MECHATRONICS ENGINEERING

KUMARAGURU COLLEGE OF TECHNOLOGY
Character is life

MECHATRONICS ENGINEERING ASSOCIATION

Newsletter
December 2024- May 2025

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da.mce@kct.ac.in

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KUMARAGURU COLLEGE OF TECHNOLOGY

VISION

- The vision of the college is to become a technical university of International Standards through continuous improvement.

MISSION

- Kumaraguru College of Technology (KCT) is committed to providing quality Education and Training in Engineering and Technology to prepare students for life and work equipping them to contribute to the technological, economic and social development of India. The College pursues excellence in providing training to develop a sense of professional responsibility, social and cultural awareness and set students on the path to leadership.

MECHATRONICS ENGINEERING

VISION

- To achieve excel in academic and industrial automation research and innovative product development driven by mechatronics systems.

MISSION

- Impart the right blend of knowledge and skills to students and enable them to apply it in real- life situations.
- Motivate the students towards interdisciplinary research to cater to the local and global needs.
- Achieve innovation in developing industrial products with social responsibility.

PROGRAM EDUCATIONAL OBJECTIVES (PEO'S)

The Program Educational Objectives of Mechatronics Engineering Undergraduate Program are to prepare the students:

- To develop innovative and sustainable products with multidisciplinary Engineering expertise.
- To solve complex engineering problems by applying mechanical, electrical and computer knowledge and engage in lifelong learning in their profession
- To work or pursue higher education in multicultural, multilingual and multinational environment with competent oral and written communication.
- To lead and contribute in a team entrusted with professional, social and ethical responsibilities.

PROGRAMME OUTCOMES (PO'S)

PO. No	Programme Outcomes	Mapped Skills
PO1	Engineering Knowledge	Core Technical Proficiency
PO2	Problem Analysis	Analytical & Critical Thinking
PO3	Design/ Development of Solutions	Design Thinking & Creative Problem Solving
PO4	Conduct Investigations of Complex Problems	Research & Inquiry Skills
PO5	Modern Tool Usage	Technological Proficiency
PO6	The Engineer and Society	Societal Awareness
PO7	Environment and Sustainability	Sustainability and Environmental Consciousness
PO8	Ethics	Ethical Integrity and Professional Conduct
PO9	Individual and Teamwork	Collaboration and Leadership
PO10	Communication	Communication Mastery
PO11	Project Management and Finance	Strategic and Project Management
PO12	Lifelong Learning	Adaptive Learning and Self-Development

PROGRAM SPECIFIC OUTCOMES (PSO'S)

Graduates of the Mechatronics Engineering Undergraduate Program will have the ability to:

