refine their skills and contribute to their overall personal and professional development.

The field of Computer Science is constantly evolving, propelled by groundbreaking innovations and emerging challenges. Our students are at the forefront of this transformation, not only acquiring technical expertise but also developing critical thinking, problem-solving, and communication skills. This publication provides them with a platform to share their knowledge, showcase their projects, and express their creativity.

I extend my heartfelt congratulations to all the contributors for creating such an impressive and inspiring edition of the magazine

Prof (Dr) Shakti Kumar
(Director)

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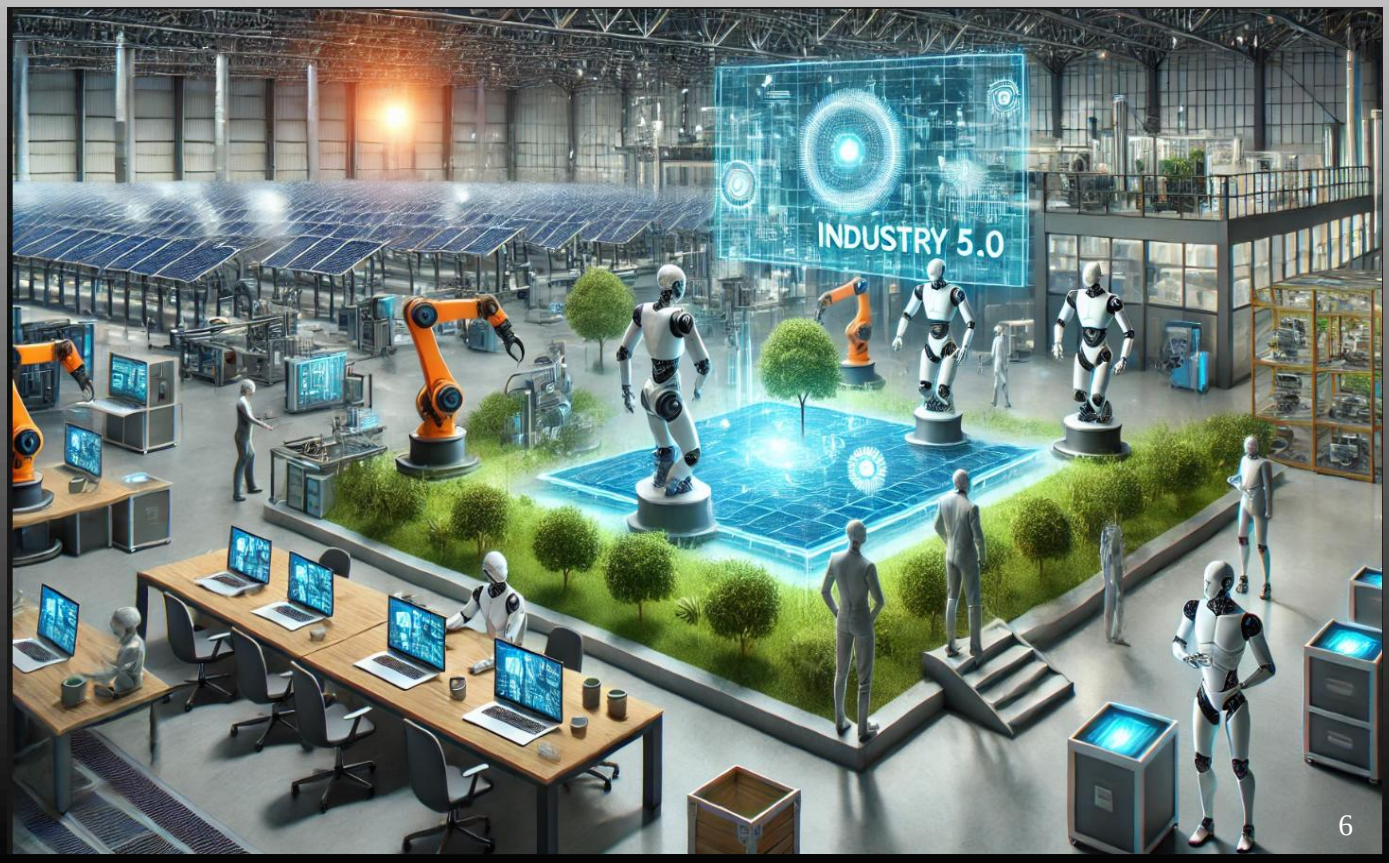
Message From HOD's Desk

It is an occasion of great pride and satisfaction for the department of CSE, to bring out the issue of the annual yearly of the Technical magazine CSE Messenger. It gives me immense pleasure to note that the response to the magazine has been overwhelming. The wide spectrum of articles gives us a sense of pride that our students and faculty possess creative potential and original thinking in ample measures. Each article is entertaining interesting and absorbing . I applaud the contributors for their stimulated thoughts and varied hues in articles contributed by them.

