

AbdelRahman Farraj

Education

- Aug. 2016 – **PhD in Mechanical Engineering**, *University of Illinois*, Urbana-Champaign.
Present Advisor: Prof. Predrag Hrnjak. CGPA: 3.85/4.00
- Sept. 2014 – **MSc in Mechanical Engineering**, *Khalifa University*, Abu Dhabi, UAE.
May 2016 Advisor: Prof. Dimitrios Kyritsis. CGPA: 3.98/4.00
- Sept. 2010 – **BSc in Mechanical Engineering**, *Khalifa University*, Abu Dhabi, UAE.
June 2014 Awarded Full Scholarship. CGPA: 3.84/4.00

Experience

- Aug. 2016 – **Research Assistant**, *Air-Conditioning and Refrigeration Center, University of Illinois*.
Present Experimental and simulation of two-phase flow and heat transfer within complex geometries.
- Developing an experimental tool to measure heat transfer distribution in plate heat exchangers.
 - Simultaneously visualize the flow regime in the corrugated channel using high speed camera.
 - Simulate the single phase flow using ANSYS Fluent and validate results with the experiments.
 - Provide a viable solution for optimizing performance for plate heat exchangers.
 - Built experimental facility with integrated DAQ systems using LabView.
- Sept. 2017 to present **Teaching Assistant**, *University of Illinois*, Urbana-Champaign.
TA for Thermodynamics, Fluid dynamics, & Energy Conversion Systems (ME400)
- Instructing the theoretical background of the lab experiments.
 - Giving training to students in simulation programs: ANSYS, MATLAB, and LabView.
 - Providing tutorials in solving engineering problems and supervising course projects.
 - Preparing student to perform professional reports for either lab submissions or faculty.
- Oct. 2014 – **Research & Teaching Assistant, MSc**, *Khalifa University*, Abu Dhabi.
July 2016 Electric control of combustion for enhancing heat transfer.
- Experimental investigation of the counter-flow flame manipulation by high intense electric field.
 - Simulating the laminar flame under the effect of external force Using COMSOL Multiphysics
 - Thermodynamic modeling for spark-ignition engine under electrostatic effect using Matlab.
- May 2015 – **Visiting Scholar**, *Advanced Propulsion and Energy Laboratory, University of Illinois*.
Aug. 2015 Investigating swirl-stabilized flame dynamics using laser diagnostic techniques.
- Experimentally visualize the flow field using the Particle Image Velocimetry technique.
 - Involved in investigation properties of the flame using OH-Planar Laser Induced Fluorescence.

Internship Experience

- June – Aug. 2013 **ATKINS Global**, (*now part of SNC-Lavalin*), Abu Dhabi.
Strategic Assessment for Nuclear Power Stations in UAE: nuclear engineering consultancy
- Simulate mass and heat transfer in primary/secondary reactor coolant systems for APR1400.
- May – Aug 2012 **Institute of Systems and Robotics**, *University of Coimbra*, Portugal.
Assisted on geothermal heat pump systems for heating and cooling in South Europe.
- Measure and analyzes thermal performance of borehole heat exchangers using proper tools.
 - Calibrated measurement instruments, published test and wrote reports to the team.

Projects

- Sept. 2013 – **Senior Undergraduate Project**, *Khalifa University*, Abu Dhabi.
May 2014 Electrostatically Driven Fuel Injectors:
- Design and build an injector drives the fuel by the action of electrostatic.
 - CFD analysis on hydraulic performance of ionized fluid inside the injector.
- Oct. 2012 – **Independent Study Projects**, *Khalifa University*, Abu Dhabi.
May 2013
- Develop automated testing for a solar thermal desalination unit using LabVIEW NXG.
 - Create a model to control flow for optimizing the heat transfer in solar fields.
- April 2012 **Student Design Competition**, *ASME*, Houston, Texas, won 3rd place.
Relay race using four cars depend on different source of energy:
- Leading the structural design group: load calculations, structural layout, CAD modeling, fabrication and testing.

List of Publications

- Published **Farraj, A. & Hrnjak, P.**, *Combination of Local Heat Transfer and Flow Visualization of R245fa Flow Boiling in plate Heat Exchanger*, International Refrigeration and Air Conditioning Conference, 2021.
- Published **Farraj, A. & Hrnjak, P.**, *Locally Measured Heat Transfer Coefficient with Simultaneous Visualization of Evaporating Fluid Flow in the Plate Heat Exchanger*, ASHRAE Annual conferences, 2021.
- Published **Farraj, A. & Hrnjak, P.**, *New Method to Simultaneously Measure Local Heat Transfer Coefficient and Visualize Flow Regimes during Evaporation in the Plate Heat Exchanger*, ASHRAE Winter conferences, 2020.
- Published **Farraj, A. et al.**, *Laminar non-premixed counterflow flames manipulation through the application of external direct current fields*, ASCE, Journal of Energy Engineering, 2017.
- Published **Al-Naeemy, A., Farraj, A., Kyritsis, D., & Al-Khateeb, N.**, *Electric Manipulation of Laminar Non-Premixed Counter-Flow Propane Flames*, ASME, Journal of Thermal Science and Engineering Applications, 2017.
- Published **Farraj, A. et al.**, *Phenomenology of electrostatically manipulated, laminar, counterflow, non-premixed methane flame*, ASCE, Journal of Energy Engineering, 2016.
- Published **Abutayeh, M., Humood, M., Alsheghri, A., Al Hammadi, A., & Farraj, A.**, *Experimental Study of a Single-Stage Solar Thermal Desalination Unit*, ASME International Mechanical Engineering Congress and Exposition, 2013.

Technical Skills

- Software Solid Modeling, ANSYS, COMSOL Multiphysics, SolidWorks, EES, LabVIEW
- Programming Python, MatLAB, C/C++
- Experimental Calibration of measurement instruments (thermocouples, pressure transducers, coriolis, etc.), data acquisition systems, running Particle image velocimetry and Planar laser-induced fluorescence on flows.

Awards

- 2016 The Future of Fuel | Best presentation Award, KAUST, KSA
- 2014 Young Future Energy Leaders (YFEL) Award, Masdar institute, UAE
- 2012 3rd place, ASME Student Design Competition, Houston, Texas