

## Wafaa Saber Sayed

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Assistant Professor, Engineering Mathematics and Physics Department,  
Faculty of Engineering, Cairo University, Egypt  
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### Education

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- 2015 - 2020    **PhD: Cairo University, Giza, Egypt**  
Engineering Mathematics, GPA: **4/4** (A<sup>+</sup>)  
**Thesis:** *Generalization and Control of Chaotic Systems Using Extra Parameters and Affine Transformations*, **Advisors:** Prof. Abdel-Latif El-Sedeek, Prof. Ahmed G. Radwan and Prof. Hossam A. H. Fahmy  
**Courses:** Information Theory and Coding, Chaos Theory and Fractals, Numerical Linear Algebra, Theory of Language Translation, Integral Equations and Engineering Applications on Fractional Differential Equations.
- 2013 - 2015    **MSc: Cairo University, Giza, Egypt**  
Engineering Mathematics, GPA: **3.8/4** (A<sup>-</sup>)  
**Thesis:** *Generalized Chaotic Maps and Elementary Functions between Analysis and Implementation*, **Advisors:** Prof. Abdel-Latif El-Sedeek, Prof. Ahmed G. Radwan and Prof. Hossam A. H. Fahmy  
**Courses:** Advanced Computer Arithmetic Circuits, Design and Analysis of Algorithms, Advanced Numerical Analysis, Advanced Linear Algebra, Linear and Integer Programming, Nonlinear and Dynamic Programming and Technical Writing.
- 2012 - 2013    **Diploma: Cairo University, Giza, Egypt**  
Engineering Mathematics, **Courses:** Linear Algebra, Abstract Algebra, Real Analysis, Functional Analysis, Numerical Analysis, Introduction to Operations Research and Optimization, and Probability and Statistics.
- 2007 - 2012    **BSc: Cairo University, Giza, Egypt**  
Electronics and Communications Engineering, **Distinction with honors (87.24 %)**, Rank: 15<sup>th</sup>/310

### Teaching Experience

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Job duties included assistance in teaching the following undergraduate courses, assignments and quizzes development and grading, exams proctoring, online teaching and projects supervision.

Introduction to problem solving & C++ programming	Spring 2015-2020 Fall 2015-2017,2019,2020
Octave and Engineering Applications	Fall 2018 Spring 2019
Algebra and Differential Calculus	Fall 2013, 2014, 2015
Analytic Geometry and Integral Calculus	Spring 2014, 2015
Linear Algebra	Fall 2012,2016 Spring 2013, 2014, 2015,2017
Ordinary Differential Equations	Fall 2013, 2014, 2015
Numerical Analysis	Spring 2013, 2014, 2015,2017
Multi-Variable Calculus	Fall 2013, 2014 Spring 2013, 2014
Probability and Statistics	Fall 2012, 2013, 2017 Spring 2013, 2014, 2018
Linear Programming	Fall 2013
Complex Analysis	Fall 2012
Special Functions	Fall 2012, 2017, 2020
Partial Differential Equations	Fall 2012,2016, 2020

### Fields of Interest

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Chaos theory, chaos-based communication and cryptography, fractional dynamics, mathematical software and adaptive personalized e-learning.

### Awards and Accomplishments

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- The paper entitled “What are the Correct Results for the Special Values of the Operands of the Power Operation?” was cited in 754-2019 - IEEE Standard for Floating-Point Arithmetic Revision of IEEE Std 754-2008. The paper proposed a formal definition of  $\text{pow}(x,y)$  for special values of the operands, which is used in the revised standard to define missed cases of  $\text{pow}(x,y)$  in the earlier version.
- 2<sup>nd</sup> place prize and silver medal in the category of information technology projects in the 5<sup>th</sup> Cairo International Exhibition of Innovation (2018).
- Nomination for the Best Paper Award on Electronics, Circuits and Systems in the 7<sup>th</sup> International Conference on Modern Circuits and Systems Technologies (MOCASST 2018).
- Poster award in the 13<sup>th</sup> International Conference on Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology (ECTI-CON 2016).
- 1<sup>st</sup> place prize in Masters Forum competition of the 22<sup>nd</sup> International Conference on Electronics, Circuits, and Systems (ICECS 2015).
- Distinguished Assistant Lecturer Award from the Faculty of Engineering Cairo University, 2015.

