

Yantro



श्रद्धावान् लभते ज्ञानम्

AMRITA

VISHWA VIDYAPEETHAM

DEEMED TO BE UNIVERSITY UNDER SECTION 3 OF THE UGC ACT, 1956

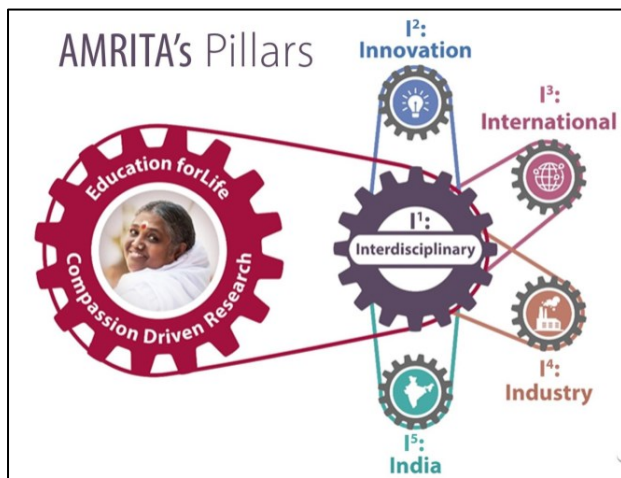
Department of Mechanical Engineering
Amrita School of Engineering, Bengaluru
2024-25 Odd Semester

Amrita Vishwa Vidyapeetham

Amrita Vishwa Vidyapeetham (AVV) is a multi-campus, multi-disciplinary research academia that is accredited 'A++' by NAAC and is ranked as one of the best research institutions in India.

Founded by the world-renowned humanitarian, Sri Mata Amritanandamayi Devi, the multi-campus University was established to provide rigorous academic instruction in an ambience rooted from Indian cultural heritage.

The vision and mission of AVV focus on "Education for Life" and "Compassion Driven Research" while aligning with the concept of five I Pillars for holistic development of the organization.



AVV Bengaluru Campus

Amrita School of Engineering started its operation at Bengaluru in 2002. With the advancements in the fields, School of Computing and School of AI have been carved out of it. Together, the three technical schools in Bengaluru Campus offer B.Tech. programs in nine disciplines and M.Tech. programs in seven disciplines. They seek to prepare graduates with a solution-mindset and highest ethical standards, with an emphasis on value-based Education.

The Bengaluru campus has carved itself as a destination for technological advancements due to its advantage of being in the Silicon Valley of India. The students and faculty are exposed to a variety of opportunities which have resulted in industry-academia collaborations.



Mechanical Engineering Department

The Department of Mechanical Engineering started the first batch of B.Tech in Mechanical Engineering in the year 2007. In the due course, B.Tech program in Robotics and AI, and M.Tech program in Robotics and Automation have been introduced to cater to needs of the demands in the emerging and frontier fields.

It has been producing qualified engineers to face the challenges of the real world with sustainable solutions. Excellent laboratory facilities, modern computer clusters, systematically designed curriculum, and dedicated faculty members make this department a dynamic place to study.

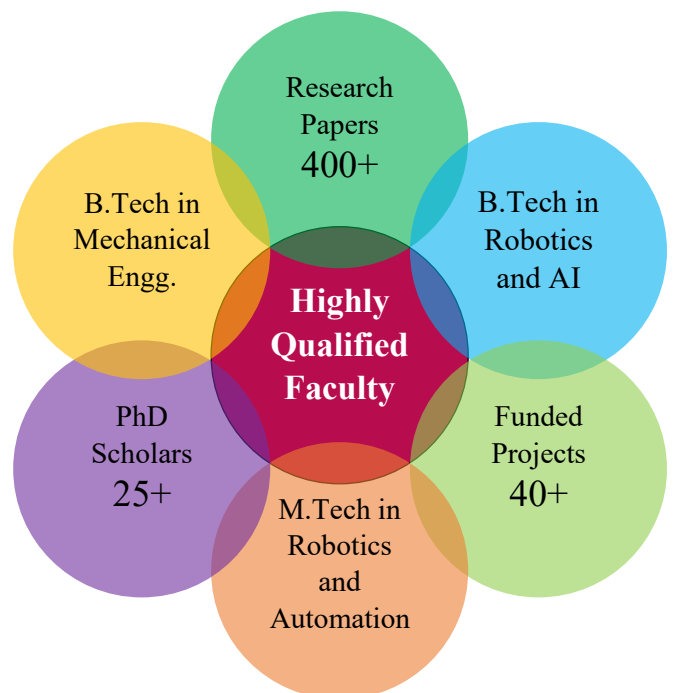
Vision:

To transform our students into outstanding mechanical engineers with **strong domain knowledge and skills, society-centric research intent, and exemplary ethical values**, making them the most desired professionals by research institutions, industry, and society.

Mission:

- To develop in each student, a profound understanding of fundamentals, motivation for continuous learning, and practical problem-solving skills for building a successful career.
- To create and share technical knowledge and collaborate with Industry and Institutions for the betterment of Society.
- To imbibe ethical values, leadership skills and entrepreneurial skills in students.
- To sustain a conducive environment to involve students and faculty in research and development.

Overview of the Department



Editorial

The Odd Semester of 2024-25 has many firsts in it. For example, the “Freshers Party” hosted by the second year students to the incoming batch, introduction of a special session for final year students to help them with placements, higher education and entrepreneurship.

The semester also witnessed several participations of our students in several competitions at National and International levels, and award of several funded/sponsored projects.

Through this edition of “Yantro” magazine, we bring out to you:

1. [Department Events and Updates](#)
2. [Faculty Corner](#)
3. [Staff Corner](#)
4. [Students' Corner](#)
5. [Parent's Point of View](#)
6. [International Affairs](#)
7. [Industry-Academia Partnership](#)
8. [Alumni Corner](#)
9. [Innovation in Teaching and Learning](#)
10. [Preparing Students for a Brighter Future](#)

We look forward to your comments and suggestions.

- Editorial Team
(Dr. Rajeevlochana and Dr. Shashi Kumar)

Department Events and Updates

Induction Program: Deeksharambh

[August 1-13, 2024]

Amrita Bengaluru campus welcomed the new batch of B.Tech students (2024-28 batch) on Aug 1, 2024.



The students belonging to B.Tech in Mechanical Engineering (MEE) and B.Tech in Robotics and AI (RAE) on Aug 6, 2024. The Orientation and Induction program had its Chief Guest as Dr. Balaraman Kannan Executive Director Idam Infrastructure Advisory Pvt. Ltd. Bengaluru, who motivated the students on the importance of fundamentals and also the need of the hour for the core branches to adapt to the emerging demands of inter-disciplinary nature of applications.



