Centre of Excellence for AgenticTwins: Agentic AI, Digital Twins, and Metaverse

[Technology Enablers and Capabilities]

Agentic AI Platforms

Autonomous, goal-driven AI systems that align with human intent.

- Enable proactive decision-making and context-aware responses across both virtual simulations and real-world applications.
- Ideal for industrial process optimization, intelligent automation, and real-time feedback loops.

Generative AI Toolkits

AI engines that generate simulations, synthetic data, digital twin instances, and narratives.

- Supports rapid ideation, scenario synthesis, and AI-augmented visual storytelling.
- Empowers design teams and engineers to explore limitless “what-if” possibilities.

Large Language Models (LLMs)

LLM-integrated systems powering intuitive natural language interactions

- Use cases include:
  - Code generation for simulations
  - Automated documentation
  - Conversational agents for decision support
- Transform how users engage with digital twin environments and complex data.

Simulation-as-a-Service (SaaS)

Cloud-native platforms for real-time, scalable digital twin simulations

- Delivers predictive analytics, system diagnostics, and performance forecasting.
- Accessible to researchers, students, and industries via web-based dashboards.

Hyper-Realistic Virtual Environments

Immersive 3D spaces modeled after industrial ecosystems.

- Enable VR-based operator training, prototype validation, and system testing.
- Mirror real-world physics and spatial logic to ensure high-fidelity simulations.

Interactive Modelling Studio

A visual sandbox to model, simulate, and test digital twin parameters

- Modify live system variables
- Run edge-case simulations and failure scenario planning

Metaverse Twin Hub

A collaborative metaverse platform for multi-domain digital twin deployment

- Supports cross-border education, design, real-time stakeholder collaboration, and remote system testing
- Designed for scale — from classroom experiments to enterprise operations

[Industry Collaborations and Applied Research]

Deep Tech Meets Real-World Impact

Renault Automotive Manufacturing Plant

- Implementing Robotic Process Automation (RPA) to optimize supply chain workflows and reduce manual tasks.
- Deploying AI-driven predictive maintenance for legacy manufacturing systems to minimize downtime.
- Utilizing AI-powered quality inspection for enhanced defect detection on the production line.
- Leveraging machine learning for demand forecasting and inventory optimization.
- Developing digital twin simulations to analyze and improve manufacturing processes

Renault Nissan Technology Business Centre India

- Designing and deploying advanced Agentic AI-powered workflows for enhanced operational efficiency.
- Co-developed and implemented the AI-powered In-Cabin Gesture Control System.
- Showcased cutting-edge Agentic AI innovations at RNTBCI AI Day, gaining industry recognition.
- Developing computer vision solutions for gesture recognition and driver monitoring.
- Collaborating on AI-driven process automation to optimize manufacturing workflows.
- Integrating Agentic AI for real-time decision support and adaptive system management.

Tata Steel

- Joint definition of requirements for image analysis and AI validation
- NDA and project order signed for advanced industrial image processing
- Access to real industrial datasets facilitated under NDA for AI model training, testing, and benchmarking.
- Custom AI algorithms being developed for defect detection, pattern recognition, and real-time visual inspection.

- Focus on scalability and integration of AI solutions with Tata Steel's existing digital infrastructure and control systems.
- Pathway defined for long-term innovation, expanding into predictive analytics, safety monitoring, and digital twin integration.

Mahindra Research Valley (MRV)

- Research focused work on Agentic AI for NVH (Noise, Vibration, and Harshness) data management to enhance vehicle performance and diagnostics
- Sustainability-driven collaboration on intelligent water management and utilization systems within industrial campuses
- Campus visits and pitch meetings deepen joint research strategies

Chennai Metro Rail Limited (CMRL)

- Co-developing an AI Troubleshooter platform for real-time diagnostics and system alerts
- Focus on predictive and preventive maintenance to reduce downtime and improve asset lifecycle
- PoC initiated for AI-driven monitoring of metro assets and passenger flow analytics
- Partnership model under development to extend Agentic Twins to urban mobility

Sentient Scripts Pvt. Ltd.

- PepHire platform deployed under the Centre of Excellence (CoE) to boost internships, placements, and skill-based learning for students
- Ongoing collaboration on Vision Analytics for healthcare and industrial monitoring applications
- Joint exploration of real-time AI solutions for image-based diagnostics and anomaly detection

Boltzmann Labs

- Collaborating on Agentic AI for biotechnology use cases
- Focused on developing indigenous AI systems tailored to healthcare and life sciences
- Joint efforts to integrate AI with biological data for innovative diagnostics and therapeutics
- Curriculum integration and interdisciplinary research initiatives

Linucare Denmark

- Collaborating on Agentic AI solutions focused on women's safety use cases
- Developing intelligent systems for real-time threat detection and preventive interventions
- Leveraging AI-driven analytics and context-aware responses to enhance personal security
- Exploring scalable deployment models for community and urban safety applications

[Industry supported Programs]

Industry Programs

- Industry-led capstone projects
- Patent co-development
- Joint publications and whitepapers
- Internship-to-employment pipelines
- Onsite industrial immersion programs

Summer & Mobility Schools (15-day intensive programs featuring)

- Industry expert lectures
- Real-time use case solving
- Immersive industrial site visits

[Research and Innovation]

Labs & Facilities

- NVIDIA RTX-powered AI Labs
- Metaverse Experience Zones
- Digital Twin Simulation Suites
- Agentic Intelligence Playground

Ongoing Research

- Autonomous decision-making agents
- Multiscale real-time digital twins
- Human-AI collaboration in the metaverse
- Sustainable AI and green logistics