Series of Stakeholders Gatherings and Research Workshops
"Machine Learning Applications in Power Grids"
organized by
Computer Science and Engineering department, Electrical Engineering department, and KINDI Computing Research center, College of Engineering, Qatar University

Thursday, March 11th, 2021, 8:00am – 2:00pm,
Qatar University: Building B09, Room F106 (while social distancing)
Online: WebEx Link (password: CENG)

You are cordially invited to attend a stakeholders' gathering and research workshop on the applications of machine learning in the electrical power grids. This event aims to increase networking and bridge gaps between Qatar University, College of Engineering, external collaborators, and stakeholders in artificial intelligence, power transmission, distribution, assets and renewable resources. The workshop will address recent development and applications of un/supervised, reinforcement, and deep learning to improve planning and operation processes of power grids. This special gathering of academics, practitioners and interested parties will create a solid forum for knowledge sharing and potential collaborations.

The main objectives of the event are:
- Discussing opportunities and challenges in theory and practice of applying machine learning in the power grid of Qatar and beyond.
- Networking and knowledge sharing between academics, practitioners, and interested parties of machine learning in power grids.
- Strengthening connections between researchers and key power industrial players.
- Identifying areas of collaboration in future research and education.

Technical topics to be discussed include machine learning in:
- Power Distribution Systems
- Smart meters
- Power Asset Assessment
- PV Energy Forecast
- Dynamic Security Assessment
- Security and Communications of Power Grids

Potential stakeholders are:
- College of Engineering, Qatar University
- College of Science and Engineering, Hamad Bin Khalifa University
- Engineering Consultants Group (ECG), Qatar
- GE Advanced Technology and Research Center (ATRC)
- Iberdrola Innovation Middle East, Qatar
- IEEE Qatar Section
- KINDI Research Center
- Ministry of Energy Affairs
- Ministry of Transport and Communication
- Qatar Computing Research Institute (QCRI)
- Qatar General Electricity & Water Corporation (Kahramaa)
- Qatar Energy & Environment Research Institute (QEERI)
- Qatar National Research Found (QNRF)
- Qatar Mobility & Innovation Center (QMIC)
- Qatar Society of Engineers
- Siemens-Qatar
- Taxes A&M University at Qatar

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Agenda	
8:00	Registration
Opening	
8:25	Dr. Khalid Naji, Dean, College of Engineering, Qatar University
8:30	Dr. Abdulla Al-Ali, Head of Computer Science and Engineering Department, College of Engineering, Qatar University.
8:35	Dr. Mohammed Al-Hitmi, Head of Electrical Engineering Department, College of Engineering, Qatar University
Presentations	
8:40	"Conservation & Energy Efficiency in Qatar (TARSHEED)" Eng. Mohammed Al Sharshani, Head of Conservation & Technology Section TARSHEED, Kahramaa.
	Engineer Mohammed Khalid Al-Sharshani, Head of Conservation & Technology started his career as a Project Engineer of Renewable Energy. He is holding a first class bachelor's degree in Electrical & Electronic Engineering (UK-2014). He is strongly interested in studying and developing energy diversification strategies through impactful awareness, conservation laws and regulations in Qatar. He is an Academic Native lecturer, influencer and active official representative on social media. He is leading technical teams including a Demand Side Management team in Kahramaa. He is a member and a speaker at GORD - GSAS (2017), QGBC (2018), EU-GCC Clean Energy Tech Network, and World Green Energy Forum 2018 as well as an MC in Kahramaa's events. Eng. Mohamed's presentation will cover the conservation & energy efficiency aspects in terms of projects , achievements , and future plans
9:00	"Overview of Machine Learning and its Applications in Smart Grids" Dr. Hazem Hajj, Associate Professor, American University of Beirut (AUB), Lebanon.
	Dr. Hazem Hajj joined AUB in 2008 and was a visiting Associate Professor at the University of Texas-Austin. Before joining AUB, Hazem was a principal engineer at Intel Corporation. He received his PhD from the University of Wisconsin-Madison in 1996, and his Bachelor from AUB with distinction. Hazem's research interests include Machine Learning and Energy-Aware Computing, with special interests in Time Series Prediction and Natural Language Processing. He has over 100 research publications in peer-reviewed reputable journals and international conferences. Dr. Hazem presentation will overview rising opportunities emerging from applying machine learning for ensuring scalable, reliable, and sustainable power grids. As an example, the residential sector, that accounts for 40% of power consumption, can leverage advanced metering infrastructure with reliable short term load forecasting to improve demand response and demand side management. Moreover, scheduling various load types of household appliances can be optimized by advanced machine learning algorithms.
9:20	"The Role of Machine Learning in Creating the Next Power Electronics Dominated Grid Paradigm" Prof. Haitham Abu-Rub, Professor, Managing Director of Smart Grid Center – Extension in Qatar, TA&M Qatar.
	Professor Haitham Abu-Rub is a full professor at Texas A&M University at Qatar and holds two PhDs. Abu-Rub has been serving since 2014 as the managing director of the Smart Grid Center at TAMUQ. His main research interests include power electronic converters, renewable energy systems, and smart grid. Abu-Rub is the recipient of many national and international awards and recognitions. He has published more than 450 journal and conference papers, six books, and six book chapters. Dr. Abu-Rub is a Fellow of the IEEE and Co-Editor in Chief of the IEEE Transactions on Industrial Electronics.