The new batch of students had a curated set of sessions to ensure they feel at home and at the same time get ready for the engineering education, in the form of following sessions:

1. General Address: Rules and Regulations of the program and institute by the concerned.
2. Dedicated Department Orientation session.
3. Empty Cup: A team-based activity to emphasize the need for learning fundamentals rather than rote learning.
4. Disha Bharat: A session by Disha Bharat team to highlight Indian culture and the advantages of preserving the same.
5. Motivational Talk by Ms. Vinuthna (IAS), an alumna of ME Dept.
6. Session on Universal Human Value.
7. Free Hand Sketching: As required by engineering students.
8. Tutorial on Scientific Calculator.
9. Introduction to TinkerCAD software.
10. Introduction to Programming and Algorithm.
11. Introduction to MATLAB.
12. Science in Engineering: Part-1 and Part -2.
13. Insights into the Importance of Communication Skills.



YouTube Video:

<https://www.youtube.com/watch?v=fAT4Tg-Nvmo&t=249>



Freshers Party: Yantrix

[August 31, 2024]

Ingenium, the forum of the department, organized a gala “Freshers Party” for the incoming batch of students.





Faculty Corner

Journal Publications (Published in 2024)

YouTube Video:

<https://www.youtube.com/watch?v=X64XQKOy974>



Convocation

[October 5, 2024]

The Convocation ceremony for the 2020-24 batch of B.Tech MEE was organized on October 5, 2024. The following dignitaries presided over ceremony and addressed the graduands on the nuances of the life ahead and the need for life-long learning.

- Shri Vijay K. Nambiar (Former Ambassador of India)
- Mr. Prashanth Doreswamy (President and CEO, Continental India)
- Dr. Varadharaju Janardhanan (Vice President, HR, Flipkart India)
- Poojya Swami Ramakrishnananda Puri (Treasurer, Mata Amritanandamayi Math)



Mr. Varun Kumar R (in absentia) and Mr. Bangi Yaswanth (in the photo) were awarded Campus Level First and Second Rank, respectively, in B. Tech Mechanical Engineering, at Amrita School of Engineering, Bengaluru.

YouTube Video:

<https://www.youtube.com/watch?v=6D1X3SbAKiw&t=100s>



1. Maddaiah, K.C., Kumar, G.V. and Pramod, R., 2024. Studies on the Mechanical, Strengthening Mechanisms and Tribological Characteristics of AA7150-Al₂O₃ Nano-Metal Matrix Composites. *Journal of Composites Science*, 8(3), p.97.
2. Mantha, Subrahmanya Ranga Viswanath, Gonal Basavaraja Veeresh Kumar, Ramakrishna Pramod, and Chilakalapalli Surya Prakasha Rao. 2024. "Investigations on Microstructure, Mechanical, and Wear Properties, with Strengthening Mechanisms of Al6061-CuO Composites" *Journal of Manufacturing and Materials Processing* 8, no. 6: 245. <https://doi.org/10.3390/jmmp8060245>
3. Mantha, S.R.V., Veeresh Kumar, G.B., Pramod, R. and Rao, C.S.P. (2024), Studies of SiC-Filled Al6061 Metal Matrix Composite Optical, Mechanical, Tribological, and Corrosion Behavior with Strengthening Mechanisms. *Adv. Eng. Mater.* 2401997. <https://doi.org/10.1002/adem.202401997>
4. Pramod R., Kumar V.G.B., Basavarajappa S., Investigation of the Effect of Drilling Induced Delamination and Tool Wear on Residual Strength in Polymer Nanocomposites, (2024), *FME Transactions*, 52 (4), pp. 573 – 589. DOI: 10.5937/fme2404573P
5. Pramod, Ramakrishna, and Veeresh Kumar Gonal Basavaraja. "Investigation of the Thermal and Mechanical Properties of Glass Fiber Reinforced ABS/Epoxy Blended Polymer Composite". *Applied Science and Engineering Progress*, 17 (4):7522, 2024. <https://doi.org/10.14416/j.asep.2024.08.003>.
6. Mrudula Prashanth, Prasad, N.J.K., Kumar, B.S.A. et al. Effect of Brass Content and Speed of Cut on Machining Outcomes of Copper-2% Silver Alloy. *J. Inst. Eng. India Ser. D* (2024).
7. Deepthi, Y.P., Kalaga, P., Sahu, S.K., Jacob, J.J. and Ma, Q., 2024. AI-based machine learning prediction for optimization of copper coating process on graphite powder for green composite fabrication. *International Journal on Interactive Design and Manufacturing (IJIDeM)*, pp.1-8.
8. Math, M.M., Rao, K.R., Gururaja, M.N., Srikantamurthy, J.S., Erannagari, S., Ramesh, S., Gupta, V.J. and Prashanth, B.N., 2024. Enhanced Tribological Properties of Nano-TiO₂ Reinforced Polymer Composites Fabricated via Stereolithography. *Journal of The Institution of Engineers (India): Series D*, pp.1-13.
9. Priya, C.B., Ravi Kumar, V., Umamaheswari, D., Venkatesh, R., Karthigairajan, M., Kaliappan, S., Soudagar, M.E.M., Obaid, S.A. and Senthil, S., 2024. Bio-degradable waste banana and neem fiber reinforced epoxy hybrid composites: characteristics study. *Journal of Mechanical Science and Technology*, 38(4), pp.1891-1896.
10. Mubeena, M., Venthan, S.M., Chitra, B., Kumar, P.S., Jakkareddy, P.S., Rangasamy, G. and Vo, D.V.N., 2024. A critical review on synthesis and application aspect of venturing the thermophysical properties of hybrid nanofluid for enhanced heat transfer processes. *Chemical Engineering Research and Design*, 210, pp.271-288.
11. Dokku, S.R., Shivaraj, B.W., Harshith Raj, A., Rajkumar, G.R., Keshava Murthy, D.B., Prashanth, B.N., Chandra, A.P. and Math, M.M., 2024. Hydrothermal synthesis, characterization of WO₃ nanoparticles for ethanol gas sensor application. *Journal of The Institution of Engineers (India): Series D*, 105(2), pp.1007-1013.
12. Varun Krishna, V.R., Sahu, S.K., Rama Sreekanth, P.S., Menon, S., Ma, Q. and Deepthi, Y.P., 2024. Modeling and

