



## PROFESSIONAL SUMMARY

- Professional experience with emphasis on product design, optimization, analysis, and testing for structural integrity and failure prevention in mechanical and automotive engineering
- Teaching experience in engineering mechanics, mechanical design and analysis, materials and manufacturing, measurements, and other relevant courses for undergraduates and graduates
- Ability to deliver the system level solutions to practical engineering problems using analytical simulations and experimental approaches
- Practical experience in hands-on engineering for operation and maintenance of mechanical and vehicular systems
- Well-balanced and well-organized engineering backgrounds in both academia and industry

## PROFESSIONAL APPOINTMENTS

- **The University of Akron** (Akron, OH): Associate Professor of Engineering Practice in Mechanical Engineering
- **Cleveland State University** (Cleveland, OH): Visiting Assistant Professor in Mechanical Engineering
- **California State University, Northridge** (Northridge, CA): Lecturer in Mechanical Engineering
- **Estoc Consulting Group** (Seoul, South Korea): Co-founder and Technical Director in Engineering R&D Services
- **Shinhan University** (Gyeonggi, South Korea): Associate Professor in Mechanical and Automotive Engineering
- **Kia Motors Corporation** (Seoul, South Korea): Research Engineer at Kia Technical Center

## EDUCATION

- **Post-Doctorate** in Mechanical and Industrial Engineering: **University of Toronto** (Toronto, Ontario, Canada)
  - Engineering Mechanics and Design: Micromechanics and failure analysis in smart structures
- **Doctorate** in Mechanical Engineering (PhD): **Yonsei University** (Seoul, South Korea)
  - Applied Mechanics and Failure Analysis: Imperfections in piezoelectric materials under electromechanical loads
- **Master of Science** in Mechanical Engineering (MSME): **Yonsei University** (Seoul, South Korea)
  - Fracture and Fatigue Mechanics: Structural integrity under mechanical and thermal fatigue loadings
- **Bachelor of Science** in Mechanical Engineering (BSME): **Yonsei University** (Seoul, South Korea)
  - Mechanical Design and Product Engineering

## CERTIFICATION AND LICENSURE

- **PE (Professional Engineer)**: Machine Design and Materials (NCEES)
- **EIT (Engineer-In-Training)**: General Engineering Disciplines (NCEES)

## TEACHING ACTIVITIES

- **The University of Akron**
  - Tools for Mechanical Engineering (*Computer Aided Engineering Tools: SolidWorks & MATLAB*)
  - Design of Mechanical Components (*Shigley's Mechanical Engineering Design: Budynas and Nisbett*)
  - Concepts of Design (*Engineering Design: G. E. Dieter and L. C. Schmidt*)
- **Cleveland State University**
  - Statics (*Engineering Mechanics, Statics: R. C. Hibbeler*)
  - Dynamics (*Engineering Mechanics, Dynamics: R. C. Hibbeler*)
  - Differential Equations for Engineers (*Differential Equations: Computing and Modeling: Edwards et al.*)
  - Eng. Materials and Manuf. Processes (*Manufacturing Engineering and Technology: Kalpakjian and Schmid*)
  - Manufacturing Processes Lab (*Lab activities with 7 topics in mechanical design and manufacturing*)
  - Machine Analysis (*Shigley's Mechanical Engineering Design: Budynas and Nisbett*)
  - Engineering Measurements (*Theory and Design for Mechanical Measurements: Figliola and Beasley*)
  - Measurements Lab (*Lab activities with 13 topics in experimental measurements*)
- **California State University, Northridge**
  - Mechanical Engineering Design (*Fundamentals of Modern Manufacturing: Mikell P. Groover*)
  - Mechanical Measurements and Lab (*Theory and Design for Mechanical Measurements: Figliola and Beasley*)
- **Shinhan University**
  - Engineering Mechanics: Statics (*Engineering Mechanics, Statics: J. L. Meriam and L. G. Kraige*)
  - Mechanics of Materials (*Mechanics of Materials: R. C. Hibbeler*)
  - Vehicle Body Structure Engineering (*The Automotive Body: L. Morello, et al.*)
  - Automotive Production Engineering (*Automotive Production Engineering: K-NCS*)
  - Capstone Design (*Senior Group Design Project*)
  - Mechanical Behavior of Materials (*Solid Mechanics: William F. Hosford*)
  - Vehicle Body System Practice (*Automobile Manufacturer's Technical Manuals*)
  - Welding Technology (*Fabrication and Welding Engineering: Roger Timings*)