Prof (Dr) S.C. Gupta
Department of CSE,
PIET

Industry Revolution 5.0: Bridging Human and Machine Collaboration

The concept of Industry Revolution 5.0 marks a transformative era in industrial development, characterized by the harmonious collaboration between humans and machines. Unlike its predecessor, Industry 4.0, which focused on automation, AI, and data exchange in manufacturing technologies, Industry 5.0 brings the human element back into focus. It emphasizes synergy between advanced technologies and human creativity, aiming to enhance productivity while also promoting sustainability, resilience, and human-centric innovation. Industry 5.0 recognizes that machines and artificial intelligence, while incredibly powerful, lack the emotional intelligence, ethical reasoning, and nuanced decision-making that humans bring. By combining human insight with machine precision, organizations can create more adaptive, personalized, and efficient systems. This revolution envisions a future where robots assist workers rather than replace them, enabling mass customization over mass production. For instance, in healthcare, AI-driven systems support doctors in diagnostics while human empathy and care remain irreplaceable. In manufacturing, collaborative robots (cobots) work alongside humans to increase efficiency without compromising safety or job quality. Industry 5.0 also integrates green technologies and ethical AI, aligning technological progress with sustainable development goals. Ultimately, Industry Revolution 5.0 is about leveraging technology to augment human potential. It fosters a balanced ecosystem where machines handle repetitive tasks, allowing humans to focus on creative, strategic, and meaningful work. As industries embrace this next wave, the focus will shift toward lifelong learning, human-machine interface design, and ethical frameworks to guide development. By bridging the gap between technological advancement and human values, Industry 5.0 sets the stage for a more inclusive, innovative, and purpose-driven industrial future. It redefines progress—not just in terms of efficiency and output, but also in how technology can empower people and improve quality of life across the globe..



The Impact of COVID-19 on the Education System

The COVID-19 pandemic had a profound and lasting impact on the global education system. As the virus spread rapidly, schools, colleges, and universities across the world were forced to shut their doors, affecting over 1.6 billion learners. This sudden disruption highlighted the vulnerabilities in existing educational structures and brought significant changes to teaching and learning methods.

One of the most noticeable shifts was the move from traditional in-person classrooms to online and remote learning. Educational institutions quickly adopted digital platforms such as Zoom, Google Classroom, and Microsoft Teams to maintain continuity. While this digital transformation ensured that learning could continue, it also exposed the deep digital divide. Students in underprivileged communities struggled with limited access to the internet, computers, or even a quiet space to study. As a result, learning inequalities were amplified, and many students fell behind. Teachers also faced considerable challenges. Most had to adapt to online teaching with little or no prior training. They were required to redesign their lessons, learn new technologies, and manage virtual classrooms, all while dealing with the same anxieties and uncertainties caused by the pandemic. This situation emphasized the need for ongoing professional development and support systems for educators. Moreover, the pandemic significantly affected students' mental health. Social isolation, increased screen time, and uncertainty about the future led to stress, anxiety, and a lack of motivation. The absence of peer interaction and extracurricular activities hindered the holistic development of learners. Despite these challenges, the pandemic also presented opportunities for innovation.

Hybrid learning models combining online and offline education gained popularity. There was also a growing emphasis on self-paced and personalized learning. Educational institutions began to prioritize resilience, digital readiness, and inclusivity. In conclusion, COVID-19 dramatically reshaped the education landscape. It exposed weaknesses but also inspired change. As the world recovers, it is essential to learn from this experience by investing in technology, training educators, and ensuring equitable access to education for all. A more inclusive, flexible, and resilient education system will be crucial in preparing students for an uncertain and rapidly changing future.