- finite element simulation of sustainable coronary stent with a variation in unit cell design. *International Journal on Interactive Design and Manufacturing (IJIDeM)*, pp.1-10.
13. Prasad, C.D., Kollur, S., Nusrathulla, M., Satheesh Babu, G., Hanamantraygouda, M.B., Prashanth, B.N. and Nagabhushana, N., 2024. Characterisation and wear behaviour of SiC reinforced FeNiCrMo composite coating by HVOF process. *Transactions of the IMF*, 102(1), pp.22-28.
 14. Durakovic, B. and Prakash Marimuthu, K., 2024. Minimization of Milling-Induced Residual Stresses in AISI 1045 Steel: Process Optimization using Design of Experiments Taguchi Method. *Journal of Materials Engineering and Performance*, pp.1-7.
 15. Huang, J., Mahariq, I., Kumar, S.M., Abdullaev, S., Kannan, S., Dieu, N.T.X. and Fouad, Y., 2024. Facile fabrication of bilayer electromagnetic wave absorber via hierarchical Mo₂C/La_{0.6}Sr_{0.4}MnO₃ nanocomposite with multi-heterointerfaces for efficient low-frequency absorption. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 689, p.133664.
 16. Deepthi, Y.P., Sahu, S.K., Anitha, D., Gupta, N., dude, N., Setti, S.G. and Sandeep, C.D., 2024. Tribological investigation into nickel-coated graphite polytetrafluoroethylene composites. *Proceedings of the Institution of Mechanical Engineers, Part E: Journal of Process Mechanical Engineering*, p.09544089241255943.
 17. Deepthi, Y.P., Ragavendra Ravi Kiran, K., Kiranmai, P., Vishwa Varun, S.M., Harish, J. and Navyasree, P., 2024. Study on Fuel Briquettes Made of Biodegradable Materials as an Alternate Source of Energy. *Journal of The Institution of Engineers (India): Series D*, pp.1-12.
 18. Singh, S. and Aswath, M.U., 2024. Effect of silica on the properties of red mud based geopolymer mortar for synthesis of sustainable bricks. *Journal of Building Pathology and Rehabilitation*, 9(1), p.67.
 19. Prakash, S.B., Chandan, K., Karthik, K., Devanathan, S., Kumar, R.V., Nagaraja, K.V. and Prasannakumara, B.C., 2023. Investigation of the thermal analysis of a wavy fin with radiation impact: an application of extreme learning machine. *Physica Scripta*, 99(1), p.015225.
 20. Mohan Kumar, S., Govindaraju, H.K., Kiran, M.D. and Lokesh, K.S., 2023. Mechanical characterization and microstructure study of Al-Zn alloy processed by equal channel angular pressing combined with heat treatment. *Adv. Mater. Process. Technolo.*
 21. Liu, X., Zou, Y., Juraev, N., Kumar, M.S., Elbadawy, I. and Kannan, S., 2024. Gradient Bi-layer coating for reducing energy consumption and improving electromagnetic wave dissipation: Elucidating the role of interfaces and interfacial polarization. *Surfaces and Interfaces*, 46, p.104171.
 22. Sahu, S.K., Sreekanth, P.R., Deepthi, Y.P., Ma, Q. and Erinle, T.J., 2024. Tensile, flexural and free vibration characteristics of sustainable recycled polypropylene filled with spherical SiC through experimental and RVE analysis. *International Journal of Structural Integrity*.
 23. Jabiulla, S., Kirthan, L.J., Kumar, R.G., Hegde, R., Math, M.M., Girisha, V.A., Erannagari, S. and Prashanth, B.N., 2024. Experimental and Numerical Evaluation of In-plane Tensile Mode Stress Intensity Factor for Edge Crack Using Empirical Formulation of Displacement Extrapolation Method. *Journal of The Institution of Engineers (India): Series D*, pp.1-11.
 24. Prasad, C.D., Kollur, S., Aprameya, C.R., Chandramouli, T.V., Jagadeesha, T. and Prashanth, B.N., 2024. Investigations on tribological and microstructure characteristics of WC-12Co/FeNiCrMo composite coating by HVOF process. *JOM*, 76(1), pp.186-195.
 25. Raja, T., Ali, M.N., Shashi Kumar, M.E., Vishal, G.R., Manikanth, V., Mohammad Soudagar, M.E., Chinnathambi, A. and Alahmadi, T.A., 2024. Study on the characteristics of novel natural fiber extracted from *Coccinia grandis* plant vine: a novel material for engineering applications. *The International Journal of Advanced Manufacturing Technology*, pp.1-8.
 26. Mohan, S., Kotebavi, V., Sahu, D. and Shetty, D., 2024. Investigations on N-Butanol and Biodiesel Blends Performance in Stationary Engine.

Conference and Book Series Publications (Published in 2024)

1. M. Spoorthi, S. S. Rao, S. Mishra, S. M. Rajagopal and Mrudula Prashanth, "Advancing Supply Chain Management: Cloud-Based Demand Forecasting Solutions," 2024 3rd International Conference for Advancement in Technology (ICONAT), GOA, India, 2024, pp. 1-6, doi: 10.1109/ICONAT61936.2024.10775167
2. P. D. Reddy, K. S. S. Reddy, P. Ganeswarachary, P. H. Reddy, Mrudula Prashanth and S. M. Rajagopal, "Cutting-Edge Steel Damage Classification Powered by Cloud Technology," 2024 15th International Conference on Computing Communication and Networking Technologies (ICCCNT), Kamand, India, 2024, pp. 1-6, doi: 10.1109/ICCCNT61001.2024.10724740
3. Sakthivel, M., Kumar, A.S., Shankar, G. and Chittawadigi, R.G., 2023, November. Virtual and Physical Components to Build Modular Robotic Arms for Effective Understanding of Denavit-Hartenberg (DH) Parameters. In *IFTToMM World Congress on Mechanism and Machine Science* (pp. 969-978). Cham: Springer Nature Switzerland.
4. Chittawadigi, R.G. and Saha, S.K., 2022, December. Rail Analyzer: 3D Model-Based Railway Simulation Software for Wheel-Rail Interaction. In *International Conference on Industrial Problems on Machines and Mechanism* (pp. 13-22). Singapore: Springer Nature Singapore.
5. Sheebu, L., Chowdary, M., Deepthi, Y.P., Tanuja, G.G. and Math, M.M., 2024, June. Application of value stream mapping on office furniture industry-A case study. In *AIP Conference Proceedings* (Vol. 3122, No. 1). AIP Publishing.
6. Naik, N.A., Swami Ayyanna Reddy, P., Pavan, S., Dhanush Eswar, R. and Deepthi, Y.P., 2023, December. Implementation of 5S Methodology in the Bike Service Shop. In *International Conference on Recent Advances in Industrial and Systems Engineering* (pp. 71-80). Singapore: Springer Nature Singapore.
7. Khan, P.A., Ravada, V.T., Tumna, M., Vidiyala, S.S. and Tatavarthy, S.R., 2022, December. A Supply Chain Study of Managing Multiple Routes Thru Ant Colony Optimization. In *International Conference on Industrial Problems on Machines and Mechanism* (pp. 607-615). Singapore: Springer Nature Singapore.
8. Ramachandrani, M., Reddy, N.S., Vamsi, M., Dharanidharareddy and Kotebavi, V., 2023, September. Cottonseed Biodiesel and Butanol Blends as a Fuel for Diesel Engine. In *International Conference on Mechanical Engineering* (pp. 317-327). Singapore: Springer Nature Singapore.
9. Srikanth, G., Hithesh, S., Anirudh, M., Yadav, A. and Kotebavi, V., 2024, August. Study of shock shapes around blunted conical bodies in hypersonic flow. In *Journal of Physics: Conference Series* (Vol. 2818, No. 1, p. 012003). IOP Publishing.