### Courses and Workshops

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October 2020	Scientific storytelling (DAAD)
July 2020	Designing an interactive blended learning journey
October 2019	Gamification for learning (GamUp)
March 2017	Researcher connect course: communication skills for researchers (British Council)

### Research Projects

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August - October 2019	<b>Lumiere Learning Management System</b> Principal Investigator: Prof. Ashraf Badawi, Funding Agency: Information Technology Academia Collaboration (ITAC) and Smart & Creative Solutions (SMACRS).
May 2018 - June 2020	<b>Innovative Solution for the Egyptian Educational System: An Artificial Intelligence-Based Adaptive Personalized Platform for an Effective and Advanced Learning (APPEAL)</b> Principal Investigator: Dr. Samah El-Tantawy, Funding Agency: Academy of Scientific Research and Technology (ASRT).
March 2017 - Feb 2019	<b>Design and Implementation of Software and Hardware Speech Encryption Techniques</b> Principal Investigator: Prof. Salwa K. Abd-El-Hafiz, Funding Agency: Cairo University, Egypt.

## Publications

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Wafaa S. Sayed has 31 publications, H-index 8, and 151 citations based on Scopus database. Her publications are subdivided into 12 peer reviewed papers published in international journals, 14 in international conferences and 5 book chapters.

- Journal Articles:

- Sayed, W. S., Roshdy, M., Said, L. A. and Radwan, A. G. “Chaotic Dynamics and FPGA Implementation of a Fractional-Order Chaotic System With Time Delay,” *IEEE Open Journal of Circuits and Systems* (Accepted)
- Sayed, W. S., and Radwan, A. G. “Self-reproducing hidden attractors in fractional-order chaotic systems using affine transformations,” *IEEE Open Journal of Circuits and Systems* (Accepted)
- Sayed, W. S., M. F. Tolba, A. G. Radwan, S. K. Abd-El-Hafiz, and A. M. Soliman, “A switched chaotic encryption scheme using multi-mode generalized modified transition map,” *Multimedia Tools and Applications*, 2020.
- Sayed, W. S., Radwan, A. G., Fahmy, H. A., and Elsedeeq, A, “Trajectory control and image encryption using affine transformation of Lorenz system.” *Egyptian Informatics Journal*, 2020.
- Sayed, W. S. and A. G. Radwan, “Generalized Switched Synchronization and Dependent Image Encryption Using Dynamically Rotating Fractional-Order Chaotic Systems,” *AEÜ International Journal of Electronics and Communications*, 2020.
- Sayed, W. S., A. G. Radwan, H. A. H. Fahmy and A. El-Sedeek, “Software and Hardware Implementation Sensitivity of Chaotic Systems and Impact on Encryption Applications,” *Circuits, Systems, and Signal Processing*, 2020.
- Tolba, M. F., W. S. Sayed, M. E. Fouda, H. Saleh, M. Al-Qutayri, B. Mohammad, and A. G. Radwan, “Digital Emulation of a Versatile Memristor With Speech Encryption Application,” *IEEE Access*, vol. 7, pp. 174280-174297, 2019.
- Sayed, W. S., M. F. Tolba, A. G. Radwan, and S. K. Abd-El-Hafiz, “FPGA Realization of a Speech Encryption System Based on a Generalized Modified Chaotic Transition Map and Bit Permutation,” *Multimedia Tools and Applications*, vol. 78, issue 12, pp. 16097-16127, 2019.
- Sayed, W. S., A. G. Radwan, M. Elnawawy, H. Orabi, A. Sagahyroon, F. Aloul, A. S. Elwakil, H. A. H. Fahmy, and A. El-Sedeek, “Two-Dimensional Rotation of Chaotic Attractors: Demonstrative Examples and FPGA Realization,” *Circuits, Systems, and Signal Processing*, pp. 1-14, 2019.
- Sayed, W. S., A. G. Radwan, A. A. Rezk, and H. A. H. Fahmy, “Finite Precision Logistic Map Between Computational Efficiency and Accuracy with Encryption Applications,” *Complexity*, vol. 2017, Article ID, 2017.
- Sayed, W. S., M. M. R. Henein, S. K. Abd-El-Hafiz, and A. G. Radwan, “Generalized Dynamic Switched Synchronization Between Combinations of Fractional-Order Chaotic Systems,” *Complexity*, vol. 2017, Article ID, 2017.
- Sayed, W. S., H. A. H. Fahmy, A. A. Rezk, and A. G. Radwan, “Generalized Smooth Transition Map Between Tent and Logistic Maps,” *International Journal of Bifurcation and Chaos (IJBC)*, vol. 27, issue 1, Article ID 1730004, 2017.
- Sayed, W. S. and H. A. H. Fahmy, “What are the Correct Results for the Special Values of the Operands of the Power Operation?,” *ACM Transactions on Mathematical Software (TOMS)*, vol. 42, issue 2, pp. 14, 2016.

