# M. Sadeq Saleh

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## Research Interests:

**Energy Storage Systems**

- Nanostructured anode materials for Li-ion batteries
- Diffusion induced stress analysis
- Flexible and printed electronics

**Fatigue and fracture mechanics**

- Development of experimental strategies for fatigue testing
- Accelerated fatigue testing in VHCF regime
- Micro-scale fatigue behavior of materials

**Structural dynamics and vibration**

- Experimental modal analysis
- Vibration based damage detection and structural health monitoring
- Modal analysis and model validation
- Active noise and vibration control

## Education:

**PhD. Mechanical Engineering,** Washington State University 2015-present
Field of research: Li-ion batteries, Sintering methods, Simulation
Adviser: Dr. R. Panat

**M.Sc. Mechanical Engineering,** University of Tehran 2013-Dec
Thesis: "*Investigation of stress ratio effect in High Cycle Fatigue of Ti-6AL-4V Using Vibration-Based testing: A novel apparatus for non-inversive bending loading*"
Field of research: Fatigue and fracture mechanics
Adviser: Prof. A. Yousefi-koma (aykoma@ut.ac.ir), Prof. S. Mohtasebi

**B.Sc. Mechanical Engineering,** University of Tehran 2011-Sep
Senior project: "*Experimental Implementation of active vibration control of piezo-actuated cantilever beam using Fuzzy-PID controller*"
Field of research: Structural dynamics and vibration
Adviser: Prof. A. Yousefi-koma,

## Research Experience:

**Graduate research assistant** AML, Washington State University 2015-present

- Design and Nanofabrication of scaffold anode for Li-ion battery
- Simulation of diffusion induced stress relaxation in anode materials

**Graduate research assistant** CAST, University of Tehran 2011-2014

- Conducted Research on ***accelerated fatigue testing methods and strategies in HCF regime*** which led to development of new apparatus for accelerated fatigue testing.
- Design and experimental implementation of a robust signal processing method for structural health monitoring of structures based on wavelet decompositions using ***ultrasonic guided waves***.
- Field research conducted on aging aircrafts and advanced ***SHM*** techniques.

## Honors, Awards, and Patents

**Micro-contest Micrograph 2015 MRS Chapter** 2015
1st Place for SEM Artistic image

**Patent No. A/89 038302** 2013
As a main contributor:
"*Long range ultrasonic health monitoring system for gas and petroleum pipelines*"

**Winner of "Dr. Chamran's National Prize for Innovation and Entrepreneurship"** 2012
As a main contributor:
"*Development of health monitoring system for gas and petroleum pipelines*"

**Winner of Iranian National Elites Foundation's financial support** 2007
According to a program for evaluation of talented students

**Khwarizmi 6th National Festival for Youth Inventors** **Silver Medal** 2004
Applied Mathematics:
A novel concept in analytic geometry: "*Angular System of Coordinates*"

## Teaching and Mentoring Experience:

**Workshop presenter** ISME- International Conf on Mechanical Eng 2013-may

- 4 hours lecture:
  "*Structural health monitoring using guided waves: Theory and Experiment*"

**Graduate mentor** University of Tehran 2013-spring

- Proposed and developed research plan for investigation of LSP process's effect on FLS strength.
- Proposed research plan for development of a new methodology for crack propagation rate measurement during resonance fatigue testing.
- Mentored graduate students for Implementation of smart material's (PVDF & Fiber optics) sensory effect in a structural health monitoring application
- Trained a graduate student for AE detection in cohesive phenomena of metal- metal abrasion.

**Teaching assistant**

- "Machine Element Design" Dr. G. Curti 2015-spring
  Undergraduate Course, MME 414
- "Smart Materials and Structures" Prof. A. Yousefi-Koma 2012-fall
  Course project: Instructed the implementation of dynamic system ID and modal parameter extraction.
- "Mechanical Vibration" Prof. A. Yousefi-Koma 2010 & 2011
  3 sessions lecture, "*An introduction to modal analysis and vibration testing*"
- "Automatic Control" Prof. A. Yousefi-Koma 2010-spring
  Experimental project: Guided the students to design a controller based on extracted modal parameters.
- "Fluid Mechanics" Prof. M.H. Rahimyan 2009-spring
  Mentored a course project, "*3D Dynamic Simulation of 2 head sprinkler*"
- "Physics I " Dr. M. Gholizadeh 2007 & 2008
  Basic course of physics for freshman engineering students (Faculty of Engineering, UT)

## Publications and Presentation:

**Best paper award** ISME- Annual International Conf on Mech Eng 2013-may
M. Kordbacheh, A. Yousefi-Koma, and **M. S. Saleh**, "Application of wavelet transformation as a signal processing method for defect detection using lamb wave signals: experimental verification", 21th annual international conference on mechanical engineering (ISME) proceeding, Vol.1, pp-203.

