RYAN FELLINI, PhD

Los Angeles, California e-mail: ryan.fellini at umich.edu

SUMMARY

Interdisciplinary mechanical engineer with extensive experience in research, mathematical and numerical optimization theory, systems optimization methods, and finite element analysis. Consistently-demonstrated growth by achieving expertise in new technical disciplines, along with developing process improvements and original research. Background includes advanced automotive powertrain systems, spacecraft structures, software development, and large-scale simulation. Advanced Italian, basic German.

EXPERIENCE

NORTHROP GRUMMAN AEROSPACE SYSTEMS Redondo Beach, California

Senior Mechanical Engineer, Space Systems Division **2004-Present**

Support development and production of the James Webb Space Telescope (JWST) spacecraft and sunshield subsystems. Analyze strength/stability, thermal distortion, dynamic response, and overall structural and optical performance of spacecraft components and subsystems, including development of system models.

- Attained and utilized expertise in the application of structural analysis methods and simulation tools, such as linear and nonlinear finite element methods. Applied cutting-edge methodologies to the analysis of bonded composite structures under cryogenic conditions.
- Researched innovative methods to simulate highly nonlinear structures; developed methodologies for the analysis and design of next-generation thin-film membrane space structures, such as in use with the JWST sunshield.
- Gained experience in the design and analysis of ultra-precision structures, such as JWST's star tracker assembly support structure.
- Responsible for performing key optimization studies of the JWST spacecraft – necessary in order to meet challenging observatory system-level performance objectives.
- Initiated multidisciplinary design optimization (MDO) research and development project at the Space Systems Divisions, focusing initially on the design of mechanical systems.
- Obtained research experience in the engineering and application of ultra-thin IMM solar cells to next-generation spacecraft solar arrays.
- Generated theoretical and software training courses for in-house SPACE University, lecturing two classes (24 students in total) in the use of analysis and optimization software.

FORD MOTOR COMPANY Dearborn, Michigan

Software Developer, V-Engine Engineering/Powertrain Operations **2003-2004**

Developed optimization software and computer-aided engineering tools that interface with in-house and commercial engine simulation codes.

- Provided internal customer support for implementation and feature enhancement of optimization tools.
- Performed overhaul of existing C++ software and initiating new tools-development projects.

UNIVERSITY OF MICHIGAN Ann Arbor, Michigan

Research Assistant, Optimal Design Laboratory **1996-2003**

Developed expertise in the field of mathematical optimization; contributing original research to the scientific field. Presented technical articles and provided peer review for scientific journals.

- Led research projects and completed case studies for Industry-Government Dual Use Science & Technology (DUST) project.
- Provided sponsors with analytical tools that identify efficient platform architectures; design studies achieved significant component and complexity reduction for a family of engines.
- Researched surrogate-modeling (approximation) techniques and system-of-systems optimization methods.
- Developed novel mathematical methods, utilizing optimal design theory, which allow for the design and analysis of product families. Methods provide for the optimal selection of common components; aiding in the identification of modular architectures.
- Conducted design studies on advanced automotive systems for the Automotive Research Center (ARC) and General Motors Collaborative Research Laboratory (GM CRL).

Instructor, Department of Mechanical Engineering **Spring 1997, 1998, 1999**
Responsible for daily lecture preparation, assigning and grading homework, along with holding regular office hours.

- Instructed two sophomore mechanical engineering classes (42 students in total) in the use of Unigraphics CAD/CAM software and CNC machines.
- Provided guidance to students during their term design project (1997).
- Advised students on optimal design theory, its application, and in the use of optimization software for a graduate-level design optimization course (1998; 1999).

GENERAL MOTORS R&D AND PLANNING CENTER Warren, Michigan
Research Assistant, Powertrain Systems Research Laboratory **Summer 1998, 1999**
Developed a MATLAB-based optimization toolbox that incorporates state-of-the-art optimization algorithms, tailored for use with powertrain simulations.

- Integrated the software package with a General Motors simulation tool in order to facilitate quick concept studies of advanced powertrain architectures.
- Performed trade studies and well-to-wheel analysis on concepts such as electric vehicles (EVs), hybrid electric vehicles (HEVs), hybrid hydraulic vehicles (HHVs), etc.

LAMPART VEGYIPARI GÉPGYÁR RT. Budapest, Hungary
Design Engineer **Summer 1996**
Participated in the International Association for the Exchange of Students for Technical Experience (IAESTE) program.

- Designed and engineered chemical pressure vessels using AutoCAD design software; digitized existing designs to allow for a reduction in product-development lead time.
- Participated in several high-profile design projects for a client in Sweden.

EDUCATION

UNIVERSITY OF MICHIGAN Ann Arbor, Michigan
Post Doctorate, Mechanical Engineering **2004**
Research areas: product component commonality, system-of-systems optimization, model approximations
Doctor of Philosophy (PhD), Mechanical Engineering **2003**
Specialization: mathematical and numerical optimization theory
Dissertation: A Model-Based Methodology for Product Family Design
Chair: Dr. Panos Papalambros
Qualifying exams: design (optimization theory concentration), dynamics, solid mechanics, thermodynamics
Master of Science in Engineering (MSE), Mechanical Engineering **1998**
Thesis: Derivative-Free and Global Search Optimization Algorithms in an Object-Oriented Design Framework
Chair: Dr. Panos Papalambros

VIRGINIA TECH Blacksburg, Virginia
Bachelor of Science in Mechanical Engineering (BSME), *Cum Laude* **1996**
Advisor: Dr. Michael Furey
Senior Project: Body design for open-wheel racecar; placed 5th at the International Formula SAE competition
Certified Engineer-In-Training (EIT) – Passed Fundamentals of Engineering (FE) examination

AFFILIATIONS

American Institute of Aeronautics and Astronautics (AIAA) – Senior Member
American Society Of Mechanical Engineers (ASME) – Member
Intl. Society of Structural and Multidisciplinary Optimization (ISSMO) – Associate Member
Society of Automotive Engineers (SAE) – Member
Society for the Advancement of Material and Process Engineering (SAMPE) – Member

TECHNICAL SKILLS

Programming: C++, Java, Perl, MATLAB, FORTRAN, XML
Platforms: Mac OS X, UNIX/Linux, Windows
CAD/CAE: AutoCAD, Unigraphics, Mathcad, Catia V5 (basic)
Finite Element Analysis: ABAQUS, MSC.Nastran, NX.Nastran, MSC.Patran, Femap
Optimization software: Noesis OPTIMUS, Engineous iSIGHT, MATLAB Optimization Toolbox
Mathematical optimization and multidisciplinary design optimization (MDO)
Linear, nonlinear, integer programming; as well as evolutionary/genetic algorithms
Analytical system-of-systems optimization methods
Application of adaptive systems such as artificial neural networks (ANNs)
Distributed computing, software development, and large-scale simulation