**Title:**

Artificial Intelligence and its Applications in Renewable Integrated Power Systems

**Date:** November 23, 2023

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**Speaker:**

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**Abstract:**

Recently, unprecedented energy demands have soared drastically that the renewable energy sources (RES) have to pave their way to meet the energy demand. The paradigm shifts towards commonly used renewable energy sources like Photovoltaic (PV) and wind is due to high availability, non-hazardous, clean and sustainable energy sources. Besides all the penetration of RES into conventional energy sources have raised stability issues. However, it is indispensable for the overall system to maintain stability for the effective execution of power flow demand. Meanwhile, the variation in load causes deviance between generation and demand that results in frequency and voltage disruption; the restoration of frequency and voltage to its normal operation is executed by load frequency control (LFC) and automatic voltage regulation (AVR) respectively. The combination of both LFC and AVR termed as Automatic Generation Control (AGC). The challenge for AGC is to maintain a balance between generation and demand to restrain the frequency and voltage within standard limits in order to have an economic operation for the overall power system. For the continuity of power to a load, frequency is the core parameter that needed to be maintained. Hence, it is indispensable to design a smart energy supervision system that has the ability to counter the challenge originated by the perturbation in the load or fluctuation in frequency which gets effected during a fault in any of the interconnected areas of the power system. Moreover, the controller should be efficient to maintain zero steady-state error for frequency disruption with fast response time to preserve system stability.

**Short Biography:**

**Dr. Muhammad Majid Gulzar** is currently an assistant professor in the Department of Control & Instrumentation Engineering (CIE), King Fahd University of Petroleum and Minerals (KFUPM), Saudi Arabia. He received his Ph.D. and M.S degrees with specialization in Electrical Engineering (Control Science and Engineering) from the University of Science and Technology of China (USTC) in 2016 and the University of Engineering and Technology (UET), Lahore, Pakistan in 2012 respectively. He is a member of the Interdisciplinary Research Center for Renewable Energy and Power Systems (IRC-REPS), KFUPM, Pakistan Engineering Council (PEC) and IEEEP (P). His areas of interest are Operation and Control of Renewable Energy Systems, Optimization Techniques and Applications, Multi-agent Networks, Analysis and Design of Linear/Nonlinear Systems, Economic Energy Dispatch, etc. He has advised several projects in these areas and has a number of publications in international leading journals and conferences.

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