

Raghu Pucha		
Senior Lecturer, School of Mechanical Engineering, Georgia Tech		
05-10-2019		
CV Table of Contents		
Section	Description	Page
I.	Earned Degrees	2
II.	Employment History	2
III.	Honors and Awards	3
IV.	Research, Scholarship, and Creative Activities	3
IV.A.	Published Books, Chapters, and Edited Volumes	3
IV.B.	Refereed Publications and Submitted Articles	4
IV.C.	Other Publications and Creative Products	10
IV.D.	Presentations	10
IV.E.	Grants and Contracts	10
IV.F.	Other Scholarly and Creative Accomplishments	
IV.G.	Societal and Policy Impacts	
IV.H.	Other Professional Activities	
V.	Education	13
V.A.	Courses Taught	13
V.B.	Individual Student Guidance	14
V.C.	Educational Innovations and Other Contributions	16
VI.	Service	17
VI.A.	Professional Contributions	
VI.B.	Public and Community Service	
VI.C.	Institute Contributions	
IV.E5	Proposals Submitted but Not Funded	12

Raghu Pucha
Senior Lecturer
The George W. Woodruff School of Mechanical Engineering

I. Earned Degrees

Degree: Doctor of Philosophy
Major: Aerospace Structures
School: Indian Institute of Science, Bangalore, India
Degree Date: 12/01/1995
Advisor: Prof. A.V.Krishnamurty

Degree: Master of Science
Major: Aerospace Structures
School: Madras Institute of Technology, India
Degree Date: 01/01/1990
Advisor: Prof. N.S.Venkataraman

Degree: Bachelor of Science
Major: Civil Engineering
School: Nagarjuna University, India
Degree Date: 01/01/1988

II. Employment History

Job Title: Senior Lecturer
Organization Name: Georgia Institute of Technology
From date: 11/01/2015 To Present

Job Title: Academic Professional
Organization Name: Georgia Institute of Technology
From date: 08/01/2013 To Date: 10/01/2015

Job Title: Senior Research Engineer
Organization Name: Georgia Institute of Technology
From date: 07/01/2005 To Date: 07/01/2013

Job Title: Post Doctoral Researcher
Organization Name: Georgia Institute of Technology
From date: 01/01/2000 To Date: 06/01/2005
Advisor: Prof. Suresh Sitaraman

Job Title: Post Doctoral Researcher
Organization Name: Purdue University, West Lafayette, IN
From date: 09/01/1997 To Date: 12/01/1999
Advisor: Prof. Horacio Espinosa

Job Title: Research Associate
Organization Name: Nanyang Technological University, Singapore
From date: 06/01/1996 To Date: 08/01/1997
Advisor: Prof. Yue Chee Yoon

III. Honors and Awards

CTL Teaching Scholar, 2018 – 2019, Georgia Tech. – Teaching as Research program.

Inaugural Serve-Learn-Sustain: Food, Energy, and Water Systems (FEWS) Fellow in 2016 to implement sustainability aspects in the curriculum.

CETL Teaching Scholar 2015-2016, Georgia Tech. – to explore research and best practices related to the notion of developing critical thinkers in classroom.

CETL Geoffrey G. Eichholz Faculty Teaching Award 2015, Georgia Tech.

Featured in GT News (The Whistle) 2015 (Putting ‘TECH’ in ‘Teaching’).
(<http://www.news.gatech.edu/features/teaching-tech>,
<http://www.whistle.gatech.edu/archives/15/051115.pdf>)

GWW Woodruff School of Mechanical Engineering Teaching Fellow Spring 2014.

1st place, best undergraduate research poster at UROP Spring 2013 Symposium (for group of mentored UG research students)

CETL Undergraduate Educator Award 2012, Georgia Tech.

Senior Member - American Institute of Aeronautics and Astronautics (AIAA)

Senior Member - Institute of Electrical and Electronics Engineers (IEEE)

Cover Image of Research Work, IEEE Transactions on Components and Packaging Technologies, March 2007. Vol. 30, No. 1, 2007.

