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Research Management Unit
Universiti Teknologi MARA Cawangan Kedah

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Embracing New Horizons: A Fresh Start for 2025

As we stand at the threshold of a new year, I welcome you to RMU4U Third Edition (January 2025). The start of a new year symbolizes renewal, an opportunity to recalibrate our aspirations and refresh our collective commitment to academic excellence, research endeavours, and impactful scholarly contributions.

The year 2024 saw significant progress within our academic and research community. It was a testament to the passion, perseverance, and creativity of all members of the UiTM Kedah family. As we reflect on those accomplishments, let us also look ahead with determination to elevate our efforts in research, publication, and innovation. Let 2025 be the year we chart new pathways for discovery and collaboration, bringing our work to greater heights.

This year, I encourage all of us to reaffirm our scholarly goals by setting clear, measurable targets for research outputs, impactful writings, and knowledge sharing, aiming to contribute meaningfully to society both locally and globally. Let us strengthen research collaborations by building networks across disciplines, faculties, and institutions to foster cross-disciplinary solutions to real-world challenges. At the same time, we must focus on innovation by exploring new ideas, embracing digital tools, and pioneering creative solutions that align with global trends and local needs. Above all, let us support each other by sharing expertise, mentoring the next generation, and collaborating to overcome challenges, creating a thriving research ecosystem where everyone uplifts one another.

Let this be a year where we balance ambition with reflection, passion with purpose, and innovation with impact. The Research Management Unit (RMU) remains steadfast in supporting your research journey through resources, platforms, and opportunities for growth.

As we embark on this new chapter, I wish each of you the strength to pursue your aspirations and the resilience to overcome any obstacles. Together, let us make 2025 a year of breakthroughs, achievements, and shared successes.

Here's to a productive and inspiring year ahead.

Sincerely,
Prof. Dr Roshima Said
Acting Rector, UiTM Kedah

A Message from the Chief Editor

Dear Readers,

I am pleased to announce the return of the RMU4U Bulletin with Volume 3, showcasing a diverse array of academic inquiries and professional perspectives across multiple themes. This edition continues our commitment to facilitating intellectual exchange and presenting research that engages with contemporary issues.

In this volume, the Law & Policy theme stands out with the highest number of contributions, featuring 14 papers that explore significant aspects of governance, justice, and societal well-being. These papers highlight the role of legal frameworks and policies in addressing current challenges and contributing to societal development.

Highlighted works include topics such as "Enhancing Access to Justice: The Role, Challenges, and Future of Small Claims Courts in Malaysia" and "Environmental Public Interest Litigation: Broadening Locus Standi to Safeguard Collective Interests," which examine the evolving landscape of legal rights and public interest. Additional discussions, such as "Alternative Dispute Resolution (ADR) in Islamic Banking and Finance in Malaysia" and "Balancing Nature and Faith: Protection and Conservation of Water Resources from the Perspective of Islamic Law," shed light on the interplay between ethics, faith, and law in addressing societal challenges.

In addition to the focus on Law & Policy, this issue covers a range of topics that contribute to understanding innovation and societal change. Articles such as AI-Driven Recommendations in Mobile Shopping Apps, Podcasts, Animations & Gen Z: Revamping Organizational Behavior Learning, and The Role of Social Media in Shaping Islamic Entrepreneurship explore the intersections of technology, education, and culture in today's world.

This edition represents the collaborative work of our contributors, whose insights and expertise have shaped the content of this bulletin. We encourage readers to engage with these ideas and consider their implications for further research and practical applications.

I would like to thank the authors, reviewers, and editorial team members who made RMU4U Bulletin Volume 3 possible. We hope this publication serves as a resource for understanding key issues and inspires further exploration.

Thank you for being part of this endeavor. Let us continue to learn and exchange ideas

Warm regards,

Dr Azyyati Anuar
Chief Editor, RMU4U E-Bulletin

CURVES THAT HEAL AND INSPIRE

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Curves are fundamental elements in both nature and design, representing smooth, continuous lines that can vary in complexity and form. They are essential in various fields, from the graceful arcs seen in architecture to the intricate paths in computer graphics. In the realm of computer graphics and animation, one of the most powerful tools for creating smooth and intricate shapes is the **Bézier curve.** A **Bézier curve** is a smooth, mathematically defined curve constructed using a set of points known as **control points**. These control points may not necessarily lie directly on the curve, but they significantly influence its shape and trajectory.

For example:

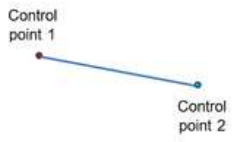


Figure 1: A straight line is produced using two control points.

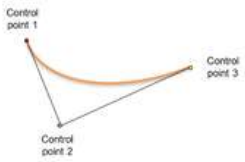


Figure 2: A smooth curve (parabola-like) is produced using three control points.

Bézier curves, first conceptualized by Pierre Bézier in the 1960s for the automotive design of Renault cars (Laurent and Sablonniére, 2001), have since become fundamental in various fields due to their flexibility and mathematical simplicity. These curves are now integral to animation, computer graphics, and medicine. Many design tools, such as Adobe Illustrator, allow users to manipulate Bézier curves visually by adjusting the control points, making it intuitive to create complex shapes and paths.

