RITU RAMAN

Curriculum Vitae

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EDUCATION

University of Illinois at Urbana Champaign, Urbana-Champaign, IL
Ph.D. Candidate, Mechanical Engineering — Expected December 2016
M.S. Mechanical Engineering — 2013
GPA: 3.9/4.0, NSF Graduate Research Fellow (2014-2017), NSF IGERT Fellow (2012-2014)

Cornell University, Ithaca, NY
B.S. Mechanical Engineering, Minor Biomedical Engineering, *magna cum laude* — 2012
GPA: 3.9/4.0, Dean's List, Kessler Fellow, Tau Beta Pi Engineering Honor Society

RESEARCH EXPERIENCE

University of Illinois at Urbana-Champaign
NSF Graduate Research Fellow & IGERT Fellow, Bashir Lab, Department of Mechanical Engineering
Project: Biological Machines — 2012-Present
Develop bio-integrated soft robotic devices powered by tissue engineered muscle that are capable of controlled adaptive sensing and actuation.
Project: High-Resolution 3D Printing — 2012-Present
Develop a dynamic mask-based projection stereolithography system for high-resolution 3D printing of cells and biomaterials. Focus on applications in patterning neovasculature.

National University of Singapore
Visiting Research Scholar, Mechanobiology Institute — 2014
Project: Biological Machines
Characterized the mechanical properties of tissue engineered skeletal muscle using atomic force microscopy.

Cornell University
Undergraduate Researcher, Bonassar Lab, Department of Biomedical Engineering
Project: Bioreactor Design — 2011-2012
Redesigned and manufactured dynamic compressive loading bioreactor for cartilage tissue engineering to better replicate anatomical conditions.
Undergraduate Researcher, Gao Lab, Department of Mechanical Engineering
Project: Skeletal Muscle Characterization — 2010-2011
Investigated the effect of chronic alcohol ingestion and regular exercise on skeletal muscle morphology and function using histological techniques.

PUBLICATIONS

Refereed Journal Articles

[4] **Raman, R**., Cvetkovic, C., Uzel, S.G.M., Sengupta, P., Kamm, R.D., & Bashir, R. (2015). Optogenetic skeletal muscle-powered adaptive biological machines. *Manuscript in review.*

[3] **Raman, R**., Bhaduri, B., Lee, M.K., Shkumatov, A., Mir, M., Popescu, G., Kong, H.J., & Bashir, R. (2015). Projection micro-stereolithography for high-resolution patterning of microvasculature. *Manuscript in review.*

[2] Neiman, J. A. S., **Raman, R**., Chan, V., Rhoads, M. G., Raredon, M. S. B., Velazquez, J. J., Dyer, R.L., Bashir, R., Hammond, P.T., & Griffith, L. G. (2015). Photopatterning of hydrogel scaffolds coupled to filter materials using stereolithography for perfused 3D culture of hepatocytes. *Biotechnology and bioengineering*, *112*(4), 777-787.

[1] Cvetkovic, C.*, **Raman, R**.*, Chan, V., Williams, B. J., Tolish, M., Bajaj, P., Sakar, M.S., Asada, H.H., Saif, M.T.A., & Bashir, R. (2014). Three-dimensionally printed biological machines powered by skeletal muscle. *Proceedings of the National Academy of Sciences*, *111*(28), 10125-10130. ***co-first author**.

Journal Review Articles

[2] Chan, V., **Raman, R**., Cvetkovic, C., & Bashir, R. (2013). Enabling microscale and nanoscale approaches for bioengineered cardiac tissue. *ACS Nano*, *7*(3), 1830-1837.

[1] Dorvel, B., Damhorst, G., Chan, V., Shim, J., Banerjee, S., Cvetkovic, C., **Raman, R**., & Bashir, R. (2013). Research Highlights: Highlights from the last year in nanomedicine. *Nanomedicine*, *8*(1), 13-15.

Book Chapters

[1] **Raman, R**., Bashir, R. "Stereolithographic 3D Bioprinting for Biomedical Applications", 3D Biofabrication for Biomedical and Translational Research, 2015.

AWARDS & HONORS

Fellowships & Scholarships

Baxter Young Investigator Award	2015
National Science Foundation Graduate Research Fellowship	2014
Society of Women Engineers Chrysler Foundation Scholarship	2014
National Science Foundation IGERT Fellowship	2012
McManus Senior Design Award	2012
Engineering Learning Initiatives Research Funding Award	2010

Innovation & Entrepreneurship

Illinois Innovation Prize	2015
National Science Foundation EBICS STC Product Conceptualization Prize	2015
Kessler Fellowship for Entrepreneurial Engineers	2011

Outreach

Society of Women Engineers Outstanding Collegiate Member Award	2014
Society of Women Engineers Student Leader Award	2013

Research Presentations

Society of Women Engineers National Poster Competition Top 10 Finalist	2015
Center for Nanoscale Science and Technology Poster Award	2015
National Science Foundation IGERT Symposium Poster Award	2014
Illinois-Tsinghua Nanotechnology Symposium Best Poster Award	2014
Center for Nanoscale Science and Technology Best Poster Award	2013
Bionanotechnology Symposium Poster Award	2012
Mechanical Engineering Innovation Award	2011

TEACHING & MENTORING EXPERIENCE

University of Illinois at Urbana-Champaign

Guest Lecturer, BIOE 306 Biofabrication Lab — Fall 2015

Design and co-lecture course focused on teaching the fundamental design rules and principles of building biological machines.

