DEPARTMENT OF MECHANICAL ENGINEERING

MODEL–SIMULATE–ANALYZE (MSA) METHOD

Academic year	: 2024-2025
Degree	: B.E.
Year & Semester	: IV/VII
Course Code & Title	: ME3791 / Mechatronics and IOT
Name of the Faculty Member	: Mr. K. Saravanan
Date	: 14/09/2024
Innovative Practice	: Model–Simulate–Analyze (MSA) Method
Topic	: Introduction to Mechatronics - Modular Approach, Sensors and Transducers:
Total Students Participated	: 16

Introduction

Model–Simulate–Analyze (MSA) Method in Mechatronics and IoT aims to provide learners with a safe, interactive, and realistic environment to understand complex system behaviors. It enhances conceptual understanding by allowing students to visualize the interaction between mechanical, electronic, and software components. Through simulation, learners can develop system-level thinking and experiment with various designs without the risk of damaging equipment. It also accelerates prototyping by enabling virtual testing of circuits, control algorithms, and IoT architectures. This approach improves problem-solving skills as students analyze system responses and debug faults in real time. Simulation tools strengthen programming and control competencies by offering hands-on practice with sensors, actuators, and communication protocols. They also facilitate remote and collaborative learning, allowing teams to work together on digital models. Furthermore, simulation prepares learners for Industry 4.0 technologies such as digital twins and smart automation. It encourages innovation by letting students explore creative solutions and test new ideas. Overall, simulation-based learning effectively bridges theoretical knowledge with practical, real-world applications.

Methodology

1. Introduce students to basic concepts of mechatronics, IoT, and relevant simulation tools.
2. Provide hands-on orientation to software platforms such as MATLAB/Simulink, Proteus, Tinkercad, or IoT simulators.
3. Guide learners to model mechanical, electrical, and embedded components in a virtual environment.
4. Design simulation tasks that replicate real-world scenarios involving sensors, actuators, controllers, and IoT communication.
5. Encourage iterative experimentation where students change parameters and observe system behavior.
6. Promote problem-solving by having learners identify, analyze, and troubleshoot simulated system faults.
7. Use guided demonstrations and step-by-step tutorials to support skill development.
8. Conduct collaborative virtual lab activities and group projects to enhance teamwork.
9. Assess learner progress through simulation reports, performance evaluations, and reflective logs.
10. Connect simulation tasks with real-world applications to strengthen practical understanding and industry readiness.

Outcomes

1. Students will be able to model and simulate mechatronic systems using tools such as MATLAB/Simulink, Proteus, or Tinkercad.
2. Students will simulate sensor–actuator interactions and analyze system responses under varying operating conditions.
3. Students will identify and troubleshoot faults in virtual mechatronic or IoT systems using diagnostic techniques.
4. Students will design and implement IoT-based simulations involving data acquisition and communication between devices.
5. Students will prepare and present simulation reports demonstrating system behavior, analysis, and design conclusions.

Student Participation

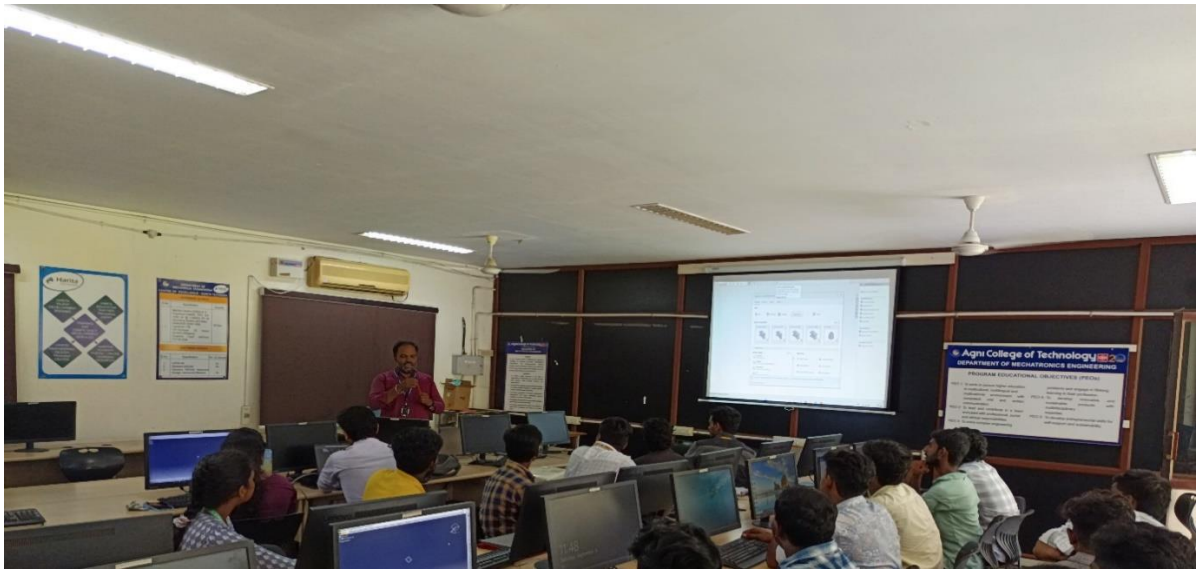
- Total Students: 16
- Participation Mode: Virtual Labs
- Engagement: Students actively discussed, clarified doubts, and provided feedback to their peers.