Bézier Curves in Animation

1) Motion Path Design

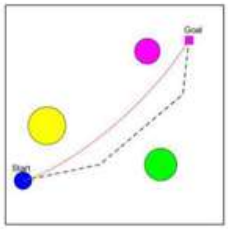
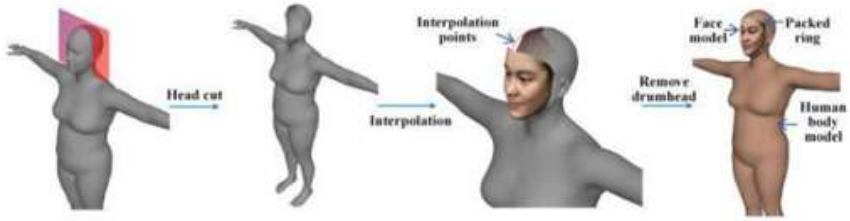


**Photo from (Bulut, 2023)*

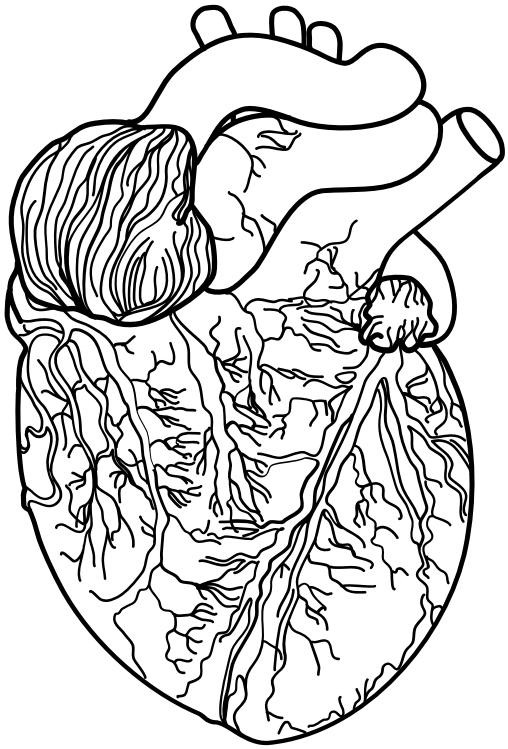
Bézier curves allow the users to create **intricate and customizable motion paths.** For example, Bézier curves with control points are utilized to determine both global and local paths for mobile robots, allowing them to navigate through obstacles and avoid collisions (Bulut, 2023).

2) Animation

Bézier curves are employed to model **facial expressions** in character design. Control points corresponding to facial features, such as the eyes and mouth, are used in the design process. Subsequently, Bézier curves are utilized to interpolate animation, smoothing the boundaries of the facial features (Fang et al., 2021).



Bézier Curves in Medical Applications



1. *Contour Detection and Modeling*

Bézier curves are used to delineate and annotate anatomical structures in medical images, for example in X-rays, MRIs, and CT scans. In MRI segmentation, a Bézier curve can outline the shape of a tumor or an organ, creating a precise, smooth boundary for further analysis (Chen et al., 2021). In an MRI scan of a brain, the outer edge of the brain can be approximated using a Bézier curve. The curve would smoothly follow the contours of the brain, helping doctors better understand its shape and size for diagnosis or surgery. Bézier curves are also used to outline anatomical structures in medical images.

For instance, in cardiology, Bézier curves are often employed to model the intricate shapes of heart chambers and the branching patterns of blood vessels. Their ability to adapt to varying curvatures and provide high levels of detail ensures precise visualization, aiding in diagnosis, surgical planning, and the development of computational models for medical research (Maqsood et al., 2020).

2. *Biomechanics*

Motion analysis in biomechanics uses Bézier curves to track and model joint movements. These insights improve rehabilitation strategies and the development of assistive devices. For instance: Plotting the smooth motion of a limb during physical therapy to evaluate the range of motion (Norman-Gerum & McPhee, 2018)

Real-World Application

Bézier curves facilitate smooth and predictable movements of robotic arms in robot-assisted and tele-controlled ultrasound scanning systems for three-dimensional imaging. The Bézier interpolation algorithm is employed to reconstruct volume image data from the ultrasound scanner, resulting in more accurate and efficient 3D volume construction (Huang and Lan, 2019). This technology also enables clinicians to design patient-specific implants, thereby improving surgical outcomes. Another notable application of Bézier curves is in font design. TrueType and PostScript fonts utilize Bézier curves to define the shapes of letters and characters, enabling smooth and scalable text rendering.

In summary, Bézier curves, a mathematical marvel, have revolutionized a wide range of applications across various fields, particularly in animation and medicine. Their precision and adaptability empower artists and scientists to push the boundaries of creativity and innovation. From crafting lifelike animations to designing life-saving medical tools, Bézier curves epitomize the confluence of art and science. As technology evolves, their applications will undoubtedly expand, shaping the future of diverse industries.

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