Arabian Institute For Training

# Digital Energy and Optimization

## INTRODUCTION

- This Digital Energy and Optimization training course is designed for professionals and companies that want to utilize predictive and prescriptive analytics and software for energy production, storage, distribution and overall optimization of the energy system as a whole. By 2050 the world will need to provide 30% more energy than it produces now, and the network level optimization is the key for the saving of energy, which will lead to save money and sustain and upgrade customer and stakeholder satisfaction. Incredible as it may seem but the world could save almost 20% of energy if it would just improve its consumption, by delivering energy only when and where it is required, the prediction of the energy use patterns with the use of Big Data, Data Mining and Artificial Intelligence (AI) should provide the answer to the questions of energy saving and optimization of energy resources use.
- By using AI and digitization methods creating of the virtual twins of the energy and industry systems help the entities and communities achieve high level of energy savings as well as high optimization of industry processes, as they provide the possibilities of experimentation, innovation, simulation and forecasting. The digital energy transformation is expected to generate trillion of dollars for the energy industry, therefore Industry 4.0 and its energy production and consumption requirements are at the doorstep, and this training course is designed to help you not to be late onboard.

### This training course will feature:

- Data Mining techniques and principles
- Artificial Intelligence algorithms and models
- Neural networks
- Simulation and creation of digital twins
- Use of Data Mining and Artificial Intelligence for Energy Preservation and Optimization

## OBJECTIVES

- The objective of this training course is to prepare the delegates for the digital world and the requirements of Industry 4.0 as it is becoming present in all the sectors and shows special opportunities in the area of energy preservation and optimization.

### At the end of this training course, you will learn to:

- Apply the data mining methodology for energy usage patterns
- Effectively utilize Artificial Intelligence algorithms for real-time optimization
- Identify key areas where the Data Mining and Artificial Intelligence can be utilized
- Understand the benefits through the example cases
- Use Data Mining and Artificial Intelligence methods for optimization of spinning reserves

## TRAINING METHODOLOGY

- This training course will utilize a variety of proven adult learning techniques to ensure maximum understanding, comprehension and retention of the information presented. This includes theoretical presentation of the concepts, but the emphasis will be on the exercises performed by the delegates with the guidance of the instructor.
- The delegates will be "learning by doing" as the course is designed around the project of designing a novel product for the digital world. Delivery will be by presentation, group syndicate exercises, training e-manual and interactive seminars, as well as group discussion on the results of the exercises.

## ORGANISATIONAL IMPACT

- The energy consumption has increased multi-fold, and it continues to be one of the most important, if not the most important issue in the modern world. The modern world simply cannot function without energy, and wastes of energy or shortages create enormous damages and great disturbances. Energy saving and optimization art therefore paramount for the success of any industry, organization or enterprise, and as a result of sending their employees on this training course, organizations can expect to benefit from:
- Acquiring the employees that understand the importance of optimization
- The knowledge of how to create digital twins of the unit, company or a system
- Identify the optimization opportunities
- Understand the use of Artificial Intelligence and Simulation in energy and industry
- Learn the data mining techniques

## PERSONAL IMPACT

Delegates will learn how to perform the data mining, identification of algorithms used in Artificial Intelligence which are beneficial for their respective industries, proper use of the technology; specifically, delegates will acquire:

- The structured way of data mining in their respective industries
- Knowledge on how to differentiate good data from the noise and biased data
- The understanding on how to find hidden patterns within the data
- Step-by-step process of digital twins' creation
- How to avoid common pitfalls of Industry 4.0

## WHO SHOULD ATTEND?

This training course is suitable to a wide range of professionals but will greatly benefit:

- Professionals who wants to learn techniques of Data Mining and Artificial Intelligence
- Team Leaders, Supervisors, Section Heads and Managers
- Professionals who have an interest in Data Science
- Technical Professionals including those in Maintenance, Engineering & Production
- Project Managers
- Anyone interested in optimization and energy consumption reduction

## Course Outline

### Data Mining and Pattern Recognition

- Data Mining Process
- Data Preparation
- Association and Pattern Recognition
- Data Mining in Energy Industry
- Data Mining-clusters and Outliers

### Artificial Intelligence Algorithms

- Artificial Intelligence Development
- Linear Regression
- Logistic Regression
- Decision Tree

### Energy Distribution Planning and Optimization

- Energy Storage Planning
- Managing Incidents and Instrument Failures
- Energy Grid Management
- Energy Consumption Forecasting

### Developing Digital Twins

- Digitization of Industry and Energy
- Optimal Power Flow Problem Formulation
- Neural Network Application to Optimal Power Flow
- Particle Swarm Optimization for Optimal Power Flow
- Total Transfer Capability Enhancement by Evolutionary Algorithm

## Simulation, Machine Learning and Smart Contracts

- Dynamic Simulation of Industry Systems
- Simulation of Unit Commitment Problem
- Machine Learning for Renewable Energy
- Forecasting Renewable Energy Generation
- Smart Contracts within the Energy Industry

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