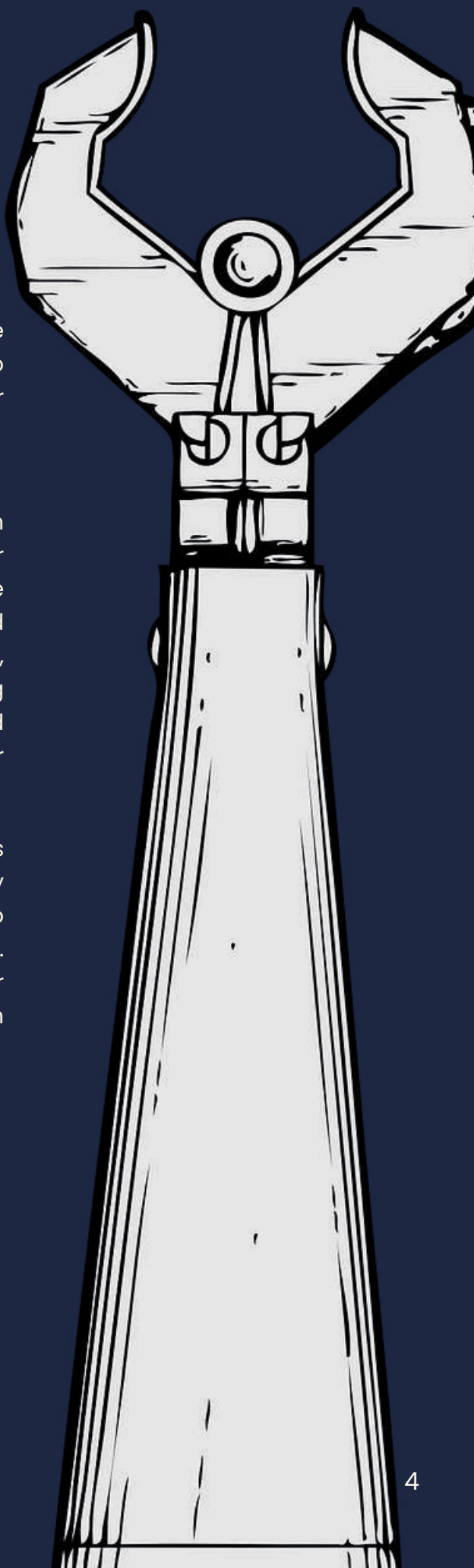
- PSO1. Design and develop Mechatronics systems to solve the complex engineering problem by integrating electronics, mechanical and control systems.
- PSO2. Apply the engineering knowledge to conduct investigations of complex engineering problem related to instrumentation, control, automation, robotics and provide solutions.

NOTE TO READERS

We are delighted to promulgate the Newsletter of the Department of Mechatronics Engineering. It is our privilege to share this newsletter with all because you are one of our impetuous factors and the one who extends constant support.

Within few weeks after declaring lockdown, we have put n place our curriculum and have continued to adapt it to our student's needs and capabilities. We have abide by all the orders and procedures necessary for the efficient and effective operation of the college. From a staff's perspective, we are establishing a sustainable professional learning community to incessantly look for improvements and innovative teaching strategies to support students reach their full potential.

This magazine covers the events, webinars and conferences organized and participated by the students and faculty members. We are sure this will inspire many of our students to reach greater heights in professional development. congratulate the entire team for bringing out the newsletter successfully which will be a great tool of communication among the students.



DEPARTMENT ACTIVITIES

ROBO Clash

The Mechatronics Department hosted **Robo Clash 2025** on March 26, 2025, featuring three thrilling competitions—Robot Sumo, Line Follower, and Maze Solver—with a prize pool of ₹15,000. The event saw vibrant participation and showcased remarkable student innovation in robotics.

Mr. Saravana Mani C.S, a proud alumnus and current professional at Bosch Electronics, graced the occasion as Chief Guest, inspiring participants with valuable industry insights. The event concluded on an energetic note, reflecting the department's strong technical culture and passion for robotics.

Entrepreneurship talk with Mr. SURYA PRAKASH– Insights for the future Innovator

On 27th December 2024, the Department of Mechatronics successfully organized a guest lecture on entrepreneurship and startup fundamentals. The session was delivered by Mr. Surya Prakash, founder of Seanavix and a proud alumnus of the department. He shared valuable insights into the startup ecosystem, covering topics like startup basics, incubation support, funding strategies, investment readiness, and networking techniques. The event provided a practical understanding of how startups grow, secure funding, and build strong financial foundations, leaving aspiring student entrepreneurs inspired and informed.

Alumni Meet 2025 – Reconnecting Roots, Inspiring Futures

The Department Association of Mechatronics proudly organized the Alumni Meet 2025 on 4th January 2025, bringing together former students for a day of reflection, networking, and inspiration. The event featured keynote speeches, a panel discussion on career and industry trends, and an interactive Q&A session, creating a valuable exchange between alumni and current students. The meet fostered professional connections, provided mentorship opportunities, and renewed a sense of belonging. It was a memorable occasion celebrating the achievements of our alumni while motivating the next generation of engineers.

