



Engineering Brown Bag Lunch Webinar, ComEd, 14 September 2020

The Evolving Landscape of Electric Power Engineering: the Role of IEEE PES

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Electric Power Engineering was the major focus when the American Institute of Electrical Engineering was formed in 1884

Purpose of AIEE:

To promote the Arts and Sciences connected with the <u>production and utilization of electricity</u> and the welfare of those employed in these Industries.

AIEE and IRE merged in 1963 to form IEEE







# Progression of Electrical Engineering

**Electric Power Engineering** was one of two branches of the then new field of electrical engineering back in 1884.

The other one was Wired Communication.

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# Traditional Electric Power Engineering

For the 19<sup>th</sup> and the 20<sup>th</sup> centuries electric power engineering has meant power stations, transmission and distribution networks, high voltage engineering, electric machines, switchgear, transformers and automatic generation control on the hardware side and stability, transient, load flow and production costing studies on the software side.



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- Electric Vehicles
- Renewable Energy
- Storage Applications
- Smart Grids
- Smart Cities

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- Demand Response
- Renewables Integration

## Heavy usage of communication technologies



# Electrification was The Most Important Innovation of The 20<sup>th</sup> Century





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# Birth Of A New Industry



Thomas Alva Edison at Menlo Park, New Jersey [1876]

This laboratory set-up laid the foundation for several inventions to come, including phonograph and the electric bulb.

Source: RUTGERS School of Arts and Sciences, http://edison.rutgers.edu/inventionfactory.htm, April 2017.

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Invention of the electric bulb [1879]

First step in the journey of electrification.

Source: Edison Tech Center, http://www.edisontechcenter.org/, April, 2017.

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# Electric Street Lights



#### Street Lights: First electric lighting, New York, USA [1882]

First demonstration of DC street lighting system

Source: Edison Tech Center, http://www.edisontechcenter.org/, April, 2017.







First central power plant in the US, fired by coal. 4th Sept. [1882]

Source: The New York Times, 14<sup>th</sup> November, 2007, https://cityroom.blogs.nytimes.com/2007/11/14/off-goes-the-power-current-started-by-thomas-edison/comment-page-3/?\_r=0, April, 2017.



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Edward Weston, President of AIEE [1888-89]

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#### Illumination of Brooklyn Bridge [1899]

Source: Wikipedia, Brooklyn Bridge Gallery, https://www.123rf.com/stock-photo/brooklyn\_bridge.html, April, 2017.







Elihu Thomson, President of AIEE [1889-90], held over 700 patents



Edwin James Houston, President of AIEE [1893-95]

#### Formed Thomson-Houston Electric Company in 1883

Source: Wikipedia, April, 2017.







Nikola Tesla – pioneered AC supply system



George Westinghouse

Source: PA History, http://study.com/academy/lesson/nikola-tesla-georgewestinghouse.html/, http://explorepahistory.com/hmarker.php?markerld=1-A-3A0, April, 2017.







Workers at a Power plant, Illinois in 1920

Source: Marion Illinois History Preservation, http://www.mihp.org/tag/lights/#/, April, 2017.







# With a press of a button 1000 lights lit up ! [1893] Witnessing over 90,000 lights for the first time...

Source: The White City, http://paleofuture.gizmodo.com/where-the-future-came-from-a-trip-through-the-1893-chi-743942247, April, 2017.







#### General Electric vs Westinghouse Electric [1893]

Source: Pinterest, https://s-media-cache-

ak0.pinimg.com/originals/a9/ce/90/a9ce909c6818ebdcf0a9aec3347e1dc0.jpg, April, 2017.







# Streetcars traveling on Broadway at Union Square in 1904 were propelled by electricity from the slot in the road.

Source: "The slot in the road: Manhattan's forgotten underground electric trolley system – Gilmore C. Cooke"; Courtesy of A. Lonto.







Alexander Graham Bell was AIEE President In 1891-1892

### Made on 10th March, 1876– Alexander Graham Bell in his Boston Laboratory calling Watson

Source: America's Library, http://www.americaslibrary.gov/jb/recon/jb\_recon\_telephone\_1.html, April, 2017.



# Wireless Telegraphy



#### Guglielmo Marconi, inventor of wireless telegraphy in 1896

Source: Wireless Telegraphy, Wikipedia, April, 2017.









### **Normal Phone**

### **Smart Phone**



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Source: Mangalam Internet Services, StockClip, http://www.mangalaminternet.com/, April, 2017.







Source: http://www.jlsteelstructure.com



Source: www.sxc.hu







#### SCADA system for monitoring

Source: All about circuits, https://www.allaboutcircuits.com/uploads/thumbnails/scada.jpg, April, 2017.







#### **Energy Management Systems (EMS)**

Source: Clariant Power System Ltd., http://www.clariantpower.com/complete-energy-management-system.html, April, 2017.





- Electric power is the foundation of electrical engineering
- Electric power industry has encompassed other areas of electrical engineering to provide a robust power supply network
- Renewable energy, smart grid, smart cities, new applications of electrification, etc. will define the future of this industry









# **PES Executive Office Staff**







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Session 1: Transient Recovery Voltage Basics Session 2: Fault Case Transient Recovery Voltages Session 3: Load Current Switching Transient Recovery Voltages Session 4: TRV Measurement in Substations

Session 4: TRV Measurement in Substations

Presented by: Dr. David Peelo – DF Peelo & Associates Ltd Dr. Farnoosh Rahmatian – NuGrid Power Corp

# IEEE PES Corporate Engagement Program





## Candidate for IEEE President-Elect 2021 Vote at: www.ieee.org/elections www.srahman.org



Balloting ends at 12:00 noon, EDT on 01 Oct 2020



# My Core Competency for IEEE President-elect

- My volunteer service to IEEE began in 1985 when I was elected the IEEE Virginia Mountain section chair
- Chair of the IEEE Products & Services Committee which looks after all IEEE electronic products
- Chair of IEEE Technical Activities Board Periodicals Committee
- VP IEEE Publication Services and Products Board
- Member of the IEEE Board of Directors
- President of the IEEE Power & Energy Society for 2018 and 2019



# My Contributions as the President of PES

## PES University

PES Corporate Engagement Program PES Chapters' Councils in China, India, Africa and Latin America



# My Focus as IEEE President

- Demonstration of relevance
- Deeper engagement with technologists at the grassroots level
- Enhanced lifelong learning opportunities
- Advancing Technology for Humanity





## Thank You!



Professor Saifur Rahman Vote at www.ieee.org/elections Director, Advanced Research Institute www.srahman.org

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