- Sayed, W. S., A. G. Radwan, and H. A. H. Fahmy, “Design of Positive, Negative, and Alternating Sign Generalized Logistic Maps,” *Discrete Dynamics in Nature and Society (DDNS)*, vol. 2015, Article ID 586783, 2015.
- Conference Papers:
  - Sayed, W. S., Gamal, M., Abdelrazek, M., and El-Tantawy, S, “Towards a Learning Style and Knowledge Level-Based Adaptive Personalized Platform for an Effective and Advanced Learning for School Students.” In *Recent Advances in Engineering Mathematics and Physics* (pp. 261-273). Springer, Cham, 2020. Sayed, W. S., A. G. Radwan, H. A. Fahmy, and A. El-Sedeek, “All-Dynamic Synchronization of Rotating Fractional-Order Chaotic Systems,” *Novel Intelligent and Leading Emerging Sciences Conference (NILES)*, pp. 226-229, 2019.
  - Tolba, M. F., W. S. Sayed, A. G. Radwan, S. K. Abd-El-Hafiz, and A. M. Soliman, “Permutation-Only FPGA Realization of Real-Time Speech Encryption,” *IEEE International Conference on Electronics, Circuits and Systems (ICECS)*, pp. 93-96, 2018.
  - Sayed, W. S., M. F. Tolba, A. G. Radwan, S. K. Abd-El-Hafiz, and A. M. Soliman, “Security and Efficiency of Feistel Networks Versus Discrete Chaos for Lightweight Speech Encryption,” *International Conference on Microelectronics (ICM)*, pp. 92-95, 2018.
  - Tolba, M. F., W. S. Sayed, A. G. Radwan, S. K. Abd-El-Hafiz, and A. M. Soliman, “Hardware Speech Encryption Using a Chaotic Generator, Dynamic Shift and Bit Permutation,” *International Conference on Microelectronics (ICM)*, pp. 100-103, 2018.
  - Tolba, M. F., W. S. Sayed, A. G. Radwan, and S. K. Abd-El-Hafiz. “Chaos-based hardware speech encryption scheme using modified tent map and bit permutation.” *International Conference on Modern Circuits and Systems Technologies (MOCASST)*, pp. 1-4, 2018.
  - Sayed, W. S., M. F. Tolba, A. G. Radwan, and S. K. Abd-El-Hafiz. “Speech Encryption Using Generalized Modified Chaotic Logistic and Tent Maps.” *International Conference on Industrial Technology (ICIT 2018)*.
  - Tolba, M. F., W. S. Sayed, A. G. Radwan, and S. K. Abd-El-Hafiz. “FPGA Realization of Speech Encryption Based on Modified Chaotic Logistic Map.” *International Conference on Industrial Technology (ICIT 2018)*.
  - Sayed, W. S., A. G. Radwan, and H. A. H. Fahmy, “Chaotic Systems Based on Jerk Equation and Discrete Maps with Scaling Parameters,” *International Conference on Circuits and Systems Technologies (MOCASST)*, 2017.
  - Sayed, W. S., A. G. Radwan, and H. A. H. Fahmy, “Double-Sided Bifurcations in Tent maps: Analysis and Applications,” *International Conference on Advances in Computational Tools for Engineering Applications (ACTEA)*, pp. 207-210, 2016.
  - Sayed, W. S., A. G. Radwan, and S. K. Abd-El-Hafiz, “Generalized synchronization involving a linear combination of fractional-order chaotic systems.” *International Conference on Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology*, 2016.
  - Henein, M. M. R., W. S. Sayed, A. G. Radwan, and S. K. Abd-El-Hafiz, “Switched active control synchronization of three fractional order chaotic systems.” *International Conference on Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology*, 2016.
  - Sayed, W. S., A. El-Sedeek, H. A. H. Fahmy, and A. G. Radwan, “Generalized Chaotic Maps and Elementary Functions Between Analysis and Implementation,” *IEEE International Conference on Electronics, Circuits, and Systems (ICECS)*, pp. 506-507, 2015.
  - Sayed, W. S., A. G. Radwan, and H. A. H. Fahmy, “Design of a Generalized Bidirectional Tent Map Suitable for Encryption Applications,” *11th International Computer Engineering Conference (ICENCO 2015)*, pp. 207-211, 2015.

