

Muhammed A. Hassan

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EDUCATION

Ph.D. in Mechanical Power Engineering – Cairo University

October 2014 – November 2017

Thesis title: Solar radiation modeling using advanced statistical and machine learning techniques

Pre-Doctorate courses: Renewable Energy, Water Desalination, Atomization and Atomizers, Computational Fluid Dynamics, Advanced Heat Transfer.

GPA: 3.7

MSc in Mechanical Power Engineering – Cairo University

October 2012 – July 2014

Thesis title: Effect of tracking orientation on the performance of parabolic trough-storage tank combination.

Pre-Master courses: Theory of Fine Measurements, Computation Methods in Energetic Sciences, Technical Writing and Report Writing, Fundamentals of Combustion, Heat Convection, Advanced Fluid Mechanics.

GPA: 3.8

BSc in Mechanical Power Engineering – Cairo University

September 2007 – July 2012

Grade: 89.23% “distinction with honors” (ranked first among 350 students)

Graduation project title: Full design of a domestic solar water heating system. (distinction)

Relevant Courses: Thermodynamics, Heat and Mass Transfer, Renewable Energy, Refrigeration and HVAC, Numerical Methods, Applied Thermodynamics, Fluid Mechanics, Engineering Measurements, Conventional and Nuclear Power Plants, Automated Control, Energy Efficiency, Turbomachines, Internal Combustion Engines.

TEACHING EXPERIENCE

Teaching Assistant/Assistant Lecturer (Two-Semesters System) – Cairo University

October 2012 - Now

Courses taught: Heat and Mass Transfer, Solar Energy, Numerical Methods, Thermodynamics, Mechanical Engineering Laboratories, Engineering Measurements, Refrigeration & Air Conditioning, Fluid Mechanics, and Nuclear Power Plants.

Teaching Assistant (Credit Hours System) – Cairo University**Mars 2015 - Now**

Courses taught: Heat Transfer, Thermodynamics, and Internal Combustion Engines.

Teaching Assistant – Akhbar El-Yom Academy**February - July 2016**

Courses taught: Thermodynamics and Internal Combustion Engines.

OTHER PROFESSIONAL ACTIVITIES

- Reviewer for the *Advances in Applied Science Research* journal (ISSN: 0976-8610).
- Available reviewer of *Renewable Energy*, *Applied Energy* and *Renewable and Sustainable Energy Reviews* journals (2017-now).
- Assistant in developing the necessary tools and facilities to apply for the international accreditation of Faculty of Engineering, Cairo University (2014-now).
- Instructor in the Renewable Energy and Energy Efficiency Laboratory, Faculty of Engineering, Cairo University (2015-now).
- Assistant designer of the official website of the Mechanical Power Department, Cairo University (2015).
- Assistant in maintaining and calibrating laboratory equipment, Cairo University (2014-now).

RESEARCH EXPERIENCE

Research Assistant – Cairo University**October 2015 – Now**

Project title: First Egyptian prototype concentrating solar power (CSP) system.
Accomplishment: Operating and maintaining the parabolic-trough concentrators; measuring and checking the quality of solar and meteorological data; communicating with the other partners of the ener-MENA project (funded by the DLR); designing, installing and calibrating a new solar station.

Research Assistant and Design Engineer – Cairo University**January 2014 – July 2015**

Project: First Egyptian standalone solar-desalination unit (funded by Masr El-Kheir organization).
Accomplishment: Sizing of different project components (parabolic troughs, PV cells, etc), designing and manufacturing a stratified thermal storage unit, designing an advanced thermal control unit.

SUMMARY OF RESEARCH INTERESTS AND AREAS OF EXPERTISE

My primary area of research is the renewable energy resources, with the main focus on solar energy. It stems from my desire to understand the different aspects of sustainable energy resources. Former studies (2012-2015) were concerned with investigating the performances of the different solar energy systems; from photovoltaic cells to thermal solar collectors such as flat plate collectors and parabolic trough concentrators. In these studies, thermodynamic, heat transfer, optical and economic analyses were carried out. In addition, the studies were concerned with grid integration of solar power systems, thermal energy storage, sizing the systems and optimizing their performances. My most recent research interests (2015-now) are dedicated to measuring and forecasting the solar radiation using different numerical techniques, which range from statistical methods to complex artificial intelligence algorithms. Other research interests include, but not limited to, computational fluid dynamics (CFD), ray tracing, and image processing.

PEER-REVIEWED JOURNAL ARTICLES

1. **Hassan MA**, Khalil A, Kaseb S, Kassem MA. Independent models for estimation of daily global solar radiation: A review and a case study. *Renewable and Sustainable Energy Reviews* 2018; 82:1565-1575. <https://doi.org/10.1016/j.rser.2017.07.002>.
2. **Hassan MA**, Khalil A, Kaseb S, Kassem MA. Exploring the potential of tree-based ensemble methods in solar radiation modelling. *Applied Energy* 2017;203:897-916. <https://doi.org/10.1016/j.apenergy.2017.06.104>.
3. **Hassan MA**, Khalil A, Kaseb S, Kassem MA. Potential of four different machine learning algorithms in modeling daily global solar radiation. *Renewable Energy* 2017; 111:52-62. <http://dx.doi.org/10.1016/j.renene.2017.03.083>.

CONFERENCE PROCEEDINGS AND PRESENTATIONS

1. **Hassan MA**, Kayed H, Hanafi AS. An investigation of thermal performance and temperature control of stratified storage tank in solar-MED desalination. International conference on nuclear and renewable energy resources, Antalya, Turkey, 2014.
2. **Hassan MA**, Kayed H, Hanafi AS. Simulation of tracking configuration effect on the performance of solar parabolic trough-storage tank combination. International conference on nuclear and renewable energy resources, Antalya, Turkey, 2014.