Webinar on Artificial Intelligence

A webinar on Artificial Intelligence (AI) was recently conducted to explore the growing impact of AI technologies across various sectors. The session aimed to educate students, professionals, and enthusiasts about the fundamentals of AI, its real-world applications, and future opportunities in the field. Expert speakers from academia and industry shared valuable insights into how AI is transforming industries such as healthcare, finance, education, and transportation. Topics covered included machine learning, deep learning, natural language processing, and ethical considerations in AI development. The interactive nature of the webinar allowed participants to ask questions and engage in discussions, making it a dynamic learning experience. One of the key highlights was the emphasis on the role of AI in solving complex problems and enhancing decision-making processes. The speakers also stressed the importance of interdisciplinary skills and continuous learning to succeed in AI-related careers. The webinar concluded by encouraging attendees to pursue AI research and development, highlighting various online courses, tools, and platforms available for skill-building. Overall, the session provided a comprehensive overview of AI, inspired curiosity, and motivated participants to explore its vast potential. It served as a valuable initiative to promote awareness and understanding of one of the most transformative technologies of our time.

Highlights of Cultural Event
Know Your Talent

Department of Computer Science and Engineering, PIET conducted a Dance/Singing Competition (Know Your Talent) on 30th June 2021.
The reason behind selecting this theme was to aware students about their hidden talent and its importance and also to encourage them.
Students from various courses registered enthusiastically and submissions were done through the link provided on the flyer.
The best talent was selected, and the results are intimated to the participants. Ms. Neha Bhatia (Assistant Professor, IT) and Mr. Sunny Kuhar (Assistant Professor, CSE) were the judges for the event.
Students were judged according to the energetic performance and creativity. Certificate were given to the best talent.

“Know Your Talent” is a vibrant cultural event designed to showcase and celebrate diverse talents within a community. It offers participants the chance to step into the spotlight, whether they are skilled in music, dance, painting, or any other form of artistic expression. This event is not just about entertainment but also about fostering confidence and personal growth as individuals display their unique abilities. The primary goal of "Know Your Talent" is to encourage people to explore and embrace their hidden talents. By providing a supportive environment, participants are empowered to perform or present their work, regardless of their experience level.
It’s an opportunity to receive recognition for one’s efforts while also learning from others. Such events often include a wide range of performances, workshops, and exhibitions, highlighting the richness of different cultures. They also bring people together, creating a sense of unity and appreciation for the various forms of artistic expression that exist across communities. In conclusion, "Know Your Talent" serves as a reminder that everyone has something valuable to offer. It encourages individuals to take pride in their talents, offering a platform for self-expression and fostering stronger community bonds.

Manthan 2021

Manthan, a vibrant and intellectually enriching event, is a flagship program organized across various colleges to promote creativity, critical thinking, and innovation among students. Derived from the sanskrit word meaning 'churning,' manthan symbolizes the churning of ideas, debates, and talents that shape young minds.

The event usually spans over a day or two and includes a variety of competitions such as debates, quizzes, tech talks, group discussions, poster-making, innovation showcases, and cultural performances. Students from different streams come together to participate and present their ideas on relevant social, technological, and economic issues.

At its core, manthan aims to provide a platform for students to express their viewpoints, challenge existing norms, and suggest practical solutions to real-world problems. This year's theme focused on **"empowering youth through innovation,"** encouraging participants to explore sustainable solutions using technology and entrepreneurship.

Expert panels, guest lectures, and interactive sessions with industry leaders added further value to the event. These not only inspired the participants but also gave them insight into the current professional and academic landscape.

The event's success was a testament to the resilience of both the organizers and participants, as they adapted to a new format while preserving the event's core values of creativity and collaboration. Manthan 2021 proved that even in challenging times, art and culture can bring people together and inspire growth and connection.

The event concluded with an award ceremony where the best-performing teams and individuals were recognized for their contributions and excellence. Manthan not only celebrated the spirit of youth but also strengthened the culture of discussion, innovation, and collaboration in the academic space.

Toycathon 2021

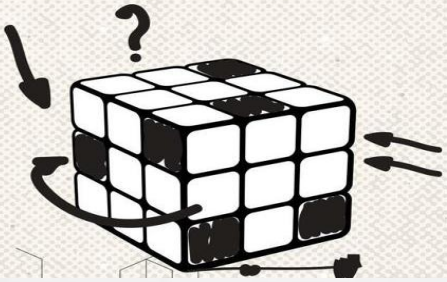
Toycathon 2021 was a unique and exciting initiative aimed at fostering innovation and creativity in toy design, with a focus on making educational toys that promote learning and development. Organized by the Government of India, Toycathon 2021 encouraged participants to develop indigenous toys and games that align with India's rich cultural heritage while meeting modern educational needs. The event invited participants from various backgrounds, including students, entrepreneurs, and professionals, to collaborate and create toys that are both engaging and educational. With themes like traditional toys, innovative design, and sustainability, the event aimed to inspire the development of toys that encourage cognitive, emotional, and social growth in children. Toycathon 2021 featured multiple rounds of challenges where participants submitted prototypes, received expert feedback, and showcased their ideas. The competition also highlighted the importance of making toys that promote physical activity, problem-solving skills, and social interactions. The winners of the event were awarded recognition and the opportunity to take their ideas to the market, helping to revitalize India's toy industry. In conclusion, Toycathon 2021 was a significant step toward making India a global leader in the toy industry by promoting innovation, creativity, and educational value. It also served as a reminder of the importance of toys in shaping the future of children.