Undergraduate Research Mentor — 2013-Present

[5] Ashley Williams (2014-Present), [4] Aaron Jankelow (2015), [3] Samir Mishra (2013-2014), [2] Madeline Tolish (2013), [1] Stephanie Nemec (2013)

Camp Coordinator, GAMES Engineering Girls Summer Camp — 2013-2015

Cornell University

Camp Coordinator, CURIE Engineering Girls Summer Camp — 2012

Teaching Assistant, MAE 2120 - Mechanical Properties — Spring 2012

Engineering Tutor, Tau Beta Pi Engineering Honors Society 2011-2012
Engineering Tutor, Cornell Engineering Learning Initiatives 2010-2012
Teaching Assistant, MAE 3230 – Fluid Mechanics Fall 2011
Teaching Assistant, MAE 3260 – System Dynamics Spring 2011

CONFERENCE ACTIVITY

Oral Presentations

Raman, R., et al. (2015, October). *Optogenetic Skeletal Muscle Powered 3D Printed Biological Machines*. BMES Annual Meeting. Tampa, FL.

Raman, R., et al. (2015, October). *High-Resolution 3D Bio-Printing Apparatus for Applications in Patterning of Microvasculature.* BMES Annual Meeting. Tampa, FL.

Raman, R., et al. (2015, September). *Optogenetic Skeletal Muscle Powered 3D Printed Biological Machines.* TERMIS World Congress. Boston, MA.

Raman, R., et al. (2015, June). *BioBlocks: Building with Biology*. EBICS Annual Retreat. Atlanta, GA.

Raman, R., et al. (2015, April). *3D Printed Muscle Powered Biological Machines*. Bioprinting Breakout. Baltimore, MD (Virtual).

Raman, R., et al. (2014, October). *3D Printed Optogenetic Skeletal Muscle-Powered Biological Machines.* BMES Annual Meeting. San Antonio, TX.

Raman, R., et al. (2013, October). *Building with Biology: Using 3D Printing to Forward-Engineer the Future*. SWE National Conference. Baltimore, MD.

Poster Presentations

Raman. R., et al. (2015, October). *3D Printed Light-Controlled Muscle-Powered Biological Machines.* SWE National Conference. Nashville, TN.

Raman, R., et al. (2015, June). *3D Printed Optogenetic Muscle-Powered Biological Machines.* EBICS Annual Retreat. Atlanta, GA.

Raman, R., et al. (2015, May). *3D Printed Optogenetic Muscle-Powered Biological Machines.* CNST Annual Symposium. Urbana, IL.

Raman, R., et al. (2014, December). *A Projection Stereolithography System for High-resolution Patterning of Cells in 3D: Applications in Tissue Engineering of Vasculature.* IEEE EMBS MNM Conference. Oahu, HI.

Raman, R., et al. (2014, December). *3D Printed Optogenetic Skeletal Muscle-Powered Biological Machines.* EBICS Annual Site Visit. Boston, MA.

Raman, R., et al. (2014, October). *A Projection Stereolithography System for High-resolution Patterning of Cells in 3D: Applications in Tissue Engineering of Vasculature.* BMES Annual Meeting. San Antonio, TX.

Raman, R., et al. (2014, June). *3D Printed Optogenetic Skeletal Muscle-Powered Biological Machines.* EBICS Annual Retreat. Urbana, IL.

Raman, R., et al. (2014, April). *A Projection Stereolithography System for High-resolution Patterning of Cells in 3D.* Illinois-Tsinghua Nanotechnology Symposium. Urbana, IL.

Raman, R., et al. (2013, November). *A Projection Stereolithography System for High-resolution Patterning of Cells in 3D.* Bioengineering 10th Anniversary Symposium. Urbana, IL.

Raman, R., et al. (2013, September). *A Projection Stereolithography System for High-resolution Patterning of Cells in 3D.* BMES Annual Meeting. Seattle, WA.

Raman, R., et al. (2013, June). *A Projection Stereolithography System for High-resolution Patterning of Cells in 3D.* EBICS Annual Retreat. Atlanta, GA.

Raman, R., et al. (2013, May). *A Projection Stereolithography System for High-resolution Patterning of Cells in 3D.* CNST Annual Symposium. Urbana, IL.