FDP on Computational Tools for Mathematics (July 8-11, 2024) and FDP on Computational Thinking for Problem Solving for AI (July 12, 15 and 16, 2024)

All ME Department and Mathematics Department faculty members attended the FDPs along with few colleagues from Amritapuri and Chennai Campus.

Session	Resource Person
Computational Linear Algebra for AI	Dr. Sarada Jayan and Dr. Neetu Srivastava
Computational tools for Robotics	Dr. Rajeevlochana G. Chittawadigi
Computational tools Data Preprocessing Resource Person	Dr. Manju Venugopal
Computational tools for Basic Probability Resource Person	Dr. Sriram Devanathan
Computational tools for ODE, PDE	Dr. E. A. Gopalakrishnan
Computational tools for Optimization	Dr. K. P. Soman and Dr. Sarada Jayan
Computational tools for Discrete Mathematics	Dr. K. N. Meera and Dr. Smitha T. V.
Computational Thinking	Ms. Saranya Devi
Problem Solving and Algorithmic Thinking	Ms. Vineetha Jain



Visits to 525 Army Base Workshop

[July 5 and August 21, 2024]

A set of faculty members of the department (Dr. Ravi Kumar V., Dr. Rajeevlochana G. Chittawadigi, Dr. Deepthi Y. P. and Ms. Mrudula Prashanth) visited the Army Base Workshop in Bengaluru to discuss on the potential collaborative projects between ABW and Amrita.



Workshop by SIATI

[October 9, 2024]

A set of faculty members of the department (Dr. Ravi Kumar V., Dr. Rajeevlochana G. Chittawadigi, Dr. Pramod R. and Dr. Mohan Kumar S.) and two S7 MEE Students (Mr. Hemand and Mr. Harihara) attended the Workshop on Advances in Aircraft Design Methodologies and Tools, organized by SIATI (Society of Indian Aerospace Technologies & Industries).



Staff Corner

The non-teaching staff of the department contributed in several ways in addition to their conventional lab related load. Some of them are listed below:

- Helping student teams working on Design Thinking course projects.
- Helping student teams working on GKDC (Go-Kart)
- Assisting faculty in the conduct of sponsored research projects (Honeywell projects and equipment)

In addition, they also coordinated and attended the 3D Printing Workshop by Honeywell personnel on December 18, 2024.



Students' Corner

IDC Robocon 2024

[August 5-17, 2024]



A team of four students represented Amrita Bengaluru in International Design Contest (IDC) Robocon organized by Amrita Vishwa Vidyapeetham, Amritapuri Campus.

Two of those were from the department (Ms. Harshada and Mr. Anandan of S3 RAE) were regrouped into random teams of students from 7 other countries. The students were given a challenge of building robots to perform societal applications and compete amongst themselves.

World Youth Meeting (WYM 2024)

[August 2024]

Mr. Harshit Bharambe (S7 MEE) participated in the World Youth Meeting 2024 held in Kyoto, Japan, on the theme "SDGs: Tackling the Root Causes of Conflict." His team secured "Gold" award as a part of team for Amrita Vishwa Vidyapeetham.



Modular Wheelchair as Innovation

[Aug 18-24, 2024]

A team of two students (Team: Mr. Punya Dube and Mr. Syed Azim, S7 MEE) was shortlisted for Design Impact Movement Incubation Phase, where the students were invited to Protovillage (Near Hindupur, Andhra Pradesh) for a curated weeklong workshop, that offered a transformative experience. It guided the participants through a reflective journey to deepen their understanding of sustainability. Through introspective exercises, attendees explored personal motivations and values, fostering a profound connection with sustainability principles.



RoboAnalyzer-based Online and Offline Competition (ROC 2024)

[August-November, 2024]

RoboAnalyzer (software developed at IIT Delhi) team comprising of Prof. S. K. Saha (IIT Delhi), Prof. Nayan Kakoty (Tezpur Univ., Assam) and Dr. Rajeevlochana G. Chittawadigi (Amrita Bengaluru), in collaboration with SVR Robotics (Pune), conduct ROC every year. ROC 2024 started with an in-person session at Pune on August 17, 2024, which was attended by three students of the department (Mr. Harshit, Ms. Varsha and Mr. Hemand of S7 MEE). After the

session, the participants were part of randomly formed groups and were asked to learn about robot kinematics using publicly available resources. ROC Conclave was held on November 9, 2024, at IIT Delhi where a few shortlisted teams competed. A team with one of our students (Mr. Harshit) won Second Prize in the ROC 2024 Competition. Ms. Maya (S7 MEE) was in the organizing team as she had undergone summer internship at SVR Robotics and was involved in the planning of the event.



FKDC Go Kart

[October 18-24, 2024]

Formula Kart Design Challenge is a competition initiated by FMAE (Fraternity of Mechanical and Automotive Engineers) to offer students the maximum design flexibility and the freedom to express their creativity and imaginations with few restrictions on the overall kart design. The main objective of this competition is students should assume that they work for a firm that is designing, fabricating, testing and demonstrating a prototype kart for the non-professional competition market.

Team Vegam, mentored by Mr. Vinod Kotebavi, participated in a Go Kart completion FKDC (Formula Kart Design Challenge) Season 8 conducted by FMAE at Kari Motor Speedway Coimbatore during October 18-24, 2024.



The team achieved a remarkable National India Rank 8th in IC Category, among 63 teams from across India.



Smart India Hackathon (SIH)

[October 18-24, 2024]

Several teams from the department participated in the internal round of SIH 2024 where the teams pitched their idea/project to a panel of faculty members. This exercise helped the students to start thinking about alignment with the thrust areas and the desired direction of innovation by the Govt. of India.



Industrial Visit to TVS Motors (Hosur)

[July 25, 2024]

Around 50 students visited TVS Plant at Hosur. They were taken around and shown the complete assembly line, engine assembly line, paint shop, etc. The visit helped the students to know about the opportunities and responsibilities of Mechanical Engineers in automotive industries.



Kodachadri and Hidlumane Falls Trek

[September 27-29, 2024]

As a part of Squad Club, around 100 students (including many from the department) and club mentor (Dr. Shashi Kumar), trekked in the Western Ghats and visited Kodachadri and Hidlumane Falls. Such nature trips help our students to unwind themselves and relax in between the semesters.



Parent's Point of View

Ms. Sharmila S.

B.E (EEE) and MBA
(Parent of Ms. Keerthinidhi S.,
S3 RAE)
PCB Layout Expert



As the electronics industry advances rapidly, Printed Circuit Boards (PCBs) are the forefront of innovation shaping

industries from consumer electronics to Aerospace and Health Care.

