

Binil Starly
Department of Industrial Engineering
University of Oklahoma, Norman, OK 73019

- Education** **PhD**, Mechanical Engineering, Drexel University, Philadelphia, PA
Dissertation Title: “Biomimetic Design and Fabrication of Tissue Scaffolds using Computer Aided Tissue Engineering”, Advisor: Dr Wei Sun
- B.Tech**, Mechanical Engineering (2001), University of Kerala, India
- Honors and Awards** Graduate Research Excellence, Drexel University, 2006
George Hill Jr. Fellowship, College of Engineering, Drexel University, 2005-2006
Graduate Research Award, College of Engineering, Drexel University, 2005-2006
Teaching Excellence Award, Drexel University, 2005
Outstanding Service Award, Mechanical Engineering and Mechanics, Drexel Univ. 2006
Joseph E. Caroleone Award for Academic Merit, 2004-2005
Dean’s List, College of Engineering, Drexel University, 2003
- Research Experience** **Drexel University , Graduate Research Assistant** **(March 2002-present)**
Laboratory for Computer Aided Tissue Engineering
- Participated in two NSF, one NASA and one industry sponsored research projects:
 - “*Computer-Aided Tissue Engineering*”- NSF
 - “*Representation and Design of Heterogeneous Structures* ”- NSF
 - “*Bioprinting of 3-D Organ Chambers for Pharmacokinetic Study*”- NASA
 - “*Direct Slicing of STEP based NURBS models for TheriForm™ fabrication*”
 - Published 10 journal articles and 17 conference proceeding papers
 - Conducted 9 research presentations, including 3 invited presentations
 - 3 Patents Pending
- University Service** **Teaching Fellow, Department of Mechanical Engineering** **(Fall 2004 to present)**
- Taught *Fundamentals of Computer Aided Design* (MEM 201) course for MEM department: providing students with basic understanding of technical graphics communication, computer-aided design for engineering applications, 3D visualization and representation, geometrical tolerances and dimensioning.
 - Taught *Introduction to CAD/CAM* (MEM 435) course for MEM department: providing students with understanding of enabling computer-aided technologies used in design (CAD) and manufacturing (CAM), to train students with hands-on experience to use integrated CAD/CAE/CAM techniques in engineering design and to solve engineering problems in product development.
- Graduate Teaching Assistant** **(Spring 2002 to Summer 2004)**
- Designed and conducted laboratory sessions for using computer software (AutoCAD and Pro/Engineer) in CAD/CAE/CAM teaching.
 - Conducted workshops for using Medical Image processing software (MIMICS®) and Reverse Engineering Software (GEOMAGICS®) for graduate course - Computer Aided Tissue Engineering.
 - Assistant to MEM Senior Design Coordinator for management of the departmental senior

design activities.

Mentorship

(Summer 2003 to present)

- Active participation in *Summer Engineering Experience at Drexel (SEED)* program: mentored a total of over 600 high school students working at the Laboratory of Computer-Aided Tissue Engineering and introduce them to advanced CAD/CAM technologies;
- Active participation in *Drexel RET (Research Experience for Teachers)* summer research program: mentored high school teachers for them getting involved with emerging research topics and research projects.
- Mentored senior design students with their projects on aspects of design, analysis and prototyping.

University Organization

- Social Coordinator, Mechanical Engineering Graduate Association (MEGA), 2003-2004
- Library Coordinator, Graduate Student Association (GSA), Drexel University, 2003-2004

Consulting Experience

Rapid Product Development Center, Drexel University

(March 2002 to present)

Assistant to Director

Assisted in providing engineering services for small and medium size companies in the Greater Philadelphia region through the use of state of the art CAD/CAE technologies. Projects undertaken:

- “Analysis and Optimization for Diaphragm Compressor Components”
- “CFD Analysis for Different Nozzle Head Configurations
- “Failure Analysis for the Spinner 100™ Tank Cleaning System”
- “Image Guided Craniofacial Reconstructive Surgery”
- “Design and Prototype Fabrication of the Spinner 200™ tank cleaning system”
- “Freeform Modeling using Reverse Engineering of an Orthotic Ankle Brace”
- “Automotive Dent Protection Assembly”

Journal Publications

1. JH Piatt, **B. Starly**, E. Faerber, W. Sun, “Application of computer-assisted design in craniofacial reconstructive surgery using a commercial image guidance system”, *J. of Neurosurgery*, 2006 Jan; 104(1 Suppl):64-7.
2. **Starly B.**, Lau W., Bradbury, T., Sun W., “Internal architecture design methodology for tissue replacement structures”, *Computer Aided Design*, , Vol. 38 (2), 2006, Pages 115-124
3. Fang, Z., **Starly, B.**, Sun, W., Shokufandeh, A., Regli, W., “A Computer Aided Multi-Scale Modeling for Direct Fabrication of Bone Tissue Structures”, *Computer-Aided Design and Applications*, Vol. 2, No 5, 2005
4. Sun, W., **Starly, B.**, Nam, J. and Darling, A., “Bio-CAD Modeling and Its Applications in Computer-Aided Tissue Engineering”, *Computer-Aided Design*, Vol. 37 (11), 2005, 1097-1114
5. **Starly, B.**, Lau, A., Sun, W. Lau, W. and Bradbury T., “Direct Slicing of STEP Based NURBS Models for Layered Manufacturing,” *Computer-Aided Design*, Vol 37, Issue 4, April 2005, pp 387-397
6. Wettergreen MA, Bucklen BS, **Starly B**, Yuksel E, Sun W and Liebschner MAK, “Creation of a Unit Block Library of Architectures for Use in Assembled Scaffold Engineering”, *Computer-Aided Design*, Vol. 37 (11), 2005, 1141-1149.