Investiture Ceremony 2025 – Celebrating New Leadership

The Department Association of Mechanical Engineering held its Investiture Ceremony at Sir C. V. Raman Hall on Tuesday, January 21, 2025, to induct the newly elected office bearers. Chief Guest and emcee Mr. Kartik Soundhararajan, Managing Partner at ADNA Automation, delivered an inspiring address on innovation, leadership, and the future of mechanical engineering. The event featured the unveiling of the vision and mission, the swearing-in of office bearers, and a group photograph, igniting enthusiasm and responsibility among students for the year ahead.

Linkedin Mastery – Peer Learning For Career Growth

A priceless peer learning session titled “LinkedIn Mastery: Build, Connect & Grow" was organized by the Department Association of Mechatronics on February 14, 2025, specifically for second-year students. The goal of the session was to provide students with useful information on utilizing LinkedIn for networking, career exploration, and personal branding. Topics Discussed included connecting with industry professionals, optimizing one's profile, job search tactics, and skill endorsements. Students were able to improve their online presence, create professional networks, and take confident steps toward career readiness thanks to this interactive session.

Industry- Academia Conclave Bridging Innovation and Insight

On 21 February 2025, as part of the Industry-Academia Conclave hosted by Kumaraguru College of Technology, the Department of Mechatronics organized a dynamic panel discussion featuring five distinguished industry professionals. Centered on the theme "Advances in Mobility, Automation, and Aviation," the session provided deep insights into cutting-edge technologies, current industry needs, and future opportunities in these rapidly evolving sectors. The discussion promoted meaningful interaction between students and industry experts, encouraging collaboration, knowledge sharing, and career readiness. It marked an important step toward strengthening industry-academic partnerships.

HONORING DISTINGUISHED GUESTS FOR THEIR VALUABLE CONTRIBUTIONS TO THE CONCLAVE

ROBO SOCCER – CLASH OF BOTS AT YUGAM 2025

The Department of Mechatronics gladly hosted the thrilling robo soccer match on March 7, 2025, as part of Yugam 2025. Teams demonstrated their tactical gameplay and technical prowess in an action-packed arena consisting of powerful 8-kilogram bots. The audience cheered enthusiastically as the bots engaged in a precise, quick, and inventive battle. The event was one of Yugam's most crowd-drawing highlights and featured an exciting demonstration of technical skill, teamwork, and creative design.

Robo Soccer 2025 was a brilliant illustration of the department's dedication to experiential learning and student-driven creativity.

EDGE TO CLOUD – MASTERING IOT IN 48 HOURS @ YUGAM 2025

The Department Association of Mechatronics organized a two-day hands-on workshop titled "Edge to Cloud – Mastering IOT in 48 Hours" on March 4 and 5, 2025, as part of Yugam 2025. Mr. Vimala Adhitya, director of Krish Tec, oversaw the workshop and gave advanced insights on IoT, edge computing, and cloud integration. In addition to working with IOT protocols and creating real-world applications, more than fifty participants gained practical experience connecting edge devices to cloud platforms. With team-based mini projects showcasing creative IOT solutions, the event came to a close. Through this workshop, students gained practical exposure to one of the most impactful technologies of our time, as well as future-ready skills

EVENTS ORGANIZED

S.NO.	DATES	TYPES OF EVENT	NO. OF. DAYS	FACULTY COORDINATOR	RESOURCE PERSON
1	2/21/25	Industry, Academia & Research Conclave 2025	1	Dr. M. Saravana Mohan	Mr. Nishanth Subbaiyan, Project Manager, ABB Robotics Mr. Srinidhi Prabhakaran, Group Manager, Hitachi Dr. Subramanian Kalimuthu, Technical Manager, OmniWOT Mr. Kailash S, Founder, & CEO WROXAI Private Limited Mr. Kasiviswanathan Panchatsharam Founder & CEO, RK Consultants, Former Sr. Project Leader, Tesla.
2	04/03/25 and 05/03/25	IEEE International Conference on Advancements in Electrical, Electronics, Communication, Computing and Automation (ICAECA 2025)	2	Dr. K. Akila & Dr. B. Sabitha	Industrial Expert from Robort Bosch and CTS
3	02/03/25 to 02/05/25	Hands On Training On PCB Building	2	Dr. B. Sabitha	Arun Balaji, CEO of YOI Robotics Laboratory
4	1/29/25 to 1/31/25	3 Days Hands on Training On STM EDGE AIOT	2	Dr. K. AKILA Mr. R. Saravanan	Prajwal and Chiranjeevi Digitoad technologies Pvt Ltd, Banglore.