By 2025 and beyond, the PCB Manufacturing Market will experience rapid changes due to the increasing complexity of devices, the need for environmental sustainability, and the push for smarter and more efficient processes. The demand for smaller, lighter, and more powerful electronic devices will lead to the adoption of high-speed and high-density interconnect (HDI) PCBs.

The evolution of RAM technology has seen significant improvements in speed, capacity, and efficiency over time. Each generation of DDR memory has introduced new features and optimizations to meet the growing demands of modern computing tasks. DDR1 started with less capacity with high voltage, now reached DDR5 with more capacity with less voltage. DDR1 started in 1990 with a memory capacity up to 1GB with a voltage of 2.5V and DDR 5 in 2021 with a memory capacity up to 128 GB with a voltage of 1.1V. The introduction of DDR6 in 2025 is expected to reach a memory capacity up to 256GB making DDR6 suitable for highly demanding Applications in data centers, AI and Machine learning environment.

Flexible and Rigid-flex PCBs are gaining traction for their ability to support foldable devices, wearable technology, and medical applications. Integration of AI and IoT transforming PCB production smarter factories that improves efficiency and accuracy. Automated Assembly lines, real-time quality control systems, and predictive maintenance make production faster, more scalable, and less prone to errors.

PCB layout designs can be done using multiple tools and are efficiently created using Cadence Allegro. This tool has Allegro X AI makes it easier for Engineers to run feasibility studies and automated component placement, critical net routing, and power plane generation reducing time spent on these tasks from days to Minutes.

A product's mechanical design governs its aesthetics. Products Mechanical design has an impact on product Hardware and Software and vice versa. Mechanical designers can help improve PCB heat dissipation and thermal analysis and 3D model analysis of component positioning before production.

If you are interested in learning about PCB commercial layouts or tool learning or need guidance, please feel free to reach out to me at sharmisuresh07@gmail.com.

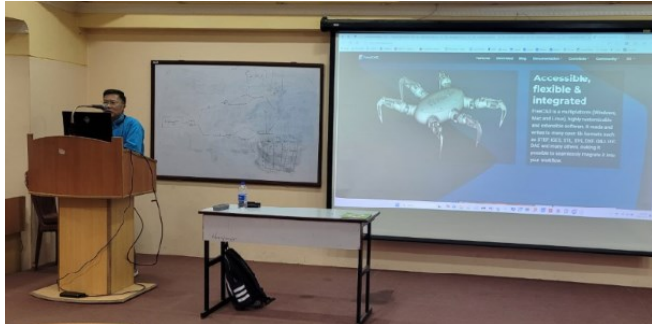
International Affairs

Talk by Dr. Aik-Siong Koh
(AR-CAD LLC, USA)

[November 11, 2024]

Dr. Aik-Siong Koh has over 40 years of experience in the development of mathematical modelling of engineering systems and translating them into software applications. As the CEO of AR-CAD LLC, USA, he has developed CAD addins/plugins to Autodesk Inventor, SpaceClaim, etc. to perform kinematic and dynamic simulation, assembly explosion, etc. Recently, he has been involved in the development of Assembly Constraint Solver/Module in

FreeCAD, an OpenSource CAD Software, on which he addressed our students.



YouTube Video:

<https://www.youtube.com/watch?v=JX4TcNzoT5I>



Research Talk by Dr. Yuichiro Yoshikawa (Osaka Univ., Japan)

[October 19-21, 2024]

Dr. Yoshikawa serves as an Associate Professor in Department of Systems Innovation, Graduate School of Engineering Science, Osaka University, Japan. He visited Amrita Bengaluru from Nov 19 to 21, 2023, and interacted with the students of the department. He presented the work carried out by his team in the field of android robots and how Human-Robot Interaction (HRI) can be used to enhance education using robots.



Talk by Sachin Pullil (Tesla, USA)

[September 5, 2024]

Mr. Sachin Pullil graduated B.Tech Mechanical from Amrita Bengaluru (2014-18 batch). After pursuing Masters in Robotics from Univ. of Pennsylvania (USA), he has been working in Tesla (USA). He interacted with the students of the department where he shared his journey from being a student at Amrita to the robotics R&D he has been doing at Tesla.



He also showcased and explained about Optimus Biped Robot, under development of Tesla, where he contributes in the field of software development and interfacing with the hardware. The session was on "Teachers' Day" and what better gift can we teachers expect than a successful alumnus.



Visit by Mr. Taiga Natori (Osaka Univ., Japan)

[October 14-19, 2024]

Mr. Taiga Natori, a PhD Research Scholar at Osaka University, Japan, visited the department to carry out a part of his PhD research work. It involved visiting schools nearby and conducting surveys on how programming is introduced to the school children. Thereafter, he also interacted with the students of the department and gave an overview of his research work, followed by a survey of Amrita students on when they started learning programming and how it has helped them so far in the Engineering program. He also volunteered to be a part of SIH Evaluation Panel and conducted Japanese speaking session with a set of interested students of the department.



Collaboration with Ms. Devasena P. (Osaka Univ., Japan)

[November 11, 2024]

Ms. Devasena Pasupuleti graduated B.Tech Mechanical from Amrita Bengaluru (2016-20 batch). After pursuing Masters in Robotics from Amritapuri campus, she has been pursuing PhD at Osaka University, Japan. She visited Amrita Bengaluru campus for the duration November 6 to December 1, 2024 with regard to the conduct of survey of school children pertaining to her PhD work. Dr. Rajeevlochana G. Chittawadigi (and alumni Mr. Bangi Yaswhant and Mr.

Dhanush Eshwar, working in Amrita Motion Lab) helped Ms. Devasena in conduct the surveys spread across 2-3 weeks in two schools, where she allowed the students to engage in gamified learning. The work carried out is being considered as a partial collaboration work for a publication.

Ms. Devasena interacted with the students of the department on November 11, 2024, where she introduced them to how smaller android robots can be used as a learning-pal for the young students. She was also one of the jury members for the Design Thinking Course Project Exhibition (Nov 19, 2024), along with her PhD supervisor, Dr. Yuichiro Yoshikawa.



ACMD 2024 (Suwon, South Korea)

[August 25-29, 2024]

The 11th Asian Conference on Multibody Dynamics (ACMD) was organized by Korean Society of Mechanical Engineers (KSME) at Suwon, South Korea. It is a biennial conference where Multibody Dynamics (MBD) community gets together to present their work and learn from each other. Dr. Rajeevlochana G. Chittawadigi (along with Dr. Akhil V. M. of CEN, Ettimadai Campus) attended the conference.

During the conference, Dr. Rajeevlochana presented his work entitled “Kinematic Analysis of an Isolated Railway Wheelset Modelled as a Serial-Chain Mechanical System” and also connected with few researchers such as Dr. Makoto Iwamura (Fukuoka Univ., Japan), Prof. Jin Choi (Kyung Hee Univ., South Korea), etc. He also interacted with FunctionBay (developers of RecurDyn MBD software) which agreed to onboard Amrita Bengaluru as an Academic Partner and provide free licenses of RecurDyn software to be used in courses and research.



