

CURRICULUM VITAE

RAHUL SHARAN RENU, PH.D.

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EDUCATION

Doctor of Philosophy degree in Mechanical Engineering from Clemson University, Clemson, SC
May 2016

Advisors: Dr. Gregory Mocko, Dr. Georges Fadel, Dr. Laine Mears, Dr. Michael Porter
Ph.D. Dissertation Title: *Product-Process Coupling to Enable Continuous Improvement of Assembly Processes*

Master of Science degree in Mechanical Engineering from Clemson University, Clemson, SC
August 2013

Advisors: Dr. Gregory Mocko, Dr. Joshua Summers, Dr. Georges Fadel, Dr. Mary E. Kurz
M.S. Thesis Title: *Decision Support Systems for Assembly Line Planning*

Bachelor of Science degree in Mechanical Engineering from Visvesvaraya Technological University, Bangalore, India
May 2011

Lean Green Belt Certification awarded by the Institute of Industrial and Systems Engineers
Certificate Number: 2567-17500
Expires: March 31, 2020

PROFESSIONAL AFFILIATIONS

Member – American Society of Mechanical Engineers

Member – American Society of Engineering Education

WORK EXPERIENCE

Assistant Professor, Industrial Engineering, Francis Marion University, Florence, SC
August 2016 – Present

Consultant, Horizon Mud Company (contracted through FMU), Midland, TX
July 2018 – Present

Instructor, Mechanical Engineering, Clemson University, Clemson, SC
May 2014 – May 2016

Process Engineering Intern, Faurecia Interior Systems, Fountain Inn, SC
June 2014 – January 2015

TEACHING EXPERIENCE

At Francis Marion University

- ENGR101 Introduction to Industrial Engineering
- ENGR201 Engineering Graphics
- ENGR301 Engineering Mechanics
- ENGR220 Materials Engineering
- ENGR350 Manufacturing Process
- ENGR350L Manufacturing Process Laboratory
- ENGR397 Undergraduate Research in Industrial Engineering (1 student)
- ENGR480 Senior Design
- PSCI101L Physical Science Laboratory

At Clemson University

- ENGR2080 Engineering Graphics
- ME3120 Manufacturing Processes (Online)

ADVISING EXPERIENCE

- **Academic Advisor (15 students)**
Developed graduation plans and assisted with course registration
Francis Marion University, Florence, SC
December 2017 – present
- **Research Advisor (4 undergraduate students)**
Francis Marion University, Florence, SC – 2 students
August 2017 – Present

Clemson University, Clemson, SC – 2 students
January 2015 – May 2016
- **Senior Design Advisor (74 students)**
ME4020 Mechanical Engineering Senior Capstone Design
Clemson University, Clemson, SC
January 2013 – January 2016

GRANTS AND FUNDING (12 AWARDED)

- **Information Technology Committee Grant – Francis Marion University**
 - Awarded in Spring 2017
 - Amount: \$5,345 – Towards purchase of an Laser Cutter machine
- **Information Technology Committee Grant – Francis Marion University**
 - Awarded in Fall 2017
 - Amount: \$2,725 – Towards purchase of five PASCO Statics Systems
- **Information Technology Committee Grant – Francis Marion University**
 - Awarded in Spring 2017
 - Amount: \$3,000 – Towards purchase of web server space

- **Information Technology Committee Grant – Francis Marion University**
 - Awarded in Spring 2017
 - PI: Renu; Co-PIs: Dr. Philip Fulmer, Dr. Justin Yates
 - Amount: \$3,849 – Towards purchase of an SLA additive manufacturing machine

- **Professional Development Funds – Francis Marion University**
 - Awarded in Spring 2018
 - Amount: \$1630
 - Towards travel and attendance for ASEE-SE Annual Conference

- **Professional Development Funds – Francis Marion University**
 - Awarded in Spring 2017
 - Amount: \$1880
 - Towards travel and attendance for ASME IDETC/CIE 2017