EVENTS ORGANIZED

S/NO	DATES	DATES	NO.OF.DAYS	FACULTY COORDINATOR	RESOURCE PERSON
5	01/21/25	Mechatronics Department Association Inauguration	1	Mr. R. Raffik	Mr. Karthik Soundararajan Managing Partner ADNA Automation Coimbatore
6	3/27/25 to 3/28/25	International Co-Teaching for the Course - U18MCI4201 - Hydraulics & Pneumatics Course	2	Mr. R. Raffik	Dr. W.B. Wan Nik Professor and Dean University Malaysia Terengganu Malaysia.
7	3/26/25	Roboclash – Line Follower, Tug of Robo War, Robo Sumo	1	Mr. R. Raffik	Mr. Saravanamani C S Associate Software Engineer Bosch Global Software Technologies Coimbatore.
8	1/27/25	Write right Empowering Students To Transform Ideas Into Impactful Research Paper	1	Mr. A . Ramkumar	Dr. Sreeharan B N Assistant Professor, Department of Mechanical Engineering, Kumaraguru College of Technology
9	3/19/25	Out reach programme government school visit - Chinnavedampatti and udayampalayam	1	Mr.A.Ramkumar	Members of Robotics and Automation Club
10	3/27/25	Balance beats Burnout: A guide to emotional well being	1	Mr. J. Sivaguru	Dr. Gnananprakash, HOD-Department of Psychology, KCLAS

PATENT SUBMITTED BY FACULTY

S/NO	DATE	APPLICANT NAME	TITLE	DESIGN STATUS
1	5/23/2025	Dr. K. AKILA	INTELLIGENT BATTERY MANAGEMENT SYSTEM USING MACHINE LEARNING FOR PREDICTIVE MAINTENANCE AND PERFORMANCE OPTIMIZATION IN ELECTRIC VEHICLES	Registered

STUDENT PUBLICATIONS

In the academic year 2024–2025, several students published Scopus indexed articles.

C. Subash (Roll No: 21BMC044) published a paper titled Health-Care Monitoring System Based on IoT – A State of the Art in the National Conference on Control Instrumentation System (NCCIS'24), Lecture Notes in Electrical Engineering (LNEE), Springer, Volume 1236, pp. 325–334, 2024, ISBN: 978-981-99-15865-4, 978-981-99-15866-1, DOI: https://doi.org/10.1007/978-981-97-5866-1_19

P. Abinesh (21BMC002); S. Sri Ram Nathan(21BMC212); R. Ramsubash (21BMC210) (2025, February). Comparative investigation on torque requirement analysis for 6 DOF robotic manipulator with aluminium A380 and magnesium AZ31B materials. In AIP Conference Proceedings (Vol. 3224, No. 1, p. 020024). AIP Publishing LLC. DOI: https://doi.org/10.1063/5.0245914.

