

PROFILE

Expert in **creative problem-solving** methods and a **generalist multi-disciplinarian** with background in ME, CS, QA, Psy.

Expert in **digital design and manufacturing** with 15+ years of experience in knowledge modeling with multimodal data.

Excellent **communication skills** with 30 peer reviewed publications, 13 invited talks, and 6 courses taught in 2 universities.

A **lifelong learner** experienced in **leading** 120+ teams or individuals defining and solving complex engineering problems.

TECHNICAL SKILLS

- **CAD/CAM:** extensive experience with parametric modeling in NX, SolidWorks, and CATIA, plus design automation with embedded tools (e.g., NX Knowledge Fusion), APIs, and under-the-hood knowledge of kernels (e.g., Parasolid)
- **AI/ML & NLP:** experienced in discovering and encoding knowledge with LISP & Prolog; applying various ML methods, e.g., decision trees, CNN, sequence mining; syntactic & semantic analysis with WordNet & Stanford Parser
- **Knowledge Modeling:** modeling apps (UML, SysML), ontologies (OWL/RDF), and relational & graph databases
- **Data Analytics:** proficient in various reasoning and querying languages (SWRL/SPARQL and SQL) for data collection, as well as descriptive and statistical data analysis with Excel Pivot Tables, Minitab, JMP, and MATLAB DL/ML toolkits
- **App Development:** familiarity with full stack dev tools in web applications, e.g., WAMP and JavaScript; skilled in implementing OOP in C# and scripting and piping processes in Python
- **Creative Problem Solving:** expert in design thinking and user-centered design, with a deep knowledge of barriers and enablers of creativity, devising creativity tests and evangelizing methods like TRIZ and Bio-inspired Design

EXPERIENCES AND ACCOMPLISHMENTS

Assistant Professor

California State University, Sacramento, CA, USA

August 2019-present

Created computational geometry algorithms for cube packing of tessellated polyhedra using PyMesh/Trimesh in Python for parallelized additive manufacturing. Performed sequence mining over a curated dataset of design shape, material, and quality attributes transformed by manufacturing sequences.

- Graduated 2 MS students whose works appeared at the flagship ASME design conference DETC/CIE 2021
- Won the \$300k NSF grant "EAGER: Exploration of Data-Driven Methods for Cyber Manufacturing" as a Co-PI, laying a foundation for automated manufacturing process planning

Postdoctoral Fellow

Georgia Institute of Technology, Atlanta, GA, USA

December 2015-June 2019

Created an app in C# for predicting manufacturing form errors to overlay as-manufactured models on as-designed models using NX API. Created an ontology of design for additive manufacturing in Protégé and demonstrated manufacturability analysis using SPARQL queries and SWRL rules.

- Successfully delivered an app to the sponsor Siemens Corp Tech
- Best paper award at ASME IDETC/CIE 2016 for the paper "A Design for Additive Manufacturing Ontology"

Research Assistant

Design Automation Lab, ASU, Tempe, AZ, USA

August 2010-October 2015

Created Problem Maps, an ontological framework for investigating creative design, used Answer Sets, NLP, and machine learning to capture designers' thoughts on a web-based platform. Developed graph-based measures of complexity to predict the intensiveness of developing products with different product architectures and manufacturing processes.

- Contributed a novel method of studying design thinking and discovered creative design strategies published in prestigious journals
- Successfully delivered complexity measures to the DARPA AVM project for improving decision making in designing product architecture

Research Assistant Wingqvist Lab, Chalmers, Gothenburg, Sweden September 2008-March 2009

Demonstrated an Engineer-to-Order design process by integrating MATLAB and CATIA in a C# app using Component Object Models, and customized a Product Lifecycle Management system by modifying its Object-relational data model implemented in MS SQL Server and Enovia SmarTeam.

- Successfully demoed the app at Scania and published the results in a leading Systems Engineering journal

Product Engineer MAPNA Blade, Tehran, Iran September 2005-August 2007

Created inspection plans for measuring gas turbine blades using Coordinate Measuring Machines (CMM) using a simulator and code reuse. Contributed to the APQP production process qualification.

- Cut down program development time from 6 days on the CMM to 4 hours on a computer
- Siemens Power certified the production of the Siemens V94.2 gas turbine blades

Lean Manufacturing Engineer Iran Khodro Diesel, Tehran, Iran October 2004-March 2005

Created a database for tracking unpacked imported assemblies as a part of an inventory system overhaul. Was a member of an EFQM self-assessment team on leadership & strategic policy.

- Helped migrate data from legacy databases and reduced the number of unique items by 30%
- Company scored 309 points on the EFQM excellence model

Production Engineer & QA manager AICE co, Tehran, Iran June 2002-September 2004

Devised low-cost automation techniques, conducted SWOT Analysis, led the FMEA team, ran SPC and MSA, designed experiments, conducted internal QA system compliance audits.

- Led the company to be certified for the auto industry QA system ISO/TS 16949:02

E D U C A T I O N

- Ph.D., Mechanical and Aerospace Engineering, *Arizona State University, USA 2010-2015*
- M.S., Product Development, *Chalmers University of Technology, Sweden 2007-2009*
- B.S., Manufacturing Engineering, *Amir Kabir University of Technology, Iran 1996-2001*

I N V I T E D T A L K S (S E L E C T E D)

1. Hybrid Representations of Design and Manufacturing for Logical, Ontological, and Geometric Reasoning, *Siemens Corporate Technology, Princeton, NJ*
2. Semantic and Spatial: complementing representations of computational frameworks for Think-to-Make design and manufacturing systems, *Palo Alto Research Institute, December 2017, Palo Alto, CA*
3. Patterns of Creative Design: Predicting Ideation from Problem Formulation, *IDETC/CIE conference, August 2015, Boston, MA*

R E F E R E E D J O U R N A L A R T I C L E S (S E L E C T E D)

1. Zhao C., Dinar M., Melkote S. N., 2020, "Automated Classification of Manufacturing Process Capability Utilizing Part Shape, Material, and Quality Attributes", *Journal of Computing and Information Science in Engineering*, 20(2), pp. 1-13. DOI: 10.1115/1.4045410
2. Nguyen, V., Malchodi, T., Dinar, M., Melkote, S. N., Mishra, A., and Rajagopalan, S., 2019, "An IoT Architecture for Automated Machining Process Control: A Case Study of Tool Life Enhancement in Turning Operations" *Smart and Sustainable Manufacturing Systems*, 3(2), 20190017
3. Dinar M., and Shah J. J., 2012, "A Model of Problem Formulation Strategies in Engineering Design," *Proceedings of First Annual Conference on Advances in Cognitive Systems*, P. Langley, ed., Palo Alto, CA, USA
4. Bergsjö D., Almfelt L., Dinar M., Malmqvist J., 2010, "Customizing Product Data Management for Systems Engineering in an Informal Lean-Influenced Organization", *Systems Research Forum*, 4(1), 101-120