- **Professional Development Funds – Francis Marion University**
 - Awarded in Spring 2017
 - Amount: \$2,130
 - Towards American Society of Engineering Education’s Annual Conference

- **Professional Development Funds – Francis Marion University**
 - Awarded in Spring 2017
 - Amount: \$850
 - Towards registration for Lean Manufacturing Green Belt Training

- **Professional Development Funds – Francis Marion University**
 - Awarded in Summer 2016
 - Amount: \$1,305
 - Towards travel to ASME IDETC/CIE 2016

- **Summer Research Funding – Francis Marion University**
 - Awarded in Fall 2016
 - Amount: \$4,000 for Summer 2017
 - Awarded on a competitive basis (14 per year)

- **Ready to Experience Applied Learning (REAL) – Francis Marion University**
 - Awarded in Fall 2017
 - Amount: \$3,050
 - Stipend and conference costs for one Industrial Engineering undergraduate student researcher

- **Ready to Experience Applied Learning (REAL) – Francis Marion University**
 - Awarded in Fall 2016
 - Amount: \$2,600
 - Towards trip for ten Industrial Engineering students to Clemson University (for exposure to graduate school), BMW Manufacturing, and ZF Transmissions

- **Ready to Experience Applied Learning (REAL) – Francis Marion University**
 - Awarded in Spring 2018
 - Amount: \$1,650

- Towards trip for ten Industrial Engineering students to Clemson University (for exposure to graduate school), and one industry tour outside the Pee Dee Region.

GRADUATE RESEARCH EXPERIENCE

- **Research Assistant**, Clemson University, Clemson, SC
January 2015 – February 2016
ZF Transmissions: Scrap and Downtime Unassignable Cause Improvement
Results: Analyzed historical data to develop mutually exclusive and collectively exhaustive descriptions for scrap and downtime events and causes. This enables root cause analysis and results in time and cost savings
- **Research Assistant**, Clemson University, Clemson, SC
January 2015 – May 2016
BMW Manufacturing: Investigation of Potential Collisions of Flexible Car Parts
Results: Detailed Failure Modes Effects and Analysis (FMEA) of flexible components on a BMW automotive product; Knowledge-based FMEA; Solution recommendations to avoid quality issues
- **Research Assistant**, Clemson University, Clemson, SC
January 2012 – May 2014
BMW Manufacturing: Efficient Assembly Process Support through Enhanced Knowledge Base
Results: Developed a method to improve consistency of assembly work instructions and to provide decision support during assembly time estimation.
- **Industrial Fabrics Association International:** Friction Testing of Tent Ballasts
Results: Characterized the performance of several tent ballasts variants by conducting friction drag tests on various surfaces.

SERVICE, LEADERSHIP AND OTHER ACTIVITIES

At Francis Marion University

- **Francis Marion University Faculty International Orientation Program (Spring 2018)**
 - Selected to be part of a delegation from FMU to Germany.
 - One objective was to gain new perspective by engaging in an international experience.
 - Another objective was to enhance collaboration with existing partner universities.
- **Francis Marion University Information Technology Committee Member**
- **Francis Marion University Multicultural Advisory Board Co-Chair (May 2017 – May 2018)**
- **Francis Marion University Mechanical Engineering Feasibility Committee Member**
- **Facilitated student internships/full-time employment at:**
 - Beneteau
 - GE Healthcare
 - Georgia Pacific – Dixie Operations
 - Wyman Gordon
- **Developed collaborative relationships with:**
 - Companies listed above
 - Fastenal
 - Honda of South Carolina