P. Abinesh (21BMC002); S. Sri Ram Nathan (21BMC212); R. Ramsubash (21BMC210) (2025, February). Comparative investigation for design optimization of 6 DOF industrial robotic manipulator drives-Torque requirement analysis using magnesium AZ91D and aluminium A380 alloys. In AIP Conference Proceedings (Vol. 3224, No. 1, p. 020038). AIP Publishing LLC. https://doi.org/10.1063/5.0245916

P. Abinesh (21BMC002); S. Sri Ram Nathan (21BMC212); R. Ramsubash (21BMC210) (2025, February). Comparative torque requirement investigation for 6 DOF industrial robotic manipulators: Relative analysis using magnesium AZ91D and AZ31B alloys. In AIP Conference Proceedings (Vol. 3224, No. 1, p. 020037). AIP Publishing LLC. https://doi.org/10.1063/5.0245915

S. Abhinnav Sundarrajan; C. Subash (21BMC044) (2025, February). Integration of industrial automation tools with a human-centric approach for enhancing sustainable manufacturing processes in Industry 5.0. In AIP Conference Proceedings (Vol. 3224, No. 1, p. 020039). AIP Publishing LLC. DOI: https://doi.org/10.1063/5.0245917

Subash C (21BMC044) published Revolutionizing Machine Learning for Sustainable Farming: A Comprehensive Review in the 3rd International Conference on Advancements in Electrical, Electronics, Communication, Computing and Automation (ICAECA 2025), IEEE Xplore, pp. 1–7, 2025.
DOI: https://doi.org/10.1109/ICAECA63854.2025.11012596.

R., Balamurugan, V. J.(23BMC008), & Pandian, N. G.(23BMC016) (2025, April). Edge Computing for Real-Time Decision-Making in Industrial Automation Systems: A Comprehensive Review. In 2025, the 3rd International Conference on Advancements in Electrical, Electronics, Communication, Computing and Automation (ICAECA) (pp. 1-6). IEEE. pp. 1–6, 2025,
DOI: https://doi.org/10.1109/ICAECA63854.2025.11012458.

Subash C (21BMC044) published another work titled Design and Development of Data Acquisition System for a FSAE car in the 3rd International Conference on Advancements in Electrical, Electronics, Communication, Computing and Automation (ICAECA 2025), IEEE Xplore, pp. 1–10, 2025.
DOI : https://doi.org/10.1109/ICAECA63854.2025.11012634.

From April 13th to 15th, 2025, students achieved remarkable success at various technical competitions hosted by Karpagam College of Engineering, Coimbatore. In the Robotrack Challenge, **Viswa G (23BMC066)**, **Jegan M (23BMC021)**, and **Vignesh A (23BMC063)** each secured the 1st Prize. The same trio once again demonstrated their technical excellence by winning the 1st Prize in the Voltedge Circuit Debugging event. Furthermore, they extended their winning streak by clinching the 1st Prize in the Mystic Maze competition, making it a clean sweep across all three categories of the event.

Harishkumar A (21BMC014) has actively participated in multiple quiz competitions and secured notable achievements. On 07.02.2025, he took part in the Quiz Competition, Q'Zenith, ERGO'25, conducted at Sri Ramakrishna Engineering College, Coimbatore, where he won the 2nd Prize. Later, on 11.03.2025, he participated in the Quiz Competition, Sublimate'25, organized by PSG College of Arts & Science, Coimbatore, and again secured the 2nd Prize. Earlier, on 01.12.2024, he had competed in the Kovai Quiz Competition, Coimbatore Vizha'2024 at PSG College of Arts & Science, Coimbatore, where he also achieved the 2nd Prize.

Muralidharan D (23BMC033) demonstrated his skills in aeromodelling and robotics. On 23.12.2024, he participated in the Aeromodelling Ideathon at Kumaraguru Institutions, where he won the 1st Prize. Later, on 12.02.2025, he competed in the Robo Mania Event – Speed Trail at Kumaraguru College of Engineering and achieved the 2nd Prize.

Sandhya S (22BMC039), Vaishali S (22BMC062), and **Vanishree J (22BMC058)** participated in the TANCAM's Hackathon – TNWISE 2025 held on 14.03.2025 at the Tamil Nadu Centre of Excellence for Advanced Manufacturing (TANCAM). All three were recognized with the Special Category Award for their performance. **Sreejhaa B(22BMC309)** participated in the Project Expo – Visionex 2025 on 17.05.2025, organized by TANSAM & SIEMENS, and received the Best Project Award.