Smart grid brings a lot of advantages and opportunities such as possible integration of massive renewable energy resources and energy storage into the grid while ensuring better efficiency and reliability with lower cost. *This opportunity is associated with significant challenges in term of dominating power electronics in such grid which is associated with major stability challenges.*

The talk will focus on the role of machine learning in creating a new energy paradigm that is power electronics dominated but smart, stable, and predictable. Enabling technologies, challenges, current status, and the future perspectives will be highlighted.

9:40	**"Using Smartmetering Infrastructure and Data in Managing Outages, Losses Detection, Demand Response and Load Flow Analysis"** Eng. Tewfik Timeridjine, Digital Grid BU Head – Smart Infrastructure, Siemens W.L.L, Qatar.

Engineer Tewfik Timeridjine is the head of Digital Grid business unit at SIEMENS Qatar. He has over 18 years experience in designing, delivering, promoting and selling energy automation and Smartgrid systems in the Middle East and African countries, He was active in many international smart grid conferences bringing the vendors view of the digital transformation in the energy sector, and acquired extensive understanding of the utilities challenges in the region. The speech will be around how to make the most of the Smartmetering investment, leveraging data and the infrastructure in driving reliability, efficiency, profitability and sustainability.

10:00	*Break*

10:20	**"Machine Learning & AI in Smart Cities"** Eng. Abdelhameed Gamal, Senior ELV/ICT Engineer, Engineering Consultants Group (ECG), Qatar

Engineer Abdelhameed Gamal is a senior ELV/ICT Engineer, RCDD & DCDC certified. His experience is gained from working in both "design" and "O&M" fields. As for the design field, he has been working with ECG since August 2013 till present. He participated through his work with ECG in designing the ELV/ICT systems of mega projects in Qatar. As for the "O&M" field, he worked in the O&M of Mecca Holy Mosque sound & CCTV systems from March 2009 till May 2013. Abdelhameed was graduated from MSA University - Egypt and also has a Bachelor of Science from Greenwich University – UK. Recently, he has been chosen as a member in the committee responsible for providing the new version of the International BICSI standard. Eng. Abdelhameed's presentation will go through the importance and applications of machine learning and artificial intelligence in smart cities. Technology is a tool that solves a problem, therefore the problem has to be defined well to clarify the importance of the technology solution.

10:40	**"Machine Learning Applications in Renewable Energy Integration, Network Management and Customer Engagement"** Eng. Santiago Lopez, Managing Director, Iberdrola Innovation Middle East, Qatar.

Engineer Santiago Bañales is Managing Director of Iberdrola Innovaton Middle East since 2016. Santiago has 25 years of global energy industry experience fulfilling executive roles in R&D, Engineering, Product Development, Management Consulting, M&A and General Management (CTO and CEO). Additionally, he has held executive and non-executive Board Directorships assignments in several energy industry associations and institutions and has been involved in graduate and executive education for more than 10 years. He holds a Master of Science from MIT (Fulbright Fellow) and a Dual Engineering Degree from Ecole Centrale Paris and Universidad Politecnica de Madrid. His presentation will provide the point of view of the global integrated power utility regarding the challenge of managing big data and of delivering

	value using machine learning in three key application areas: smart networks, renewable integration and engaging with "prosumers".
11:00	**"AI-inspired Energy Management Programs"** Dr. Antonio Sanfilippo, Chief Scientist, Energy Management Program Director, Qatar Environment & Energy Research Institute – QEERI, Qatar. Dr. Antonio Sanfilippo is Chief Scientist at QEERI, where he leads the Energy Management Program. His current research focus is on solar resource assessment, smart grid technologies, and renewable energy policy and economics with specific reference to AI. He has a PhD from the School of Informatics at the University of Edinburgh, and 30 years of experience in performing and managing research in academia, government, and the public sector, in the US, the UK, Luxembourg, and from 2014 in Qatar. His talk will provide an overview of AI methods used in the Energy Management Program at QEERI for the development of energy applications such as solar forecasting, real-time PMU data analytics, electric vehicle integration, and energy blockchain. The talk will focus on both data collection through sensor deployment, data generation though digital-twin and simulation development, and the use of machine learning for data analysis and optimization.
11:20	**"Applying Machine Learning to Assess Conditions of Outdoor Insulators"** Dr. Ayman El-Hag, Lecturer, University of Waterloo, Canada. Dr. Ayman El-Hag received his B.S. and M.S. degree from King Fahd University of Petroleum and Minerals and his PhD from the University of Waterloo in 1993, 1998 and 2003 respectively. Currently, Dr. El-Hag is a lecturer and adjunct professor at the Electrical and Computer Engineering department at the University of Waterloo. Dr. El-Hag main areas of interest are condition monitoring and diagnostics of electrical insulation. In this presentation, an introduction on the role of outdoor insulators in power system will be given. Then the process of applying of machine learning from choosing the proper sensors to the classification of insulators's status will be introduced. Two examples from both outdoor ceramic and non-ceramic insulators will be used to demonstrate the use of machine learning based techniques for the purpose of condition monitoring of outdoor insulators.
11:40	*Break*
12:15	**Round table discussion**
13:15	**Closing remarks**
13:30	*Lunch*