- Otis Elevators
- Sam Carbis
- Dr. Lynn Hanson – Dept. of English – Francis Marion University
- Dr. Allen Clabo – Dept. of Chemistry – Francis Marion University
- **ABET Accreditation**
 - I have been actively involved in preparing the Industrial Engineering program for ABET accreditation. This includes co-authoring, reviewing and editing the ABET self-study report.
- **Founder and Lead of the Physics and Engineering Social Hour**
 - Students, faculty and staff gather in an informal environment (typically, a weekday lunch). This enhances the rapport among members of the department.
- **Database Development and Data Analysis for Hobcaw Barony items (through FMU)**
 - Developed a database and website GUI for recording items found at the Hobcaw Barony in Georgetown, SC. The recovery and cataloging of items is led by Dr. Lynn Hanson.
 - I assist Dr. Hanson with analysis of the data gathered.
- **Department Website**
 - I regularly perform necessary updates and maintenance of the department website
- **Darlington County Institute of Technology**
 - Introduced DCIT students to engineering and the various engineering programs offered by FMU
- **FMU Open House**
 - Co-conducted six FMU Open House sessions and followed up with attendees through email
- **FMU Scholarship Interviews**
 - I, along with several other faculty members, help conduct interviews which impact awarding of FMU scholarships
- **SC GEAR UP**
 - Conducted activities to introduce South Carolina high school students to industrial engineering
- **Manufacturing Lab Setup**
 - Involved with procurement of laboratory equipment
 - Assembled, setup and calibrated all laboratory equipment
 - CNC router, Rockwell hardness testing machine, sheet forming machine, injection molding machine, universal materials testing machine, and various metrology equipment
- **ABET Student Outcome Management**
 - Developed a database management system for ABET student outcome measurement
 - This system allows for input, storage and retrieval of questions used to measure student outcomes
- **Session Chair**, American Society for Engineering Education – Southeast Section Annual Conference 2018, Daytona Beach, FL
- **Student Poster Competition Judge**, American Society for Engineering Education – Southeast Section Annual Conference 2018, Daytona Beach, FL

- **Student Research Paper Competition Grader**, South Carolina Junior Academy of Science 2018 Annual Meeting
- **Symposium Co-Chair**, Design of Complex Systems, ASME International Design Engineering Technical Conference (IDETC) 2017, Cleveland Ohio
- **Session Co-Chair**, Design of Complex Systems, ASME International Design Engineering Technical Conference (IDETC) 2016, Charlotte NC
- **Session Co-Chair**, Simulation-Based Design Under Uncertainty, ASME International Design Engineering Technical Conference (IDETC) 2016, Charlotte NC
- **American Society for Engineering Education – Southeast Section**, Industrial Engineering Division Vice Chair
- **Faculty Intramural Volleyball Team Member**
- **Intramural Singles Billiards Champion (Spring 2017)**

Before Francis Marion University

- Coordinator, National Science Foundation Engineering and Systems Design Grantees Conference 2015
- Finance Committee Chair, Graduate Student Government, Clemson University
- Member, Mechanical Engineering Graduate Student Council, Clemson University
- Member, Activities Committee, Graduate Student Government, Clemson University
- Member, Clemson Graduate Student Academic Integrity Committee
- Member, Clemson Graduate Student Academic Grievance Committee
- Member, Clemson Engineering Design Applications and Research (CEDAR)
- Senator, Graduate Student Government
- Treasurer, Clemson Indian Students Association
- Vice-President, Association for India's Development – Clemson Chapter
- Volunteer, Janaagraha – Bangalore, India
- Volunteer, Future Engineers – Clemson Elementary

PUBLICATIONS REVIEWER

- National Science Foundation Design Essay Reviewer 2017 (7 papers)
- Artificial Intelligence for Engineering Design, Analysis and Manufacturing (1 paper)
- ASME Journal of Mechanical Design (2 papers)

- ASME Journal of Computing and Information Science in Engineering (3 papers)
- ASEE Southeastern Conference (3 papers)
- ASME DETC/CIE Conferences (12 papers)
- CAD and Applications Journal (2 paper)
- Complex Adaptive Systems Conference (2 papers)
- International Journal of Information Technology & Decision Making (1 paper)