**Oral Presented Paper** X-Mech International Conf on Exp Solid Mech 2012-march

**M. S. Saleh**, A. Yousefi-Koma, and M. Barimani, "Modification of the natural frequency pattern of a cantilever beam using topology optimization method", X-Mech international conference on experimental solid mechanics and dynamics, Vol.1, pp-49

## Work Experience:

**Lead project engineer** ADCSLab, University of Tehran 2012-2013

**Project: "***High Cycle Fatigue testing of gas turbine blades***"** 1 year

In approval procedure of parts' manufacturing processes, for two batches of blades made by different methods, accelerated fatigue tests performed and the FLS measured and compared.

**Consultant engineer** CAV, University of Tehran 2012

**Project: "***3rd Generation of Iranian humanoid robot-SURENA III***"** 6 months

Professional consultancy on test planning for actuation system proper selection.

**Senior project engineer** ADCSLab, University of Tehran 2008-2009

**Project: "***Gas turbine components EMA and FEM validation***"** 1 year

Experimental modal analysis of several gas turbine components was conducted. The results used to validate the FEM modeling of components.

**Internship** Mobin Petrochemical Company, Asalouye, Iran 2008

**Project: "***Failure analysis of GFRP water transportation line*" 3 months

In this undergraduate internship project, various failure scenarios were investigated and an inspection & maintenance strategy have been proposed.

## Technical Skills:

**Experimental Modal Analysis (EMA)**

Planed, designed, and implemented several types of modal and vibration test strategies from SISO to MIMO, environmental vibration and shock testing. Experienced in hardware controlling and modal analysis software. Familiar with and extensive experience in commercial hardware and technical software of B&K, LMS, LDS, and NI companies.

**Accelerated fatigue testing: High Cycle Fatigue (HCF)**

Planed, designed, implemented, and analyzed the results of fatigue tests in HCF regime. From strategy selection, calibration of test quantities, sensor selection, criterion derivation, and strain measurement to fractography and SEM inspection of fatigue cracks, statistical analysis of results and preparation of a professional report.

**Digital and analog data acquisition of vibration and dynamic signals**

Experienced in hardware controlling and instrumentation of various analog and digital acquisition systems. Dynamic measurement of ultrasound and vibration signals with the aid of accelerometers, triangulation lasers, LDV, force, and torque sensors.

**Experimental stress analysis**

Familiar with experimental stress analysis techniques and expert in strain measurement using strain gauges and PVDF sensors.

**Utilization of smart materials**

Capable of smart materials embedding as a sensor or actuator in smart structures. Large experience in piezoelectric and PVDF materials implementation for AVC and SHM.

**Dynamic measurements and Instrumentation**

Knowledge of measurement principles of diverse sensor types from conventional

gauges to advanced optical sensors and lasers, various conditioning methods and the correspondent instrumentation.

**FEM Modeling**

Professional structural dynamics analysis using ANSYS and ABAQUS. Growing capabilities on harmonic and modal analysis of cracked objects.

## Computer Skills:

**Engineering software package**

Extensive experience in:

- LABVIEW, MATLAB, Mathematica
- NI Sound and Vibration Toolkit
- Solidworks, AutoCAD, ANSYS, Abaqus
- LMS *Test.Lab* structural analysis
- LDS vibration shaker controller

**Operating system and applications**

- Microsoft windows, Microsoft office, Photoshop

## Personal Information:

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|---|---|---|---|
| Date of birth: | 1989-Sep | Sport skill: | Judo- Q5 (Violet belt) |
| Nationality: | Iranian | Hobbies: | Bungee jumping/ Jogging |