"A 3 Day workshop on Artificial Intelligence for Energy and Utilities: Applications, Insights, and Future Trends"

Target Audience:

- Energy and utility engineers
- Data scientists and analysts
- Operations managers
- Renewable energy professionals
- Policy and strategy planners

Day 1: AI Foundations and Energy Sector Overview

Morning Session:

- **Introduction to AI and Machine Learning**
  - Types of AI (Supervised, Unsupervised, Reinforcement Learning)
  - Overview of ML algorithms relevant to energy and utilities
- **Energy Sector Challenges and Opportunities for AI**
  - Smart grids and energy management
  - Renewable energy integration
  - Predictive maintenance

Afternoon Session:

- **Data in Energy and Utilities**
  - Sources: IoT sensors, SCADA systems, energy consumption data
  - Data preprocessing, cleaning, and feature engineering
- **Hands-on Exercise:**
  - Analyzing historical energy consumption data using Python
  - Visualizing energy trends

Day 2: AI Applications in Energy and Utilities

Morning Session:

- **Predictive Maintenance**
  - Detecting equipment failures using ML
  - Case study: Transformer and turbine monitoring
- **Energy Forecasting**
  - Load forecasting and renewable energy prediction
  - Time-series modeling: ARIMA, LSTM, Prophet

Afternoon Session:

- **Smart Grid Optimization**
  - Demand-response management
  - Energy storage optimization
- **Hands-on Exercise:**
  - Build a predictive model for energy consumption or solar/wind output
  - Evaluate model accuracy and performance

Day 3: Advanced AI Solutions and Strategic Applications

Morning Session:

- **AI for Energy Efficiency and Sustainability**
  - Reducing wastage and improving energy efficiency
  - Carbon footprint tracking using AI
- **Advanced AI Techniques**
  - Reinforcement learning for energy management
  - AI-driven anomaly detection

Afternoon Session:

- **Case Studies and Industry Applications**
  - AI in smart meters, renewable energy plants, and utilities operations
  - Regulatory and ethical considerations in energy AI
- **Hands-on Exercise / Mini-Project:**
  - Develop an AI solution for a real-world energy problem
  - Group presentations
- **Closing Session:**
  - Key takeaways
  - Future trends in AI for energy and utilities
  - Q&A and certificate distribution

Tools & Technologies Covered:

- Python, Jupyter Notebook
- Scikit-learn, TensorFlow, PyTorch
- Pandas, NumPy, Matplotlib, Seaborn
- Energy-specific datasets (open-source or provided by the organizer)

1. Predictive Maintenance

- **Use:** AI analyzes sensor data from equipment like turbines, transformers, and pipelines.
- **Benefit:** Predicts failures before they happen, reducing downtime and maintenance costs.
- **Techniques:** Machine learning, anomaly detection, computer vision.

2. Demand Forecasting

- **Use:** AI models energy consumption patterns to predict short-term and long-term demand.
- **Benefit:** Optimizes generation schedules, reduces energy wastage, and improves grid stability.
- **Techniques:** Time-series analysis, deep learning, reinforcement learning.

3. Renewable Energy Optimization

- **Use:** AI predicts solar, wind, and hydro power generation based on weather and environmental data.
- **Benefit:** Enhances renewable energy integration, improves efficiency, and balances supply-demand.
- **Techniques:** ML regression models, neural networks, hybrid AI-weather models.

4. Grid Management and Smart Grids

- **Use:** AI manages load balancing, voltage regulation, and fault detection in real-time.
- **Benefit:** Reduces outages, improves reliability, and enables dynamic pricing.
- **Techniques:** AI-driven optimization algorithms, real-time analytics, IoT integration.

5. Energy Trading & Market Optimization

- **Use:** AI predicts energy prices and optimizes trading strategies.
- **Benefit:** Maximizes profit, minimizes risk, and enables automated bidding.
- **Techniques:** Reinforcement learning, predictive analytics, algorithmic trading.

6. Customer Engagement and Energy Efficiency

- **Use:** AI-driven apps provide insights for energy consumption and personalized recommendations.
- **Benefit:** Reduces energy bills, promotes sustainable behavior, and enhances customer satisfaction.
- **Techniques:** Recommendation systems, AI chatbots, behavior analytics.

7. Asset Management and Planning

- **Use:** AI evaluates asset health, optimizes lifecycle, and plans upgrades or replacements.
- **Benefit:** Extends asset life, reduces capital expenditure, and improves operational efficiency.
- **Techniques:** Digital twins, predictive analytics, optimization algorithms.

8. Safety and Environmental Monitoring

- **Use:** AI monitors emissions, leakage, or hazardous conditions in real-time.
- **Benefit:** Improves compliance, reduces accidents, and minimizes environmental impact.
- **Techniques:** Computer vision, sensor fusion, anomaly detection.

Overall Impact:
AI in energy and utilities drives **efficiency, reliability, sustainability, and cost savings**, while enabling a **transition toward smarter, greener energy systems**.

Instructor: Mr Suresh Tripathi is a founder of Geosun Pty Ltd an Australian company registered in year 2000 to provide AI corporate training, data center solutions and data pipeline end-to-end cloud platform. He has nearly 25+ years of work experience in digital data analytics integrated with AI and tech platforms. His education qualifications include master degree in Statistics from India, master degree in Geostatistics from Australia and master degree in Geoscience from Australia. He completed his AI certificate courses from Stanford Business School from California and High Impact Leadership from Cambridge University, UK. He has worked in Australia and US focusing his career on data strategy, tech platforms, and developing in-house training. He has worked with range of industries in Australia and US that include Deloitte, Flybuys, Ambulance Victoria, CFA (Emergencies Services), Avexa, Covance, Avance Clinical (Pharmaceuticals), Intelligen, Commonwealth Bank, Hackett Group (US), Health and Safety Sphera Solutions(US), Vic Government (Environment, water and energy), Waste Management (US), Outfront Media (US), Adani Mining (Australia) and Fura Gems Industries (Dubai).

Fee: Rs 25,000 per participant plus GST payable to GeosunAI Tech Cloud Pvt Ltd. RTGS/Cheque/ PhonePe via below link form.

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