A Report on One Day Seminar on
"Applications of AI & ML in Civil Engineering"
Organised by Department of CSE – AI & ML
on 19.09.2024 (Thursday)

Submitted by: Mrs. N. Geethanjali, Assistant Professor, Department of CSE – AI & ML
Resource Persons Details: Dr. Dipankar Roy, Professor & Head, Dept. of Civil Engineering; Dr. Nakkeeran G, Asst. Professor, Dept. of Civil Engineering
Participants: II Year CSE – AI & ML – 123 Students
Venue: Seminar Hall A
Mode of Conduct: Offline
Report Received on 23.09.2024.

Department of Computer Science & Engineering – AI & ML has organized a Seminar to the students titled "One Day Seminar on Applications of AI&ML in Civil Engineering" on 19.09.2024 (Thursday).

Welcome Address:

The event commenced at 03:00 PM with a warm and engaging welcome address to all by Mrs. N Geethanjali, Asst. Professor, Department of CSE – AI & ML, Madanapalle Institute of Technology & Science (MITS), Madanapalle. The event aimed to provide an insightful understanding of the latest trends, innovations, and research in this intersectional field. These applications showcase how AI&ML are transforming civil engineering, making processes more efficient, safe and sustainable.

Keynote Address:

Dr. S. Padma, Associate Professor & Head, Department of CSE – AI & ML, Madanapalle Institute of Technology & Science (MITS), Madanapalle welcomed the resource persons with her keynote address and motivated the students to enrich themselves. Madam has given note on how smart infrastructure can possible with AI. AI integrates with IoT to develop smart infrastructure systems. These systems enhance traffic management, energy efficiency, and urban planning by using data-driven insights to improve decision-making.

Dr. Ramanathan, vice principal academics, MITS, Madanapalle explained about the importance of AI&ML in civil engineering. He motivated the students to enlighten themselves by utilizing the Seminar. Sir has given note on Geotechnical Engineering and how AI models analyze soil and rock behavior, predicting landslides or ground movements. This aids in designing stable foundations and tunnels.

Resource Person Lecture: Dr. Dipankar Roy, Professor & Head, Dept. of Civil Engineering, MITS, Madanapalle explained about the AI in Civil Engineering.

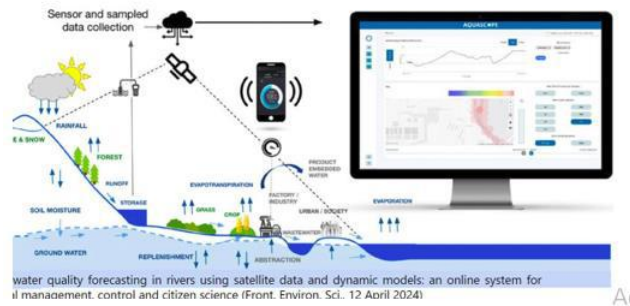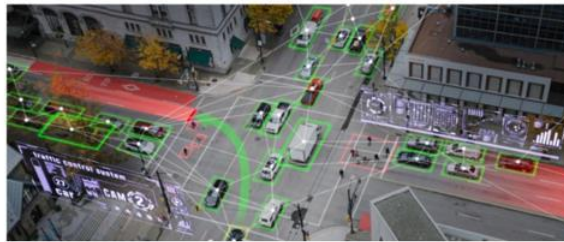The resource person shared the following points in the Seminar

- Artificial Intelligence refers to the simulation of human intelligence in machines that can perform tasks like decision-making, problem-solving, learning, and understanding language.
- AI can handle large datasets, solve complex design problems, and automate repetitive tasks, making it ideal for use in civil engineering where precision, efficiency, and safety are paramount.
- AI reduces the time spent on planning, design, and project management by automating tasks.
- With AI's predictive capabilities, projects can avoid delays and over-expenditures by anticipating issues before they occur.
- AI for generating optimized building designs and structures. AI-powered tools for simulating load, stress analysis, and environmental impacts.
- AI algorithms can explore various design possibilities and select the best solutions. AI for resource allocation, scheduling, and project monitoring.

Structural Health Monitoring:

- Sensors & IoT: AI integrated with sensors for monitoring the health of structures in real time.
- Predictive Maintenance: How AI predicts the need for repairs or maintenance of infrastructure before critical failures.
- Data Analysis: Machine learning models analyzing historical and real-time data to detect potential structural issues

Traffic and Transportation Engineering:

- Smart Traffic Management: AI algorithms for real-time traffic control and congestion management.
- Autonomous Vehicles: Development of self-driving cars and smart transportation systems.
- Infrastructure Planning: Optimize Road networks and transportation infrastructures.

water quality forecasting in rivers using satellite data and dynamic models: an online system for
al management, control and citizen science (Front. Environ. Sci.. 12 April 2024)

Generative AI in Geospatial Mapping:

Use Generative AI to make future climate scenarios by using geospatial technologies and show them in a way that changes how people behave. It can also help improve climate models, simulate how different policies affect the climate, make manufacturing processes better, and make climate risk analysis easier to understand. This can help companies and governments make best of Geo and AI for better decisions. The possibilities are diverse and helpful.

NVIDIA Generative AI Weather Forecasting and Climate Simulation Accuracy

Disaster Risk Management:

- **Predictive Modeling:** Predict the likelihood of natural disasters like earthquakes and floods.

- **Resilient Infrastructure:** Applications in designing disaster-resilient buildings and infrastructure.