## PROFESSIONAL ACTIVITIES

- **Engineering Society and Industry**
  - ASME (The American Society of Mechanical Engineers): Professional member
  - SAE (The Society of Automotive Engineers): Professional member
  - Ember STIC (Katy, TX): Principal Consultant in Engineering R&D Services
  - Additive Manufacturing (Elsevier): Journal Paper Reviewer
- **The University of Akron**
  - Faculty Advisor: Zips Baja SAE Student Design Team, College of Engineering and Polymer Science
  - Faculty Advisor: Senior Design Projects, Department of Mechanical Engineering
- **Shinhan University**
  - Interim Chair in Automotive Engineering: Department of Mechanical and Automotive Engineering
  - Faculty Advisor: Baja KSAE Student Design Team, Department of Mechanical and Automotive Engineering
  - Executive Director: Center for Vehicle and Transportation Convergence Technology, College of Engineering
  - Executive Director: National Human Resources Development Consortium, College of Engineering
  - Faculty Advisor: Hyundai Motor Group Apprentice Program for New Research Engineers

## RESEARCH AREAS AND INTERESTS

- **Engineering Design with emphasis on Structural Integrity, Materials, and Manufacturing Technologies**
  - Computational engineering design, analysis, and manufacturing technologies based on structural integrity and failure prevention considering static, dynamic, thermal, and fatigue loads / linear and nonlinear contacts / elasto-plastic behaviors
  - Topology and robust optimization for lightweight designs based on the mechanism of contact, wear, fatigue, and fracture of engineering materials, elements, modules, and systems
  - Virtual qualification test and actual accelerated qualification test focusing on reliability engineering based on the statistical approaches through measurements and signal processing analyses for monitoring the fundamental material properties and the functional performance of mechanical components, modules, and systems
- **Electric Vehicle Structures and Components**
  - Standardizations of body repair processes to prevent hazardous effects on the structural properties and reliability
  - Qualifications of vibration durability and reliability for electric vehicle battery packages and their structures

## RESEARCH AND PROJECT EXPERIENCES

- **Materials and Manufacturing Technologies**
  - Back pressure forging process for reaction hub in automatic transmission
  - Residual stress and deformation analysis on aluminum die-casting products
  - Optimal design on dimpled seals considering high temperature and large deformed material properties
  - Multi-Phase-Single-Process (MPSP) press works for steel bush
  - Material properties of nuclear pressure vessel under high thermal impact
- **Mechanical Components, Modules, and Systems**
  - Structural validation of emergency maintenance system in road tunnel
  - Optimal design and validation of running board system
  - Dynamic simulation on tumble impact of smart phone
  - Evaluation on emotional quality of battery cover hook in smartphone
  - Strength evaluation of gas plant dryer
  - Optimization on beam structures of FPSO (Floating Production Storage and Offloading) air dryer
  - Optimal design and analysis on excavator arm
  - Strength and reliability analysis on mobile hinge spring
  - Optimal shape design of U-type seals under high pressure
  - Optimal design and experimental performance evaluation of butterfly valve with rubber coated disk
  - Product design of coupling housing in grooved piping system
  - Design optimization of pedicle screw for spine implants
- **Vehicle Body: BIW and Components**
  - Topological design optimization of auxiliary structure for vehicle body stiffness enhancement
  - Lift, gate, and seat systems of express and intercity buses for wheelchair users
  - Optimization on panel thickness of vehicle BIW (Body-In-White) and under-body structures
  - Structural optimization of BIW (Body-In-White) adopting TRB (Tailor Rolled Blank) members
  - Optimization on combined unit-structure of floor and local components for SUV (Sport Utility Vehicle)
  - Structural evaluation on BIW (Body-In-White) of passenger car adopting laser welding technology
  - Optimal design of low-floor bus body structure based on DFSS (Design for Six Sigma)
  - Structural evaluation on BIW (Body-In-White) of minivan
  - Durability evaluation on passenger car seat

- **Vehicle Chassis: Suspension, Brake, and Drivetrain**

- Structural durability evaluation on suspension components of rally car
- Durability evaluation on suspension and steering systems of special performance vehicles
- Thermal and structural interactions in brake caliper hub
- Design validation of powertrain module for large size four-wheel drive vehicle
- Design and performance evaluation of trunnion pin type double cardan shaft in military tactical vehicle
- Optimal design and structure analysis on leaf spring system of commercial vehicle
- Thermal and vibration analysis on brake system of commercial vehicle
- Design and performance evaluation on double disc brake system in KTX (Korea Train Express)

## **PUBLICATIONS**

- **Papers:** 34 peer-reviewed journal articles and 12 conference proceeding articles
- **Patents:** 12 registrations and 20 applications