IEEE ROBIO 2024 (Bangkok, Thailand)

[December 10-14, 2024]

The 20th edition of IEEE International Conference on Robotics and Biomimetics (IEEE ROBIO 2024) was conducted at Bangkok (Thailand) and was attended by Dr.

Rajeevlochana G. Chittawadigi. He presented two papers. The first one being “Systematic Overview of Development of a Robot Kinematics Library for Motion Planning of Serial Robots using Object Oriented Programming Concepts” and the second one, out of a collaboration project with alfaTKG (Japan), being “A Web-based Framework for Intuitive Offline Programming of Serial-chain Robots with Environment Objects”. On the sidelines of the conference, Dr. Rajeevlochana interacted with three potential collaborators viz. Dr. Ramana Vinjamuri of Univ. of Maryland Baltimore County (UMBC), USA, Prof. Jackrit Suthakorn of Mahidol Univ. (Thailand) and Dr. Branesh Nair of Asian Institute of Technology (Thailand). He also visited Jinpao Industry (a collaborator of alfaTKG) on the outskirts of Bangkok to understand their requirements with regards to robot programming for particular applications being co-developed by Amrita and alfaTKG.



Industry-Academia Partnership

MoU Signing between Amrita and alfaTKG (Japan)

[August 2, 2024]

Dr. Rajeevlochana G. Chittawadigi has ongoing projects with alfaTKG (India), whose progress was demonstrated to the alfaTKG team at IIT Madras Research Park on August 2, 2024. In addition to the already existing MoU with alfaTKG (India), a new MoU was signed with alfaTKG (Japan).



Project Signing between Amrita and alfaTKG (Japan)

[November 13, 2024]

Project “alfaTKG-A2”: Augmented Reality based Motion Planning of an Industrial Robot to Perform Welding

Project Investigator: Dr. Rajeevlochana G. Chittawadigi

Funding: 10,000 USD

Duration: Dec 2024 to Nov 2025

1. RobKinLib (Server) has been developed by Amrita which has capability to program an industrial robot on standard motions. A web interface (alfa3D Viewer) developed by alfaTKG has been integrated with RobKinLib in another project.
2. In this project, image processing and depth camera sensor shall be used to determine the position and orientation of the workpiece and adapt the robot program to perform different operations such as welding, pick-and-place, etc.
3. Augmented Reality/Virtual Reality based interface shall also be created to provide an immersive environment to the robot programmer.



MoU and Project Signing between Amrita and AR-CAD LLC (USA)

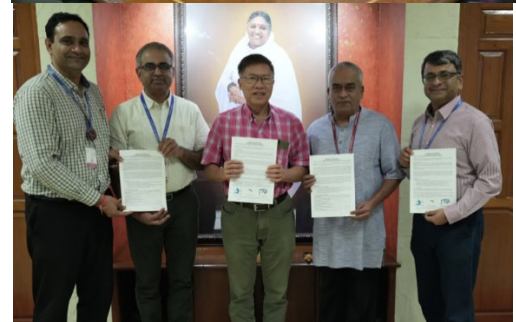
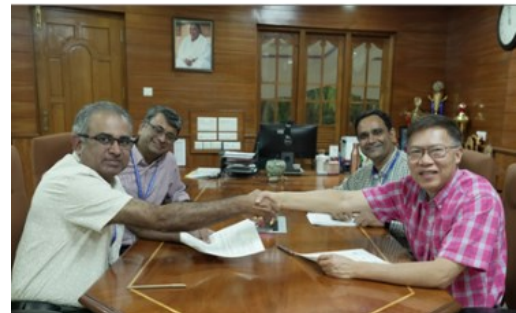
[November 14, 2024]

Project “AR-CAD-A1”: Development of Addins and Workbenches in CAD Software

Project Investigator: Dr. Rajeevlochana G. Chittawadigi

Funding: 18,000 USD; Duration: Dec 2024 to Nov 2027.

1. AR-CAD LLC has developed several CAD addins or workbenches in FreeCAD and other Commercial CAD Software.
2. Amrita team shall help AR-CAD in the development of Workbenches in FreeCAD such as “Assembly Explode to achieve keyframe animation between exploded views” and “2D-to-3D to convert orthographic views into equivalent 3-dimensional model”.
3. Amrita team shall also extend the existing CAD addins such as SC-Motion, SCExplode, etc.
4. Amrita and AR-CAD shall apply to FreeCAD Project Association (FPA) to develop interface for C# in FreeCAD through Python.



Project Signing between Amrita and Ms. Honeywell

[November 22, 2024]

Project Honeywell-1: “Experimental investigations on characterization of pumps provided by Ms. Honeywell”

Project Investigator: Dr. Pradeep S. Jakkareddy

Project Co-investigator: Mr. Vinod M. Kotebavi

Funding: Rs. 3,41,680

Duration: November 2024 to March 2025.

Project Honeywell-2: “Experimental investigations of filmwise and dropwise condensation on the material provided by Ms. Honeywell”

Project Investigator: Dr. Pradeep S. Jakkareddy

Funding: Rs. 73,100

Duration: November 2024 to February 2025

To augment the rate of heat transfer in the cooling systems for batteries and refrigeration systems. There is a need identified to validate influence of different nano materials and mechanical equipment designs on overall performance of thermal systems.



MoU between FunctionBay and Amrita

[September 10, 2024]

FunctionBay (South Korea) is the developer of RecurDyn Multibody Dynamics Software. They have entered into an agreement with Amrita Bengaluru where they have agreed to let their software be used by our teachers, students and researchers for academic purposes. This software can be used in courses such as kinematics, dynamics, controls, vibrations, etc. and also by the students to test their virtual prototypes.



Ongoing Projects in the Department

Project SVR-1: “Integration of AMoRA (Amrita Modular Robotic Arm) with RoboAnalyzer® for Effective Robotics Education”

Project Investigator: Dr. Rajeevlochana G. Chittawadigi

Funding: Rs. 8,43,700

Collaborator: SVR Infotech, Pune

Duration: May 2023 to April 2025.

Project alfaTKG-A1: “Motion Planning of an Industrial Robot to Perform Welding in a CAD Environment”

Project Investigator: Dr. Rajeevlochana G. Chittawadigi

Funding: Rs. 9,40,000

Collaborator: alfaTKG Technology India Services Pvt Ltd, Chennai

Duration: June 2023 to March 2025.

Project alfaTKG-B1: “Further Development of a Software Library to Convert Orthographic Views to a 3D Model for AutoPilot3D”

Project Investigator: Dr. Rajeevlochana G. Chittawadigi

Funding: Rs. 14,75,000

Collaborator: alfaTKG Technology India Services Pvt Ltd, Chennai / alfaTKG Co. Ltd., Tokyo, Japan

Duration: March 2024 to April 2025 (extended upto 3 years).

