EE431 Final Project

Fall 2018

Final project is an important part of the course work, intended to expand our understanding beyond the materials covered in this course.

Up to three students can form a team for the final project. Each team is required to choose one topic listed below (some topics allow multiple teams to study independently, first come first reserve), which should be approved by the instructor.

A LIST OF TENTATIVE TOPICS:

- **Power Transmission, Distribution, and Microgrid**
  
  (1) *Business models for energy storage of various technologies*
  
  [Ref Example] Business Models for Deploying and Operating Energy Storage and Risk Mitigation Aspects

  (2) *Offshore wind – the relatively high cost of energy, the mitigation of environmental impacts, the technical challenges of project installation, and grid interconnection.*
  

  (3) *Advanced Metering System Review*
  
  [Ref Example] State of the Art and Trends Review of Smart Metering in Electricity Grids
  http://www.mdpi.com/2076-3417/6/3/68

  (4) *Microgrid energy management systems – what’s new beyond existing transmission and distribution management systems.*
  
  [Ref Example] Microgrids energy management systems: A critical review on methods, solutions, and prospects

  (5) *AC-DC hybrid systems at transmission and/or distribution level*
  
  [Ref Example] A Hybrid AC/DC Microgrid and Its Coordination Control
https://ieeexplore.ieee.org/document/5733387/

(6) **Utility practice in response to future distributed resources (multiple teams are allowed)**

[Ref Example] State of New York, Reforming the Energy Vision (REV)
https://rev.ny.gov/
[Ref Example] Central Hudson Distributed System Implementation Plan 2018

(7) **Intendent System Operator/ Regional Transmission Operators practice in response to future distributed resources (multiple teams are allowed)**

[Ref Example] How California plans to integrate distributed resources into its ISO market

(8) **Coordination between transmission and distribution system operations.**

[Ref Example] Coordination between transmission and distribution system operators in the electricity sector: A conceptual framework

(9) **Modeling the dynamic process of cascading failure in power systems**

[Ref Example] Modeling cascading failure propagation in power systems

(10) **Prediction of Distribution System Outages**

[Ref Example] Modeling cascading failure propagation in power systems
[Ref Example] Real-Time Prediction of the Duration of Distribution System Outages
https://arxiv.org/abs/1804.01189

(11) **Transmission and/or distribution hardening against natural disasters**

[Ref Example] Distribution Systems Hardening against Natural Disasters,
• **Interdependency of Power Systems and Others**

(12) *Transportation electrification.*

[Ref Example] Electric Vehicles in Logistics and Transportation: A Survey on Emerging Environmental, Strategic, and Operational Challenges

(13) *Increased electricity usage of new information technology and its impacts to power systems*

[Ref Example] Digitalisation, energy and data demand: The impact of Internet traffic on overall and peak electricity consumption

(14) *Water-food-energy nexus.*

[Ref Example] Optimization of water-energy nexus: A network representation-based graphical approach

(15) *Co-simulation of power systems and information and communication technology (ICT)*

[Ref Example] Interfacing power system and ICT simulators challenges state-of-the-art and case studies

(16) *Combined cooling, heating, and power system*

[Ref Example] Combined cooling, heating and power systems: A survey

(17) *Smart City and smart community – smart energy, smart transportation, smart socio-ecological system, etc (multiple teams are allowed)*

[Ref Example] Sustainable smart city IoT applications: Heat and electricity management & Eco-conscious cruise control for public transportation
DEVELOPABLE AND DEADLINE

- Deliverable I
  - Each team should send the following information by October 5th 2018 to the instructor for approval.
    - The topic choice
    - A list of team members
    - A tentative title together with a ~200 words abstract to describe your project

- Deliverable II
  - Each team should write a final project report and prepare an in-class presentation.
    - The final project report should be no less than eight pages following the format of IEEE TRANSACTIONS and JOURNALS. The final project report should be self-contained and complete. The student is also required to submit codes that are used for case studies as attachment, if there are any. The final project report is due on December 10th 2018.
    - Each team will also give a 20-minute oral presentation followed by a 5-minute question section in class. Presentations will be scheduled at the end of the semester. The slides/handouts for the presentation must be emailed to the instructor by the scheduled presentation.

OTHER REQUIREMENTS

- The project should be self-contained and complete, which includes, but is not limited to:
  - Background introduction.
  - The issue(s) that you want to address in this project and why it is important, also includes a literature review on what have been done on this issue.
  - What are optional solutions
  - What would be potential benefits if the issue(s) has been properly solved, including economic benefits, energy benefits, environmental benefits, and other benefits.
  - Critique the disadvantages of the solutions, and suggest how to improve it.

CROSS EVALUATION OF PRESENTATION

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