India, despite being a home of many globally popular games like Chess, Ludo, Snakes and Ladders, is not among leading developers and manufacturers of toys. Under the 'AatmaNirbhar Bharat Abhiyan' initiated by our Hon'ble Prime Minister, Shri. Narendra Modi, Toycathon-2021 is conceived to challenge India's innovative minds to conceptualize novel Toy and Games based on Bharatiya civilization, history, culture, mythology and ethos. Toycathon 2021 is an inter-ministerial initiative organized by Ministry of Education's Innovation Cell with support from All India Council for Technical Education, Ministry of Women and Child Development, Ministry of Commerce and Industry, Ministry of MSME, Ministry of Textiles and Ministry of Information and Broadcasting.

Currently, India's toy market stands at around 1.5 Billion USD, which primarily is dominated majority of these toys do by imported not represent toys. Moreover, Indian heritage, civilization and value systems. Toycathon 2021 is a unique opportunity for Students, Teachers, Start-ups and Toy experts/professionals in India to submit their innovative toys/games concepts and win large number of prizes worth Rs. 50 lakhs.

It's been 50 years since **Ernő Rubik** unveiled his magic cube prototype, and it still mesmerises us!

How To Solve A 3x3 Rubik's Cube?



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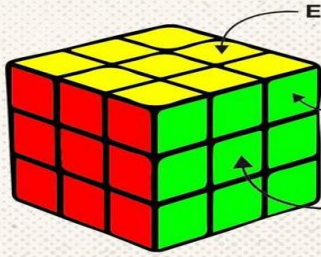


Here're Some Basics First

- Each of the six faces of the Rubik's cube is defined by its centre. A face with red in its centre would be red when it is solved because centres don't move.
- There are 21 pieces in total: 1 principle piece with three axles, 8 corner pieces (corner solid shapes) with three colours each, and 12 edge pieces (edge 3D squares) with two colours each.

3x3 Rubik's Cube

Basic Rotations

No matter the movements, hold the cube in such a way that the decided "front" face is always towards you.

R: Rotate the right layer clockwise.

L: Rotate the left layer clockwise.

U: Rotate the top layer clockwise.

F: Rotate the front layer clockwise.

D: Rotate the bottom layer clockwise.

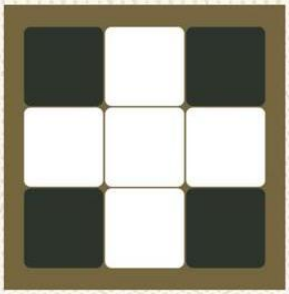
B: Rotate the back layer clockwise.

Adding an ' after the letters denote an anti-clockwise rotation.

For example- R': Rotate the right layer anti-clockwise

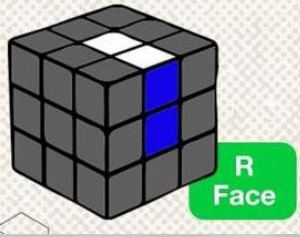
Stage 1: The Cross

First choose a centre piece of any colour keeping it at the top, let's say white, then bring all edge pieces adjacent to the white centre to form a cross of that colour.



The order ahead would be- **blue** --> **orange**--> **green**--> **red.**

Rotate the right face (R) until the 'blue & white' edge piece is at the top face (U) and matches blue centre piece.



Stage 2:
Solving The Cross

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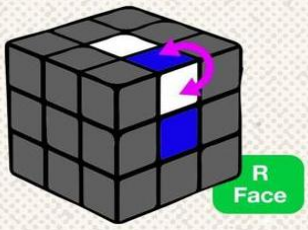
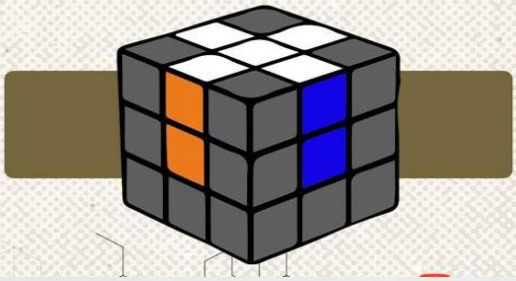
Attention: If a piece is switched. Keep blue centre piece on the right and follow-
R' U F' U'



Then move to the orange centre piece, keeping it on the right side, and repeat the process.