WORKING PAPERS

1. **Hassan MA**. An optimized optical model of parabolic trough solar collector using MCRT method. Technical Report: Cairo University, 2015. <http://dx.doi.org/10.13140/RG.2.2.31989.06884>.
2. **Hassan MA**, Kayed H, Hanafi AS. Effect of tracking configuration on the performance of parabolic trough collectors in a solar-desalination unit. Technical Report: Cairo University, 2015. <http://dx.doi.org/10.13140/RG.2.2.11017.54881>

3. **Hassan MA**, Kayed H, Hanafi AS. Performance simulation of the parabolic trough collectors in a solar-desalination unit. Technical Report: Cairo University, 2015. <http://dx.doi.org/10.13140/RG.2.2.21083.87845>

MANUSCRIPTS IN PREPARATION

1. **Hassan MA**, Khalil A, Kaseb S, Kassem MA. Solar radiation in Morocco: assessment of resource and evaluation of empirical stochastic models.
2. **Hassan MA**, Khalil A, Kaseb S, Kassem MA. Stochastic and time-series modeling of solar radiation: A critical review of the two different methodologies.
3. **Hassan MA**. A working guide for efficient integration of artificial neural networks in energy forecasting research.
4. **Hassan MA**, Khalil A, Kaseb S, Kassem MA. Sub-Hourly Soft-Computing Irradiance Models for Tracking Solar Power Systems

TRAINING EXPERIENCE

2011: Khalda Petroleum Company (KPC), Marsa-Matrouh, Egypt.

Safety engineering, gas power plants, and pipelines

2011: Productivity and Vocational Training Department (PVTD), Ministry of Industry and Trading, Cairo, Egypt

Air conditioning systems

2010: National Research Center (NRC), Cairo, Egypt

Internal combustion engines, energy storage, and wind tunnels

2009: Arab Contractors (OAO & Co.), Qalyubia, Egypt

Quality control, metal processing, and CNC machines

Selected Field Trips:

- Kuraymat combined solar/steam/gas power plant (2011)
- Mercedes-Benz factory (2013)
- Zafarana wind farm (2013)
- Solar energy laboratories of the Egyptian New & Renewable Energy Authority (2016)

TRAINING COURSES FOR ACADEMIC STAFF

- Effective presentation skills.
 - Exams and student evaluation systems.
 - University code of ethics.
 - University management.
 - Quality standards in teaching.
 - Legal and financial aspects in university environment.
 - Communication skills.
 - Meetings and time management.
 - E-learning.
 - Managing research teams.
 - Use of technology in teaching.
- ** All courses are demonstrated by the Faculty and Leadership Development Centre (FLDC), <http://fldc.cu.edu.eg>

COMMUNITY SERVICE AND OTHER ACTIVITIES

- Translator from Arabic to English (and vice versa) at different internet websites.
- Blogger and writer, with four electronically published fragment and short story collections.

- Freelance technical writer and programmer.
- Tutor of modern standard Arabic language for English speakers.
- Long-term volunteer in Resala Charity Organization.
- Active member and volunteer in Misr Public Library.

PROFESSIONAL MEMBERSHIP

- Member of the Egyptian engineer's syndicate.
- Member of Cairo University staff club.

LANGUAGE SKILLS

Arabic: Mother tongue.

English: Proficient in reading, writing, listening and speaking.

French: Beginner level.

COMPUTER SKILLS

Operating Systems: Windows, Linux.

Office Packages: Microsoft Office, Libre Office, WPS Office.

Programming: Matlab, Python, EES, Octave.

Mathematics: Mathematica, Mathcad, Maple.

CAD: SolidWorks, AutoCAD, Rhinoceros.

Solar Energy: SAM, FChart, PVChart, Meteonorm.

Ray Tracing: SolTrace.

Data Acquisition: Labview, PC400, PC200, LoggerNet, HyperWare.

CFD Simulations: ANSYS Fluent, COMSOL Multiphysics.

Project Management: Microsoft Project.

Stress Analysis: SolidWorks COSMOS.

Statistics: Minitab, R, SPSS.

HVAC: HAP.

Image Editing: Photoshop, Gimp, Inkscape.

Illustrations: Microsoft Visio, SmartDraw, Prezi, Edraw MAX.

AWARDS

- Scientific publication award from Cairo University (2017).
- Distinguished researcher award from the Mechanical Power Engineering Department, Cairo University (2017).
- Three distinguished student awards from Schlumberger Petroleum Company (2010, 2011 and 2012).
- Two awards from Faculty of Engineering for academic excellence (2009 and 2010).
- Three certificates of appreciation from Resala Charity Organization, for voluntary works (2009 and 2010).

REFERENCES

1- Prof. Dr. Adel Khalil (Main Ph.D. advisor)

Professor of Mechanical Engineering, Cairo University, Giza, Egypt
Leader of the CSP System Project, Cairo University
Coordinator of Renewable Energy and Energy Efficiency Master (www.remena.uni-kassel.de)
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2- Prof. Dr. Sayed Kaseb (Ph.D. advisor)

Professor of Mechanical Engineering, Cairo University, Giza, Egypt
Head of Mechanical Power Department, Cairo University
Consultant, Postgraduate and Research Sector, Cairo University
Manager of Renewable Energy and Energy Efficiency Master (www.remena.uni-kassel.de)
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3- Prof. Dr. Abdel-Wahed El-Dib (BSc supervisor)

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4. Dr. Mahmoud Kassem (Ph.D. advisor)

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Head of the heat transfer group.
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5. Dr. Hatem Kayed (MSc Supervisor)

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