Project Orangewood-1: “Setting up of Amrita-Orangewood Collaborative Robotics Lab”

Project Investigator: Dr. Rajeevlochana G. Chittawadigi

Project Co-investigator: Dr. Nippun Kumar A. A.

Funding: Rs. 16,00,000

Collaborator: Orangewood Labs, Noida

Duration: Feb 2024 to January 2029.

Alumni Corner

Ms. B. Vinuthna, IAS

Ms. B. Vinuthna, a proud alumna of the Amrita Bengaluru Campus graduated in the year 2016 from the department of ME, fondly credits her alma mater with lesson in resilience and positivity which could propel her to become an IAS officer – a dream for many.

Currently, she is serving as an Assistant Collector, in a District in Andhra Pradesh. She addressed her juniors and took them through her journey to success. She also interacted with them and boosted their self-confidence. She graciously exhibited her gratitude for the faculty who supported her in the journey to success.



Mr. Balasubrahmanyam Madireddy

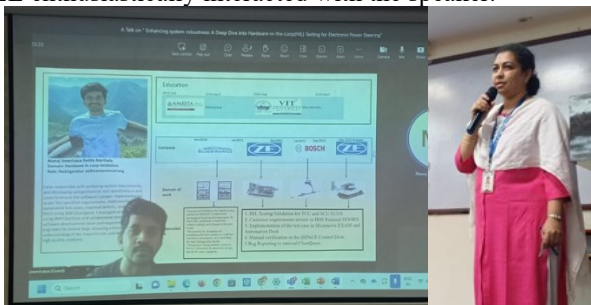
Mr. Balasubrahmanyam graduated B.Tech Mechanical Engineering from Amrita Bengaluru in 2023 and has been working at Honeywell in the Aerospace vertical as Systems Engineer. He has been actively engaged in Amrita-Honeywell collaboration. He also interacted with the students of the department and briefed them about the internship opportunities and was instrumental in shortlisting one of the department students who has been offered the internship at Honeywell. We thank such alumni who are acting as the bridge between the academia and industry.





Mr. Manoj Srinivas Reddy

Manoj Sreenivasa Reddy Marthala, is a senior testing manager at ZF CVS systems, Germany, currently working for off-highway vehicles. His area of specialization is Hardware in Loop validation. Manoj completed his B.Tech. in Mechanical Engineering from ASE, Bengaluru and M.Tech. in Mechatronics. Prior to his current job, he was working at Bosch, Germany. Through his technical talk (virtually) titled “Enhancing System Robustness: A Deep Dive into Hardware-in-the-Loop (HIL) Testing for Electronic Power Steering”, he gave an insight into levels of driving automation/ driverless and connected cars, automotive software development, system integration and qualification testing and detailed about power steering, its control, functions, and recommendations. The students of S5 ME and EEE enthusiastically interacted with the speaker.



Mr. Dipayan Banerjee

Mr. Dipayan Banerjee completed his B.Tech Mechanical Engineering in 2016 and currently works at Altair Bengaluru as Senior Software Development Engineer (Meshing and Geometry). He has been actively participating in our pursuit to inform the current students on what industries expect from a graduand. Like the last few years, he was invited to address the first year students during the Orientation program in August 2024.



Catching up with our Alumni



Innovation in Teaching and Learning

Industry Visit to Sameta Sheetmetal Industry and Follow up Evaluation

An industrial visit to Sameta Sheetmetal industry was arranged on October 29, 2024 for S3 MEE students, pertaining to the syllabus Metal working/forming of Manufacturing Process-I (23MEE204):

- Students received knowledge and made observations on
- Industrial set up and process plan
- Different types of hydraulic and pneumatic presses in the industry
- Metal inert gas welding
- The different steps in manufacturing of home safe locker (product being manufactured)
- Different steps like forming, welding, grinding and painting and assembly
- The different material used to manufacture the product at different stages
- Technical specifications of the process and equipment
- The different types of ovens (LPG and IR)



To disseminate the knowledge and for an effective teaching learning process a quiz (as a part of lab evaluation process) was conducted on the subsequent day in the school (of Engineering) and the marks were considered for final grading of the student in the course.

- Dr. Ulhas K. Annigeri

Design Thinking Course: Projects Exhibition

Design Thinking course is offered to S3 MEE and S3 RAE where the students are taught on the principles of design

leading to product development. To improve the participation and effective learning, the end-semester evaluation for these two courses were conducted as Project Exhibition. As jury, we had Dr. Yoshikawa and Ms. Devasena (visitors from Osaka Univ., Japan), in addition to the faculty of the department.



- Dr. Dileep B. P. and Dr. Ulhas K. Annigeri

Preparing Students for a Bright Future

GATE Session by IMS GATE Academy

[September 11, 2024]

An information sharing sessions on GATE for Mechanical Engineers was organized on Sept 11, 2024, by the resource persons from IMS GATE Academy.



Special Sessions for Placements/ Higher Education/ Entrepreneurship

For the 7S MEE students, a dedicated two-hour slot was introduced on Tuesday afternoons throughout the semester towards:

- a) Presentations of Internships done after their sixth Semester
- b) Tips on placements
- c) Mock Group Discussion sessions
- d) Experience sharing sessions by students participating in placements

Few of the testimonials by the students, thanking Mr. Bhanu Prakash S. and Dr. Ravi Kumar V. are below:

“The placement, higher education, and entrepreneurship sessions conducted on Tuesday afternoons have been incredibly valuable and impactful for us students. These sessions, organized in addition to our regular classes, provided critical insights and practical knowledge to help us prepare for our future endeavours”

- K. Suhas Aditya (S7 MEE)

“These sessions on placements helped to gain confidence in my placement preparation. They provided practical advice on resume building, group discussion preparation and effective techniques for answering interview questions which ultimately helped me get an internship and full-time job”

- K. Sai Jaswanth (S7 MEE)

“We had a talk by a Guest Speaker for students seeking to pursue higher education and understood the process in applying for international universities and navigating scholarship opportunities in various domains”

- Varsha Megha V. (S7 MEE)

“I sincerely appreciate the department's efforts in organizing such focused and informative sessions. They have played a pivotal role in shaping my preparation and success, and I am confident they will continue to guide many other students toward achieving their career goals”

- Maya Dhanani (S7 MEE)

B.Tech Program Objectives (POs)

[As mandated by AICTE/NBA]

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objectives (PEOs)

[Formulated by the ME Dept.]

PEO1: Apply their Knowledge in Science, Mathematics and Engineering to **address Industrial and Societal problems** with a strong emphasis on creativity, confidence, ethics, and responsibility.