The end result should look something like this.



Stage 3:
The Corners

Keeping white cross at the top face (U), we'll solve the white corners. If corner piece is already at bottom face (D), rotate to position directly below intended place.

Keep doing R' D' R D until it's at correct position. Repeat for other 3 corners.

Stuck At Corners? If a corner piece is at top face (U), move it to bottom face (D) using- R' D' R

Stage 4:
The Middle Layers

Keep the white face at bottom, by rotating the top face (U), match the edge pieces with the centre piece, keeping the solved corners at bottom.

Use any of the following two sequences till you solve the middle layer completely.

- U R U' R' U' F' U F

- U R U' R' U' F' U F

Even if the colours are switched, use the same two sequences to sort things.

Stage 5:
The Top Yellow Cross

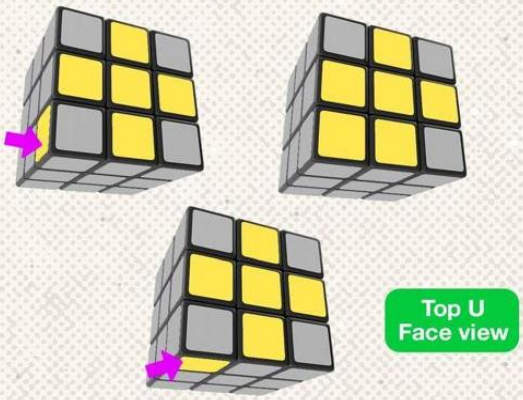
Apply the following sequence to form a yellow cross on the top of the cube.

F U R U' R' F'

Repeat this 1-3 times to get the above result.

Stage 6:
Solving Yellow Corners

Observe the following three states where the yellow cross is at the top face (U).



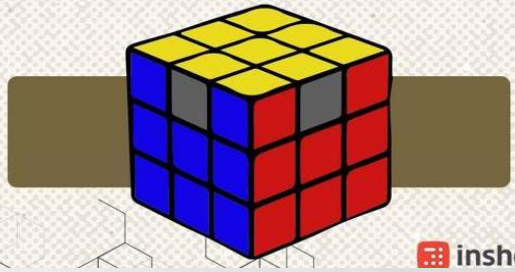
Do the following sequence 1-3 times to solve the corners, and after each repetition, orient the top face (U) to the three states given.

R U R' U R U U R'

Stage 7:
Positioning The Yellow Corners

Keeping the yellow at the top face (U), rotate it until at least two corners are at the right place- A,B or B,C or A,D.

If A,B is achieved then do the following-
R' F R' B B R F' R' B B R R U'.
If a diagonal is achieved then, do the same given sequence then re-orient to achieve A,B and repeat.



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Stage 7:
Positioning The Yellow Edges

If only 1 edge is correct, position the correct edge at the back face (B) and determine if it needs to move clockwise or anticlockwise and do the correct sequence. If all 4 are incorrect, then do either.

Clockwise

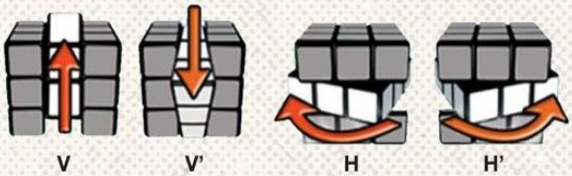
F F U L R' F F L' R U F F

Anticlockwise

F F U' L R' F F L' R U' F F

Stage 8:
The Centre Pieces

Check out the following new moves



Rotate a centre piece 90 degrees clockwise
(Place the side with piece on the L face)
V' H' V U V' H V U'

Rotate a centre piece 90 degrees anticlockwise
(Place the side with piece on the L face)
V' H' V U V' H V U'

Rotate a centre piece 180 degrees
(Place the side with piece on the U face)
U R L U U R' L' U R L U U R' L'

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Dr Alankrita

Review

Generative adversarial network: An overview of theory and applications

Alankrita Aggarwal [a], Mamta Mittal [b], Gopi Battineni [c]

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Abstract

In recent times, image segmentation has been involving everywhere including disease diagnosis to autonomous vehicle driving. In

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