- **Emergency Response:** Optimizing response and recovery efforts after disasters.

- Later the next resource person Dr. Nakkeeran G explained about the AI in Building and Construction.


- AI tools are enabling civil engineers to create more efficient designs and optimize resource allocation. By analyzing vast amounts of data, AI can predict potential challenges, leading to better planning and scheduling of construction activities.
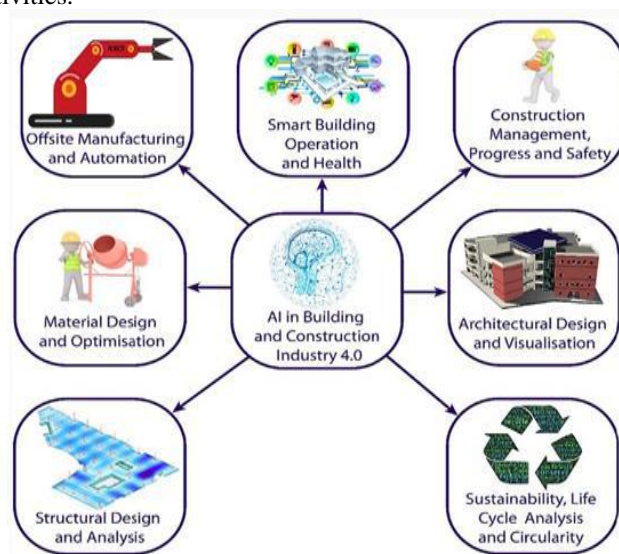

Predictive Maintenance with Machine Learning:

- Machine Learning algorithms can analyse historical data to predict when maintenance is needed for infrastructure. This proactive approach reduces downtime and extends the lifespan of structures, ensuring safety and reducing costs over time.
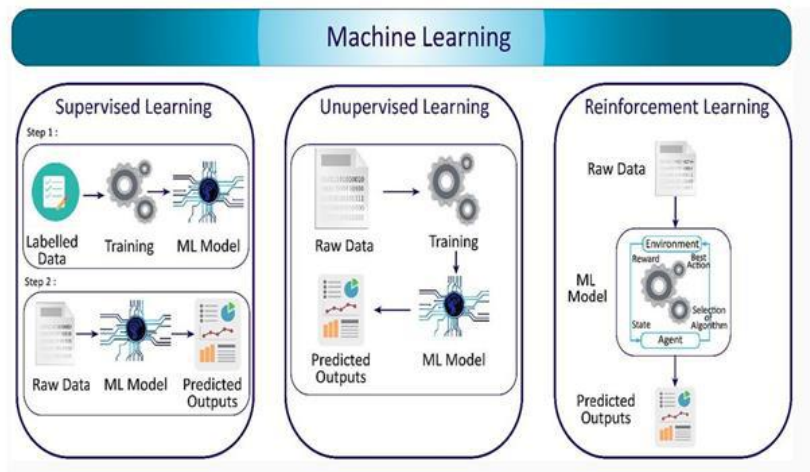
Future trends:

AI-based applications in the building and construction industry are currently underutilized, but they are likely to grow. Current AI use is largely in design and monitoring. However, 3D and 4D printing and robotics are becoming popular.

AI-assisted technologies including smart robotics, Cloud VR/AR, AI, Digital Twins, 4D printing, and blockchain are expected to dominate the construction industry. These technologies are being extensively explored and may be used in building. Automation is common in manufacturing and recycling. However, AI-enabled robotics can flourish in construction applications including module production for prefabricated buildings, additive manufacturing, brick and block laying, welding.
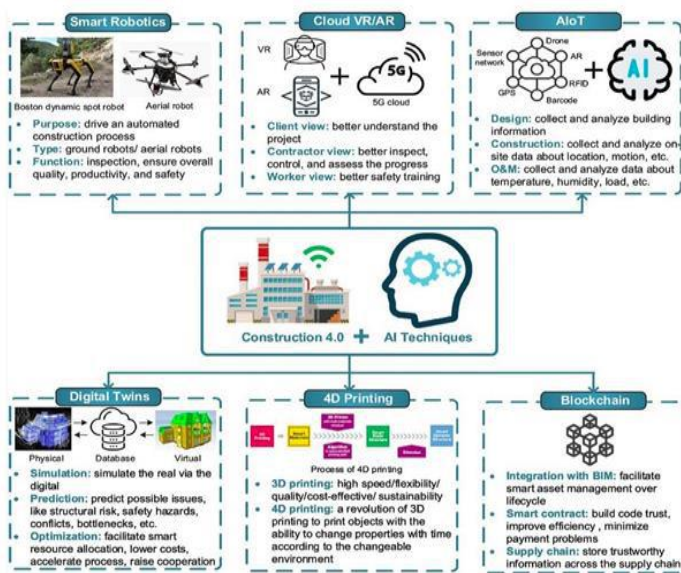
Vote of thanks:
The Seminar formally concluded with a vote of thanks delivered by Mrs. N Geethanjali, Assistant Professor, Department of CSE – AI & ML. She expressed sincere gratitude to resource persons for the time to share his expertise. She extended her thanks to the HOD, Principal, and the Management for their support to conduct the Seminar.

Outcomes:
At the end of Seminar, Students will be able to

1. Understand the Generative AI in Geospatial Mapping.

2. Understand the Smart Traffic Management.

3. Understand the Sustainable Construction.

4. Understand the Structural Health Monitoring.