Harishankar S (22BMC012)

In the 6th Covai Ties 2025, held from 11.03.2025 to 15.03.2025 at Coimbatore Institute of Technology, he participated in the 400m race and won the 3rd Prize.

In the same event, he competed in the 4 × 400 m relay and secured the 1st Prize.

Earlier, on 08.03.2025, he had also taken part in the 14th Centies Championship – 4 × 400 m relay at Coimbatore Institute of Technology, achieving the 1st Prize.

Furthermore, in the 6th Covai Ties 2025, he participated in the 4 × 100 m relay, where he earned the 3rd Prize.

STARTUP INTERVIEW

Wroxai, a Journey of Innovation - Kailash Saravanan, Founder of Wroxai

Our journey began in 2019 at Kumaraguru College of Technology, where I pursued Mechatronics Engineering with big dreams but little idea of how far they would take me. The turning point came during the COVID-19 pandemic, when my friends and I developed the ADTB Robot, designed to monitor patients and assist doctors. The recognition it received revealed the true potential of student innovation. Though our team eventually split, three of us — myself as Founder, Shankar Raj as Co-Founder, and Prem Kumar as CTO — chose to carry the vision forward. In our second year, we built the S-Vision Robot, which pushed our technical limits.

By the third year, we dared to take on bigger projects with an Autonomous Travel Robot, which the President of Bosch described as a "billion-dollar idea." That moment made us realize we weren't just creating projects; we were shaping the future. Over the years, our work earned accolades such as the Make in India Awards, CII Industrial Innovation Award, and the TIE Global Pitching Award, among many others. Through it all, the mentorship of Dr. Saravana Mohan and our faculty stood as our backbone. Today, Wroxai is proof that with resilience, teamwork, and vision, student dreams can grow into innovations that impact the world.

TECHNICAL ARTICLE

Mitigation and Management of Space Debris Using Advanced Composite Materials

Introduction

The rapid growth of space exploration and satellite deployment has brought tremendous benefits to communication, navigation, weather forecasting, and defense. However, it has also introduced one of the most pressing challenges in modern space science: space debris. Consisting of defunct satellites, rocket stages, and fragments from collisions, this debris orbits Earth at speeds exceeding 27,000 km/h, posing a severe threat to operational spacecraft and astronauts.

In the recent Youth Astronomy and Space Science Congress, organized by the Tamil Nadu Astronomy and Science Society at Sivakasi, our student Kabilan & Kishore presented a pioneering approach to debris mitigation. The presentation was recognized with the Best Presentation Award, handed over by Dr. Mayilsamy Annadurai, Former ISRO Chairman.

The Kessler Syndrome – A Growing Concern

In 1978, NASA scientist Donald J. Kessler proposed the Kessler Syndrome, a scenario where the density of debris in orbit reaches a tipping point. A single collision could trigger a chain reaction, producing more fragments that cause further collisions, ultimately leading to an uncontrollable debris cascade.

- Today, more than 36,000 tracked objects larger than 10 cm and millions of smaller fragments exist in orbit.
- Even a paint chip traveling at orbital velocity can damage critical systems on satellites.
- Without mitigation, future space missions—including human exploration of Mars—could be jeopardized.

This highlights the urgent need for active debris removal (ADR) strategies and advanced material solutions.

Proposed Composite Material for Space Debris Capture

To address the debris challenge, Kabilan & Kishore developed a conceptual design of a composite material system capable of safely capturing and dissipating the energy of high-speed collisions.

Material Components and Their Role:

Current research is focused on composite materials that combine lightweight strength, impact resistance, and adaptability. These advanced composites are being developed to enhance protection against space debris while maintaining structural efficiency in the space environment.

(Some materials are not mentioned here as they are currently under the patent process.)