Raman, R., et al. (2012, August). *Bioreactor Design: Dynamic Compressive Loading of Tissue Engineered Knee Menisci.* NSF IGERT Bionanotechnology Summer Institute. Urbana, IL.

Other Conferences Attended
TTS North America (2015, July). Chicago, IL.
3D Printing for Medical Procedures (2014, May). Singapore.
Society of Women Engineers Regional Conference (2013, February). Minneapolis, MN.

CAMPUS TALKS

Raman, R. et al. (2015, September). *NanoSTRuCT: Integrating Outreach, Communication, and Leadership Experiences for Graduate Students.* Bionanotechnology Seminar. Urbana, IL.

Raman, R., et al. (2015, April). *BioBlocks: Building with Biology*. Entrepreneurship Forum. Urbana, IL.

Raman, R., et al. (2014, September). *3D Microfabrication of Biological Machines*. MechSE Bio-Interest Group Seminar. Urbana, IL.

Raman, R., et al. (2013, December). *Microfabricated Biological Machines for Sensing and Locomotion*. Bionanotechnology Seminar. Urbana, IL.

Raman, R., et al. (2013, April). *A Projection Stereolithography System for High-resolution Patterning of Cells in 3D.* EBICS Symposium. Urbana, IL.

PATENTS

Provisional: Bajaj, P., **Raman, R.**, Bashir, R. Patterned three dimensional encapsulation of biological entities in hydrogels.

Provisional: Chan, V., **Raman, R.**, Cvetkovic, C., Bashir, R. Locomotive Biological Machines.

UNIVERSITY SERVICE & OUTREACH

University of Illinois at Urbana-Champaign

Graduate Society of Women Engineers	2012-Present
Publicity Chair (2012-2015)*, Speaker Coordinator* (2015-Present)	
Mechanical Engineering Graduate Women	2013-Present
Treasurer (2013-2014), *President* (2014-2015), *Secretary* (2015-Present)	
Dean's Engineering Graduate Student Advisory Council, *Elected Member*	2014-Present
NSF EBICS STC Student Leadership Council, *Elected Member*	2013-Present
nanoSTRuCT Outreach Organization, *Board Member*	2013-Present
GAMES Engineering Girls Camp, *Camp Coordinator*	2013-Present
Bionanotechnology Lab Operations and Safety Committee, *Elected Member*	2015-Present
MechSE Council of Fellows	2015-Present
Cornell University Alumni Network, *Admissions Ambassador*	2014-Present
NSF IGERT Student Leadership Council, *Elected Member*	2013-2014

Cornell University

CURIE Engineering Girls Camp, *Camp Coordinator*	2012
Tau Beta Pi Engineering Honor Society, *Engineering Tutor*	2011-2012
American Society of Mechanical Engineers, *Newsletter Committee*	2011-2012
Cornell Engineering Learning Initiatives, *Engineering Tutor*	2010-2012
Cornell Piano Society, *Publicity Director*	2010-2012
Society of Women Engineers, *Corporate Liaison*	2010-2011
Society of Asian Scientists and Engineers, *Director of Club Affairs*	2009-2011

PROFESSIONAL SERVICE

Organization Committee: Women Empowered in STEM Conference 2013-Present
Session Co-Chair, TERMIS World Congress Meeting 2015
Peer Reviewer: Advanced Healthcare Materials 2015
Poster Judge, NSF IGERT Bionanotechnology Symposium 2015

PROFESSIONAL AFFILIATIONS

Biomedical Engineering Society, Society of Women Engineers

PROFESSIONAL EXPERIENCE

Kessler Entrepreneurial Fellow 2011
Rheonix, Inc., Ithaca, NY
Devised novel DNA microarray manufacturing techniques and developed quality control assays for start-up company's automated lab-on-a-chip systems.

Sub-Team Leader 2010
AguaClara Project Team, Ithaca, NY
Led the Chemical Dose Controller sub-team in the AguaClara water purification project, an endeavor to provide potable water to small-scale communities in the Honduras.

Education Intern 2010
Cornell University Laboratory of Ornithology, Ithaca, NY
Developed educational materials and led tours for K-12 students focused on ornithology research and environmental conservation.

TECHNICAL SKILLS

Laboratory: Stereolithography, Cell Culture, Mechanical Testing, Immunostaining, Fluorescence & Confocal Microscopy
Computer: MATLAB, Mathematica, Visual Basic, SolidWorks, ANSYS, COMSOL

MEDIA COVERAGE

National media coverage on research and outreach can be found at RituRaman.com/Publicity

REFERENCES

Rashid Bashir, Abel Bliss Professor and Department Head
Department of Bioengineering
University of Illinois at Urbana-Champaign
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M. Taher A. Saif, Gutgsell Professor
Department of Mechanical Science and Engineering
University of Illinois at Urbana-Champaign
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Hyun Joon Kong, Associate Professor
Department of Chemical and Biomolecular Engineering
University of Illinois at Urbana-Champaign
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