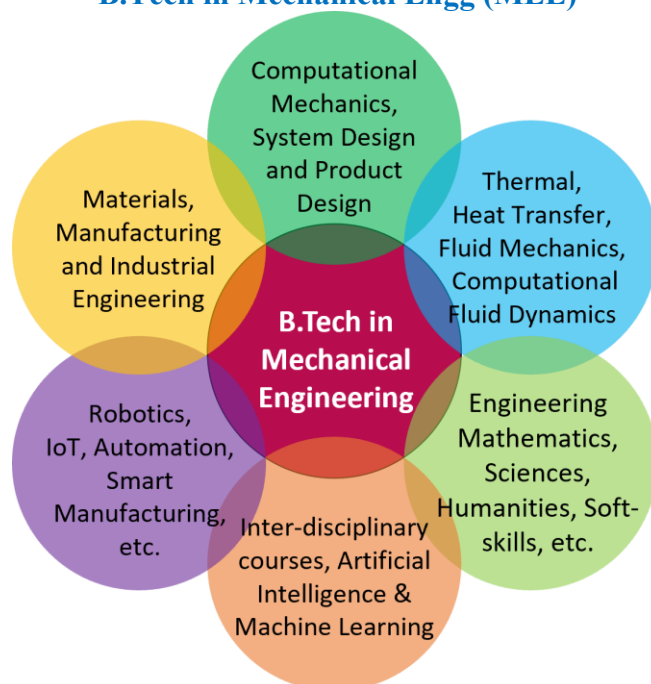
PEO2: Apply latest **computational, analytical, simulation tools** and techniques to develop and improve products and processes.

PEO3: Solve **multidisciplinary** problems by working in cross functional teams.

PEO4: Develop and upgrade technical, intellectual, and emotional **skills for life-long learning** to compete in a rapidly evolving world.

PEO5: Nurture **entrepreneurial** ventures and **foster research** activities that support **sustainable** economic development to enhance the quality of life.

B.Tech in Mechanical Engg (MEE)



Program Specific Objectives (PSOs - MEE)

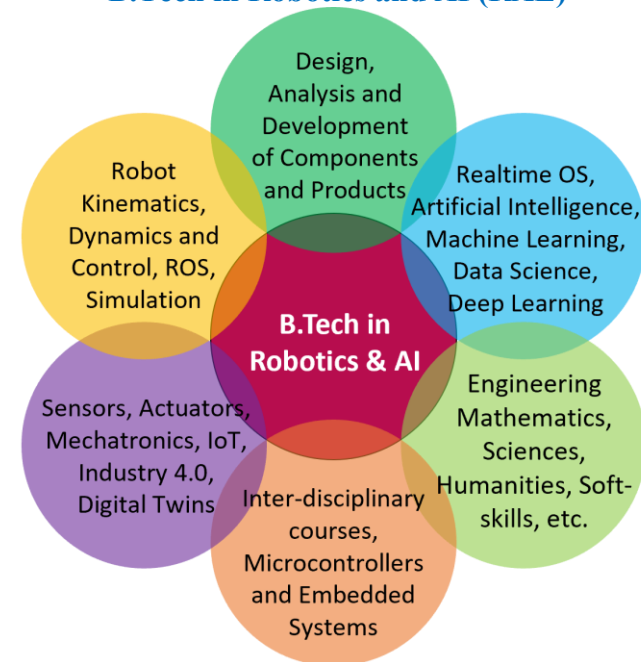
PSO1 (MEE): Apply knowledge acquired in the field of **Design, Manufacturing, Thermal, and Fluid sciences** to solve real-world engineering problems using emerging technologies.

PSO2 (MEE): Extend and implement **innovative** thinking on **product design and development** with the aid of modern tools.

PSO3 (MEE): Apply the Science and Engineering knowledge for advanced materials design and processing for development of **sustainable solutions** and improvement of products and processes.

PSO4 (MEE): Augment the acquired domain knowledge with **AI and Computational skills** in order to be ready with the changing interdisciplinary demands of the industry.

B.Tech in Robotics and AI (RAE)



Program Specific Objectives (PSOs - RAE)

PSO1 (RAE): Design and develop cost-effective **robotic systems** catering to Industrial and Societal requirements.

PSO2 (RAE): Develop cost-effective, safe, and efficient **AI-based automation systems** for manufacturing applications, focusing on product development and process improvement.

PSO3 (RAE): Apply the acquired knowledge and skills in **AI** to **address real-life multidisciplinary** engineering problems.

Faculty



Mr. Bhanu Prakash S.

- Heat Transfer
- Fluid Mechanics
- Thermoelectric Modules



Dr. Y. P. Deepthi

- Polymer Composite Materials
- Industrial Engineering



Dr. Dileep B. P.

- Ferrous-based Metal Matrix Composites
- Powder Metallurgy
- Industrial Automation



Ms. Divya Sharma S. G.

- Supply Chain Engineering
- Total Quality Management
- Lean Manufacturing
- Optimization



Dr. E. A. Gopalakrishnan

- Nonlinear Dynamics
- Complex Systems
- Combustion Instabilities
- Stochastic Systems



Dr. Mohan Kumar S.

- Composite Materials
- Fracture Mechanics
- Material Science
- Finite Element Method



Ms. Mrudula Prashanth

- Composite Materials
- Alloys
- Cryogenics
- Manufacturing



Dr. M. V. Phanibhushana

- Composite Materials
- Aluminium Metal Matrix Composites
- Severe Plastic Deformation



Dr. Pradeep S. Jakkareddy

- Inverse Heat Transfer
- Experimental Heat Transfer
- Cooling of Electronic Systems



Dr. Prakash Marimuthu

- CAD /CAM
- Manufacturing
- AI / ML in Mechanical Domain



Dr. Pramod R.

- Composite Materials
- Fracture Mechanics
- Finite Element Analysis
- Computational Mechanics

Profiles



Dr. Prashanth B. N.

- Product Lifecycle Management
- CAD/CAM
- Robotics & Industrial Automation
- Wind & Solar Energy Systems



Mr. Raghavendra Ravi Kiran K.

- Composite Materials
- CAD / CAM
- Robotics & Industrial Automation



Dr. Rajeevlochana Chittawadigi

- Robotics
- Kinematics and Dynamics of Multi-body Systems
- CAD and Graphics



Dr. Ravi Kumar V.

- Nano Composites
- Mechatronics and Sensors
- Machine Design



Dr. Shali S.

- Aeroelasticity
- Vibration Analysis in Sub-sonic and Super-sonic flow



Dr. Shankara

- Waste Management
- Pollution Research
- Geo-environmental Engineering



Dr. Shashi Kumar M. E.

- Composite Materials
- Concurrent Engineering
- Complex Products Development



Dr. Smita Singh

- Geo-polymer Technology using Industrial Wastes
- Structural Engineering



Dr. Sriram Devanathan

- Data Reconciliation & Gross Error Detection
- Groundwater Transport
- Low-cost Materials



Dr. Ulhas K. Annigeri

- Composite Materials
- Metal Matrix Composites
- Tool Design



Mr. Vinod Kotebavi

- Shock Wave and Hypersonic flow
- Renewable Energy