Relavant PO's :

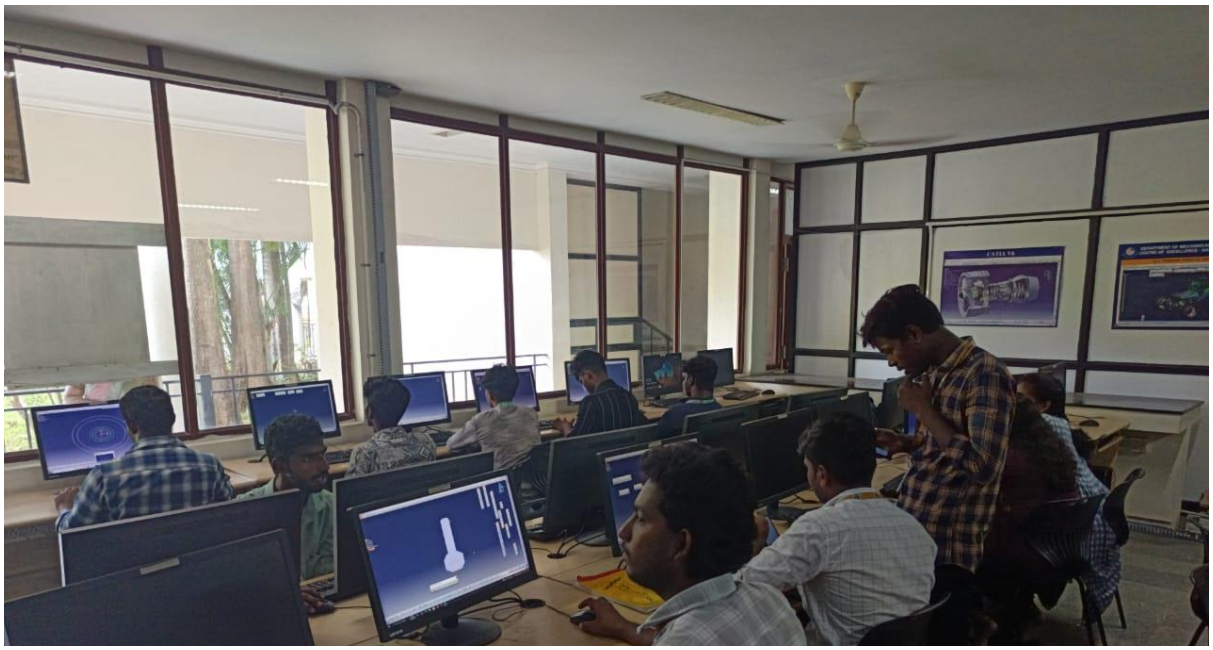
PO1	PO 2	PO 3	PO 4	PO 5	PO 9	PO 10

Participant Name List

S. NO	REGISTER NO	STUDENTS NAME
1	312821114002	Divya N
2	312821114003	Gokul P
3	312821114004	Guna S
4	312821114005	HariRaghavan C
5	312821114006	Kalaiselvan R
6	312821114007	Kannan S
7	312821114008	Karthick K
8	312821114010	Reshav Raj
9	312821114011	Sibi Raynord U
10	312821114012	Sivasakthi J
11	312821114013	Yuvaraj A
12	312821114301	Gokul S
13	312821114302	Meera T M
14	312821114303	Mohammed Jameel S
15	312821114305	Umar Faruk N
16	312821114306	Yuvaraj M



Model–Simulate–Analyze (MSA) Method conducted on 14.09.2024 by Mr. K.Saravanan for Mechatronics and IOT course



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The valuable feedbacks can be provided in the below link for the above innovative teaching method.

https://docs.google.com/forms/d/1C5BNIvd230S9P0Uw7vcZ9OJKl5ff9bhwgITyaniX1TQ

Faculty In charge

HoD/Mech