BOOK REVIEWER

- *Manufacturing Processes for Engineering Materials* by Serope Kalpakjian and Steven Schmid, Sixth Edition
- *Materials and Manufacturing: An Introduction to How They Work and Why it Matters...* by Mark Atwater

AWARDS AND HONORS

- Recognized as a faculty member who has made a lasting impact on Javier Bustos Jaimes' (senior NCAA athlete) life.
- National Science Foundation – Travel Award (2014)
- National Science Foundation – Design Essay Award (2013 & 2014)
- Clemson University Professional Enrichment Grants Award (December 2014 & May 2015)
- Eastman Chemical Award for Excellence, Department of Mechanical Engineering, Clemson University (2013)

INVITED TALKS

- “Pattern Recognition: Understanding How We Learn”, Vox Novo, Clemson University, October 2013
- “Francis Marion University – Industrial Engineering”, South Carolina Society of Professional Engineers: Coastal/Pee Dee Chapter, May 2017
- “Manufacturing: The Past, The Present, and The Future”, Francis Marion University Science Symposium, November 2017
- “Manufacturing: The Past, The Present, and The Future”, Plenary Address at the Pee Dee Regional High School Mathematics Tournament, December 2017

PUBLICATIONS

Peer-Reviewed Journal Papers (3 accepted, 1 submitted for review, 1 in-preparation)

1. **Renu, R.**, Visotsky, D., Knackstedt, S., Mocko, G., Summers, J., Schulte, J., (in print) "A Knowledge Based FMEA to Support Identification and Management of Vehicle Flexible Component Issues", *Procedia CIRP*.

2. **Renu, R.**, Mocko, G., 2016, "Retrieval of Solid Models based on Assembly Similarity", Computer-Aided Design and Applications, DOI:10.1080/16864360.2016.1150708
3. **Renu, R.S.**, Mocko, G., 2016. "Computing similarity of text-based assembly processes for knowledge retrieval and reuse." Journal of Manufacturing Systems 39: 101-110.
4. **Renu, R.**, Mocko G. (2018, submitted for review) "Linking Product Geometry and Assembly Process Knowledge through Solid Modeling Similarity and Natural Language Processing Algorithms", Journal of Manufacturing Systems.
5. ¹Sousa, C., **Renu R.**, (in preparation) "Tessellated Solid Model Similarity using Congruent Triangles" Computer-Aided Design.

Peer-Reviewed Conference Papers (14 accepted/published)

1. **Renu, R.**, ¹Sousa, C., (2018, accepted for publication) "Similarity of Tessellated Solid Models for Engineering Applications" ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, Quebec, Canada.
2. ¹Jaimes, J. B., ¹Powell, T., **Renu R.**, Hanson L., (2018, accepted for publication) "Use of Artificial Intelligence to Evaluate Authoring of Technical Instructions" ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, Quebec, Canada.
3. **Renu, R.**, Cintron-Gonzalez, L., (2018) "Towards Standardization of ABET Student Outcome Assessment", American Society for Engineering Education Southeastern Section Conference, Daytona Beach, FL.
4. **Renu, R.**, Hanson, L., (2017) "Rule-Based Decision Support System for Authoring Technical Instructions", ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, Cleveland, OH.
5. ***Renu, R.**, Anthony, G., Grigg, S., Minor, J., Yasmin, N., (2016) "Improving Engineering Graphics Grading Using a Shape Similarity Algorithm – An Initial Investigation", ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, Charlotte, NC.
6. **Renu, R.**, Visotsky, D., Knackstedt, S., Mocko, G., Summers, J., Schulte, J., "Knowledge Based Failure Modes Effects and Analysis", 6th CIRP Conference on Assembly Technologies and Systems, Gothenburg, Sweden.
7. ***Renu, R.** Mocko, G. (2015) "Text Analysis of Assembly Work Instructions", ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, Boston, MA.
8. ***Renu, R.**, Mocko, G.M. (2015) "Retrieval of Solid Models based on Assembly Similarity", Proc. CAD'15, London, UK.
9. ***Renu, R.**, Mocko, G. (2015) "Design and Implementation of a Line Balance Visualization and Editing Tool", 5th International Conference of Research into Design, Bangalore, India
10. ***Renu, R.**, Mocko, G (2014) "Ontological Knowledge Representation and Inference Rules for MTM Decision Support System", ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, Buffalo, NY