- Sayed, W. S., A. G. Radwan, H. A. H. Fahmy, and A. El-Sedeek, “Scaling Parameters and Chaos in Generalized 1D Discrete Time Maps,” International Symposium on Nonlinear Theory and its Applications (NOLTA2015), Hong Kong, China, pp. 688-691, 2015.
- Book Chapters:
  - Sayed, W. S., S. M. Ismail, L. A. Said, and A. G. Radwan. “On the Fractional Order Generalized Discrete Maps.” In *Mathematical Techniques of Fractional Order Systems*, pp. 375-408, 2018.
  - Sayed, W. S., A. G. Radwan, and S. K. Abd-El-Hafiz. “Chaotic Properties of Various Types of Hidden Attractors in Integer and Fractional Order Domains.” In *Mathematical Techniques of Fractional Order Systems*, pp. 503-528, 2018.
  - Sayed, W. S., A. G. Radwan, and H. A. H. Fahmy. “Chaos and Bifurcation in Controllable Jerk-Based Self-Excited Attractors.” In *Nonlinear Dynamical Systems with Self-Excited and Hidden Attractors*, pp. 45-70, Springer, Cham, 2018.
  - Sayed, W. S., A. G. Radwan, and S. K. Abd-El-Hafiz. “Self-Excited Attractors in Jerk Systems: Overview and Numerical Investigation of Chaos Production.” In *Nonlinear Dynamical Systems with Self-Excited and Hidden Attractors*, pp. 71-86, Springer, Cham, 2018.
  - Radwan, A. G., W. S. Sayed, and S. K. Abd-El-Hafiz, “Control and Synchronization of Fractional-Order Chaotic Systems,” *Fractional Order Control and Synchronization of Chaotic Systems*: Springer International Publishing, pp. 325-355, 2017.

### **Posters & Presentations**

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- El-Tantawy, S., Sayed, W. S., Noeman, A., Hamed A., Abdelrazek, M., Gamal, M., Tawfiq, O. “An Artificial Intelligence-Based Adaptive Personalized Platform for an Effective and Advanced Learning (APPEAL)”, 6<sup>th</sup> Cairo International Exhibition of Innovation, 2019.
- El-Tantawy, S., Sayed, W. S., Noeman, A., Assem, M. “Towards the Development of an Adaptive Personalized Platform for an Effective and Advanced Learning (APPEAL)”, 5<sup>th</sup> Cairo International Exhibition of Innovation, 2018.
- Sayed, W. S., A. G. Radwan, H. A. H. Fahmy, and A. El-Sedeek, “Scaled logistic map with negative control parameter,” *Computational Methods for Linear and Nonlinear Systems Workshop*, Faculty of Engineering, Cairo University, 2015.
- Sayed, W. S., A. G. Radwan, and H. A. H. Fahmy, “Analysis of Bidirectional Bifurcations in Tent Maps,” *International Conference for Mathematics and Applications (ICMA15)*, 27–29 December 2015.

**Activities and Services**

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Served as a reviewer for several international journals such as Scientific Reports, Journal of Advanced Research, IEEE Access, AEÜ International Journal of Electronics and Communications, IET Circuits, Devices & Systems, IEEE Open Journal of Circuits and Systems, IEEE Photonics Journal, Entropy, British Journal of Applied Science & Technology, Iranian Journal of Science and Technology, Transactions of Electrical Engineering as well as several international conferences such as ICM, MOCASST and NILES.

2018, 2019      Lectures on “Basics of Scientific Research” for students, senior students and researchers at the Faculty of Engineering, Cairo University

2017 - 2019      Judge in the Undergraduate Mathematics Research Forum of Faculty of Engineering, Cairo University.

2017 - 2019      Judge in the Undergraduate Research Forum of Faculty of Engineering, Nile University.

ISEF 2015      Member of the Judgment Committee in Intel Sciences and Engineering Fair (ISEF) in Giza governorate.

2014 - 2016      Volunteer in Quality Assurance and Accreditation activities in Engineering Mathematics and Physics department: responsible for updating the webpage of the department on the website of the faculty.

Summer 2012      Member of the instructing group of the workshop “Introduction to programming under Linux”, in collaboration with Security Meter company, held for Electronics and Communications Engineering department students in Cairo University and in AinShams University

Summer 2012      Member of the instructing group of the summer training “Analog Electronics”, in collaboration with Intel company, given to Electronics and Communications Engineering department students in Cairo University.