



Research Plan of Electrical Engineering Department (2017-2022) - 2020 update

Research

The goal of the department is to provide students with a solid theoretical foundation combined with a good engineering ability. This is reflected in the research program which covers both theory and applications. The major research areas for the department branches are:

(A) Electrical Power and Machines Engineering

The research areas of power systems and electrical machines branch are:

New and Renewable Energy:

- New and Renewable Energy Systems.
- Green Buildings.
- Energy Storage.
- Integration of New and Renewable Energy Resources in Power System.

Smart Grid:

- Smart Power Grid.
- Smart Home Based on IoT Technology.
- Multi-objective Optimization and Control of Smart Grid.
- Intelligent Control Application in Smart Grid.
- Distributed Generation and Microgrid in the Environment of Smart Grid.
- Wide Area Monitoring using Phasor Measurement Units (PMUs), Dynamic State Estimation, and Distributed Control of Power System.
- Internet of things (IoT) applications in Smart Power Grid.
- Applying Blockchain Technology to Power Systems.
- Application of Big Data in Electric Power Systems.

Electrical Machines:

- Optimal Operation and Performance of Electrical Machines.
- Optimal Design of Electrical Machines Using New Technique.
- Maximum Power Tracking of Renewable Energy.
- Control of Electrical Machine Using DSP and Microcontrollers.
- Modern drive system application.

Power Electronics:

- Power Electronics Applications in Electrical Machines.



- Power Electronics Applications in power systems.
- Power Electronics Applications in the New and Renewable Energy Systems.
- FACTS and HVDC Transmission Systems.
- Plug-in Electric Vehicles (PEVs).

High Voltage Engineering:

- Enhancement of Insulation Properties.

Power System Protection:

- New Fault Current Limiting Technologies.
- Protection of Power System with Distributed Generation

Power System Planning and Operation

Energy Pricing and Power Market Deregulation

Power Quality Study with Existing of Renewable Energy Resources and Nonlinear Loads

Power System Optimization

Artificial Intelligence Applications in Power Systems

(B) Electronics and Electrical Communications

The research areas of Electronics and Communications are:

Optoelectronics:

- Nano optics and Nano electronics.
- Optical amplifiers.
- LASER applications in industry and medicine.
- Light sources and detectors

Photonics and Nanotechnology:

- Nanotechnology applications.
- Quantum dots: fabrications, characteristics and applications.
- Optical Nano antennas.
- Integrated Optics and optical fibers.

Optical communications:

- Optical communications networks.
- Optical computers and Optical measurements.

Antennas and microwaves:

- Computational Electromagnetic and microwaves.
- Plasma antennas.



- Radio frequency identification.
- Reflect arrays and transmitter array.

Digital communications:

- Digital communications networks.
- Mobile communication network.
- Cognitive radio network.
- WIMAX and WIFI network.

Security:

- Secure communication channels.
- Cryptography and cryptoanalysis.
- Secure electronic fund transfer.
- Security in mobile communication.

(C) Computer Engineering & Systems

The research areas of Computer Engineering & Systems branch are:

Intelligent control systems using soft computing methodologies:

- Neuro-Fuzzy modeling and control.
- Genetic algorithm for optimizing Neuro-Fuzzy systems.
- Applications of neural networks (NN) in science and engineering. The areas of the NN applications include medicine and biology, signal processing, computer networking, chemical process and oil refinery.
- Applications of fuzzy logic control including navigation of autonomous planetary rover, autonomous underwater vehicle, heating and cooling systems, robot manipulators, desalination and object recognition.
- Evolutionary computations and their applications to several engineering problems.
- Artificial intelligence for Robotics.
- Modern control strategy for power systems.
- Soft computing in Astronomy.
- power systems optimization.
- Intelligent techniques for renewable energy.
- Modern optimization algorithms.

Security:

- Encryption techniques development.
- Security and its applications:
(a) Web security, (b) Files security, and (c) Network security.
- Converge Security.



Image Processing:

- Image encryption.
- Image processing advancing methods.
- Develop methods of image compression.

Cloud Computing:

- Cloud computing and its applications.
- Data security during cloud computing.

Pattern Recognition:

- Pattern Recognition discovery.
- Pattern recognition advanced methods.
- Security of pattern recognition.

Virtual Reality:

- Virtual reality developed techniques.
- Augmented reality advanced applications.

Information Systems:

- Information retrieval systems.
- Evaluate solar potential over Egypt.
- Storage of power systems.
- Search engine.
- E-learning courses design.
- Machine learning.
- Granular computing

الخطه التنفيذيه للخطه البحثيه لقسم الهندسه الكهربيه

النسبه	مؤشرات النجاح (المخرجات)			فتره التنفيذ	المسئول عن التنفيذ	الخطه التنفيذيه للخطه البحثيه بالقسم	المجالات البحثيه في الخطه الاستراتيجيه بالجامعه
	المراجع	رسائل ماجستير و دكتوراه	ابحاث في مؤتمرات ودوريات عالميه ذات معامل تاثير				
100%	[26,27]	1	1	2017	د/محمد نبيل فتحي ابراهيم	1. New and Renewable Energy 2. Electrical Machines	-1 استخدامات الطاقه الشمسيه
100%	[1-4]	-	4	2017	د/عبدالفتاح عطيه هليل د/رجب السحيبي د/تامر مدحت د/وسام فكري د/علي صقر د/غاده هميسه د/حمدي المنير م / ندي محمد معوض	3. Intelligent control systems using soft computing methodologies 4. Information Systems 5. Security 6. Image Processing 7. Cloud Computing 8. Pattern Recognition 9. Virtual Reality 10. Information Systems	-2 هندسه البرمجيات
100%	[37-39] [41,44]	-	5	2018			
100%	[92-98] [103]	-	8	2019			
100%	[5-32]	-	28	2017	د/ رجب عبدالعزيز السحيبي د/ هاني احمد عبد السلام د/ايمان سعد عبدالنبي د/ساميه غريب على د/محمد ابراهيم عبد الونيس د/فتح الله فريخ سليم د/املاك اباظة قطب الحريري د / شريف محمود امام د/محمد نبيل فتحي ابراهيم م/ محمد بديع شفيق	11. Smart Grid 12. Electrical Machines 13. Power Electronics 14. High Voltage Engineering 15. Power System Protection 16. Power System Planning and Operation 17. Energy Pricing and Power Market Deregulation 18. Power Quality 19. Artificial Intelligence Applications in Power Systems	-3 هندسه القوي و الالات الكهربيه (يقترح اضافتها في الخطه الاستراتيجيه بالجامعه)
100%	[40-68]	-	29	2018			
100%	[71-92] [99] [104-108]	-	27	2019			
100%	[30] [33-36]	-	5	2017	د/نهي عبد السلام شلبي د/ بدير يوسف بدير د/شاميه عمري السيد د/ابراهيم فتحي العشري د / رنا عدلي غلاب	20. Optoelectronics and Nanotechnology 21. Photonics and Nanotechnology 22. Optical communications and microwaves 23. Antennas and microwaves 24. Digital communications 25. Security	-4 هندسه الالكترونييات و الاتصالات الكهربيه (يقترح اضافتها في الخطه الاستراتيجيه بالجامعه)
100%	[69,70]	-	2	2018			
100%	[94-96] [100-102]	1	6	2019			



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- 14) AM Shaheen, RAE Sehiemy, "Optimal allocation of capacitor devices on MV distribution Networks using crow search algorithm", 24 th international conference on electricity distribution, CIRED 2017 2017
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