11. ***Renu, R.**, Mocko, G., Summers, J., Peterson, M. (2013) "Automated Navigation of Method Time Measurement (MTM) tables for Automotive Assembly Line Planning", ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, Portland, OR, DETC2013-13325.
12. ***Renu, R.**, Mocko, G., Koneru, Abhiram (2013) "Use of Big Data and Knowledge Discovery to Create Data Backbones for Decision Support Systems", Complex Adaptive Systems, Baltimore, MD
13. *George, D., Mocko, G., **Renu, R.** (2013) "Concept Generation through Morphological and Options Matrices", 4th International Conference of Research into Design, Chennai, India, doi: 10.1007/978-81-322-1050-4_16.
14. Antani, K., Pearce, B., Mears, L., **Renu, R.**, Kurz, M. E., Schulte, J. (2014) "Application of System Learning to Precedence Graph Generation for Assembly Line Balancing", Manufacturing Science and Engineering Conference, Detroit, MI.

**Presenter*

¹Undergraduate Student researchers

Ph.D. Dissertation

Renu, R.S. (2016) "Product-Process Coupling to Enable Continuous Improvement of Assembly Processes" Department of Mechanical Engineering, Clemson University, Clemson, South Carolina.

M.S. Thesis

Renu, R.S. (2013) "Decision Support Systems for Assembly Line Planning –Modular Subsystems for a Large Scale Production Management System," Department of Mechanical Engineering, Clemson University, Clemson, South Carolina.

AWARD PAPERS

1. Linnerud, B., **Renu, R.**, Mocko, G. (2013) "Design as a First Person Cooperative Game" ASME International Design Engineering Technical Conference, Portland, OR.
2. **Renu, R.**, Sarthy, V., Mocko, G. (2014) "Brain Mapping and Adaptive Manufacturing" ASME International Design Engineering Technical Conference, Buffalo, NY.

NON-REFEREED PRESENTATIONS AND POSTER SESSIONS

1. ****Sousa, C., Renu, R.**, (2018) "Assessing 3D Model Similarity Based on Mathematical Similarity" Francis Marion University Research and Exhibition Day, Florence SC.
2. ****Bustos-Jaimes, J., Renu, R.**, (2018) "Use of Machine Learning to Understand Technical Writing" Francis Marion University Research and Exhibition Day, Florence SC.
3. Yates, J., Cintron-Gonzalez, L., **Renu, R.**, (2016) "Understanding the Impact of In-class Undergraduate Research in Engineering Education for Non-Traditional Students: An Adaptive Guide" Annual INFORMS 2016, Nashville TN.
4. ***Renu, R.**, Mocko, G. (2014) "Reducing Defects in Original Equipment Manufacturers" Graduate Research and Discovery Symposium, Clemson University

5. ***Renu, R.,** Sarthy, V., Mocko, G. (2014) “Brain Mapping and Adaptive Manufacturing” ASME International Design Engineering Technical Conference, Buffalo, NY.
 6. ***Renu, R.,** Mocko, G. (2013) “Decision Support System for Assembly Line Planning” Mechanical Engineering Graduate Student Poster Competition, Clemson University – First Prize
 7. ***Renu, R.,** Mocko, G. (2013) “Utilizing Knowledge Extraction Techniques to Process Big Data” CIE 2013 Graduate Research Poster, Portland, OR
 8. Linnerud, B., ***Renu, R.,** Mocko, G. (2013) “Design as a First Person Cooperative Game” ASME International Design Engineering Technical Conference, Portland, OR.
- *Presenter **Undergraduate Research Assistants*