7. Fang, Z., **Starly, B.** and Sun, W., “Computer-Aided Characterization of Effective Mechanical Properties for Porous Tissue Scaffolds,” *Computer-Aided Design*, Vol. 37, No. 1, 2005, pp. 65-72.
8. Sun, W., Darling, A., **Starly, B.**, Nam, J., “Computer-Aided Tissue Engineering: Overview, scope and challenges”, *Biotechnology and Applied Biochemistry*, Vol. 39, Issue 1, 2004, pp. 29-47.
9. Nam, J., **Starly, B.**, Darling, A. and Sun, W., “Computer Aided Tissue Engineering for Modeling and Design of Novel Tissue Scaffolds” *J. of Computer-Aided Design and Application*, Vol. 1, No. 1-4, 2004, pp. 633-640
10. Sun, W., **Starly, B.**, Darling, A., Gomez, C., “Computer-Aided Tissue Engineering: Application to biomimetic modeling and design of tissue scaffolds”, *Biotechnology and Applied Biochemistry*, Vol. 39, Issue 1, 2004, pp. 49-58.

Research Presentations

Invited presentations:

1. “Design and Biofabrication of Tissue Engineered Substitutes using Computer Aided Tissue Engineering”, School of Industrial Engineering, University of Oklahoma March 1st, 2005
2. “Image Based CAD Modeling in Product Design”, Grand Valley State University, February 2nd, 2006
3. “Biomimetic Design and Fabrication of Tissue Scaffold Structures”, 2nd International Workshop on Bioprinting, Medical University of South Carolina, 13th March 2005

Other conference presentations:

4. B. Starly, W.Sun, “Space Filling Curves: Design and Fabrication”, Proceedings of the 16th Solid Freeform Fabrication Symposium, August 1-3, 2005, Austin, TX, U.S.A.
5. B. Starly, J.H Piatt, W. Sun, “Image Guided Reconstructive Surgery”, 2nd International Conference on Advanced Digital Technology in Head and Neck Reconstruction, March 10-13th, 2005, Banff, Alberta, Canada
6. B. Starly, W. Sun, A. Lau, W. Lau, T. Bradbury, “Biomimetic Design and Fabrication of Interior Architecture of Tissue scaffolds using Solid Freeform Fabrication,” Proceedings of 15th Solid Freeform Fabrication Symposium, August 3-5, 2004, Austin, TX, U.S.A.
7. Binil Starly, Connie Gomez and Wei Sun, “Biomimetic Modeling and Design of 3D Bone Scaffolds”, The 6th International Conference on Tissue Engineering, Orlando, FL, Dec. 10-13, 2003.
8. B. Starly, A. Lau, W. Sun, W. Lau, T. Bradbury, A. Youssef, C. Gaylo, “Direct Slicing of STEP Based NURBS Models for Solid Freeform Fabrication,” Proceedings of 14th Solid Freeform Fabrication Symposium, August 4-6, 2003, Austin, TX, U.S.A.
9. B. Starly, C. Gomez, A. Darling, Z. Fang, A. Lau, W. Sun, W. Lau, T. Bradbury, A. Youssef, C. Gaylo, “Computer-Aided Bone Scaffold Design – A Biomimetic Approach,” The 29th Northeastern Bioengineering Conference, 3/23 ~ 24, NJIT, 2003, Newark, U.S.A.
10. Starly, B, Sun W., Lau, W., and Fang, Z., “Biomimetic Model for Heterogeneous Bone Scaffold” 21st Southern Biomedical Engineering Conference, Sept 28th-29th, 2002, Bethesda, MD, USA

Patents

- US Patent Pending: “Apparatus, Method and Article for Direct Slicing of STEP based NURBS models for Solid FreeForm Fabrication”, Application No:60/487,463 (co inventors - Thomas Bradbury, Dr Wei Sun, Wing Lau, Dr Alan Lau).

- Patent in Review: “A Process of Using Computer Modeling, Reconstructive Modeling and Simulation Modeling for Image Guided Reconstructive Surgery (co inventors Dr Joseph Piatt, Dr Wei Sun).
- Patent in Review, “Bioprinting Three-Dimensional Polymeric Hydrogel Structures onto Microscale Tissue Analog Devices for Pharmacokinetic Study” (co-inventors Robert Chang, Dr Wei Sun)

Professional Activities

- Session Co-Chair in Digitally Enabled Tissue Engineering at The World Congress on Tissue Engineering and Regenerative Medicine, Pittsburgh, April 23rd-26th, 2006.
- Paper Reviewer for articles published in the ASME Proceedings.

**CAD/CAE/
Bioprinting
Technology
Skills**

- CAD software packages – Pro/Engineer, SolidWorks, AutoCAD, IronCAD.
- Structural/Fluid analysis packages – ANSYS, ProMechanica, ABAQUS, Star-CD
- Medical Image Processing & Reverse Engineering Software – MIMICS, GEOMAGICS
- Rapid Prototyping – 3D Printing, Fused Deposition Modeling systems
- Bio-Microfabrication – UV Soft Lithography, Cell Printing, Electro-Spinning
- Programming Languages – C++, Matlab, Visual C++, HTML, MS Access
- Cell Culture Characterization – Live/Dead Cell Assay , Alamar Blue Assay, Urea Synthesis