Mechanism of Action:

When a debris particle strikes the composite:

- The superior composite material resists tearing, adapts to impact conditions, and distributes the force effectively.
- The Aluminum structure provides stability, ensuring the system withstands multiple impacts.
- The Electro-magnets attract steel and other magnetic elements for reconnection.

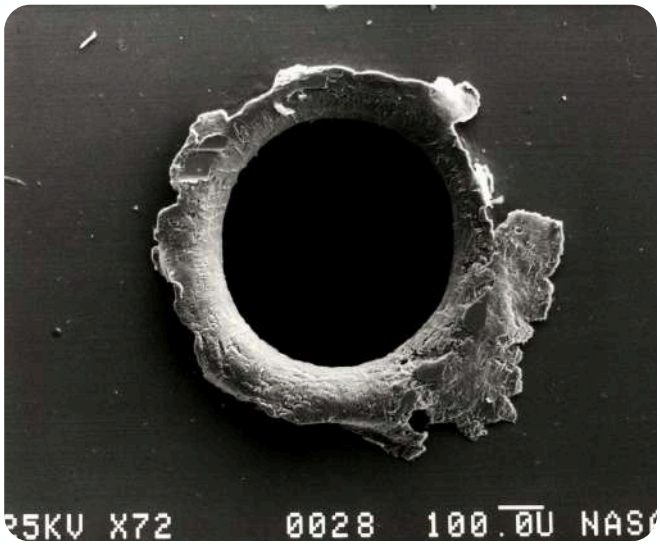
This layered approach mimics the Whipple Shield concept but improves adaptability and survivability for reusable debris capture systems.

Applications in Space Debris Mitigation

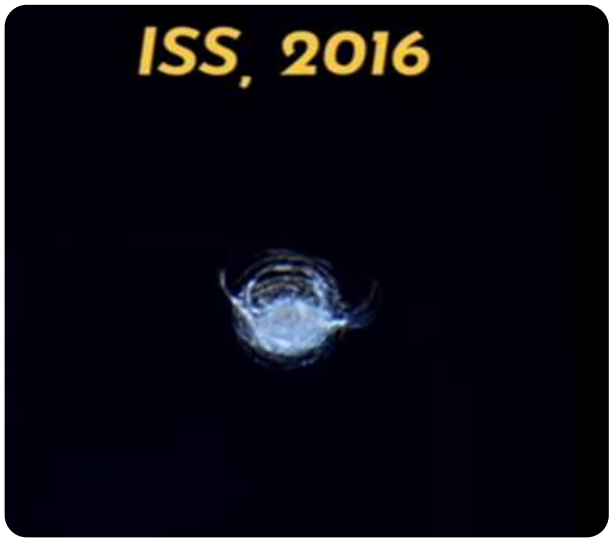
- **Magnetic Reconnection**– Magnetic reconnection is a physical process in plasma where magnetic field lines break and reconnect, releasing massive amounts of energy. It drives solar flares, auroras, and affects space weather near Earth.
- **Satellite Shielding** – Equipping future satellites with lightweight, impact-resistant protective shells.
- **Orbital Cleaning Platforms** – Robotic satellites fitted with composite shields for collecting debris clusters.
- **Cold Welding**- Cold welding is a solid-state welding process where two clean metal surfaces bond together under high pressure without heat or melting. It often occurs in space, where the absence of atmosphere prevents oxide layers from forming.
- By incorporating this material, missions could safely collect and deorbit fragments, reducing the long-term risk of collision cascades described by the Kessler Syndrome.

Conclusion

- As humanity prepares for the next era of space exploration—commercial satellites, lunar bases, and Mars missions—ensuring a sustainable space environment is critical. Innovative materials like Kevlar–Aluminum–Non-Newtonian composites can be a game changer in debris mitigation.
- By proactively addressing space debris today, we can prevent catastrophic outcomes predicted by the Kessler Syndrome and ensure safe, reliable access to space for generations to come.



View of an orbital debris hole made in the panel of the Solar Max satellite



International Space Station hit by tiny paint chip

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