1st place in the 2009 ASEE-SE Student Poster Competition Undergraduate Research Division (Student: John Semmens: Designing DNA Nanostructures Using Analytical and NanoCAD Tools)

CETL Inaugural 1969 Teaching Scholar, 2008 – 2009, Georgia Tech. – to develop peer-assisted learning initiative in classroom.

Selected for conducting classroom research on the impact of case study methodology on student learning (Spring 2009) – LITEE National Dissemination Grant Competition, sponsored by NSF DUE # 0442531.

Honored with “Excellence in Teaching” recognition from the Center for Enhancement of Teaching and Learning (CETL) at Georgia Institute of Technology Spring 2007 – Spring 2018.

Invited to the “Dean Griffin Day” program in honor of outstanding contributions to the Georgia Tech Community through teaching. 2008 - 2018: Hosted by Center for Enhancement of Teaching and Learning, and Georgia Tech Alumni Student Ambassadors, Georgia Tech.

IV. Research Scholarship and Creative Activities

A. Published Books, Book Chapters And Volumes

A1. Refereed Book Chapters

[1] (2008). Mixed-Signal Package Reliability. *Introduction to System-on-Package (SOP)* (pp. 443 - 487) by McGraw-Hill, NY.

[2] (2004). Novel board material technology for next-generation microelectronic packaging. *Developments in Dielectric Materials and Electronic Devices, Ceramic Transactions*, 18(21), (pp. 371 - 381)

[3] (2004). Materials and Mechanics Challenges in SOP-based Convergent Microsystems. *Micromaterials and Nanomaterials* (pp. 16 - 29)

B. Refereed Publications And Submitted Articles

B1. Published and Accepted Journal Articles

- 1) Demir, K; Sukumaran,V; Sato,Y; Amrani,A.E; Ramachandran,K; Pucha,R.V; Pulugurtha, M; Sundaram,V; Tummala, R.(2018). *Reliability of fine-pitch through-vias in glass interposers and packages for high-bandwidth computing and communications*. *Journal of Materials Science: Materials in Electronics*, (pp 1-12)
- 2) Song W; Krishnaswamy V; Pucha RV (2016). *Computational homogenization in RVE models with material periodic conditions for CNT polymer composites*. 137 *Composite Structures*, (pp. 9 - 17)
- 3) Bhuiyan, M. A., Pucha, RV., and Kalaitzidou, K (2016). *3D RVE models able to capture and quantify the dispersion, agglomeration and orientation state of CNT in CNT/PP nanocomposites*, *Frontiers in Materials (Composite Materials)*, 3, (pp.1-12)
- 4) Pucha RV; Worthy J (2014). *Representative volume element-based design and analysis tools for composite materials with nanofillers*. 48 *Journal of Composite Materials*, (17) (pp. 2117 - 2129)
- 5) Liu R; Melkote S; Pucha R; Morehouse J; Man X; Marusich T (2013). *An enhanced constitutive material model for machining of Ti-6Al-4V alloy*. 213 *Journal of Materials Processing Technology*, (12) (pp. 2238 - 2246)
- 6) Bhuiyan MA; Pucha RV; Worthy J; Karevan M; Kalaitzidou K (2013). *Understanding the effect of CNT characteristics on the tensile modulus of CNT reinforced polypropylene using finite element analysis*. 79 *Computational Materials Science*, (pp. 368 - 376)
- 7) Bhuiyan MA; Pucha RV; Worthy J; Karevan M; Kalaitzidou K (2013). *Defining the lower and upper limit of the effective modulus of CNT/polypropylene composites through integration of modeling and experiments*. 95 *Composite Structures*, (pp. 80 - 87)
- 8) Pucha R; Utsching T (2012). *Learning-Centered Instruction of Engineering Graphics for Freshman Engineering Students*. *The Journal of STEM Education: Innovations and Research* 13(4), (pp. 24 - 33)
- 9) Bhuiyan MA; Pucha RV; Karevan M; Kalaitzidou K (2011). *Tensile modulus of carbon nanotube/polypropylene composites - A computational study based on experimental characterization*. 50 *Computational Materials Science*, (8) (pp. 2347 - 2353)
- 10) Tummala RR; Sundaram V; Raj PM; Pucha R; Bandyopadhyay T; Kumbhat N; Sridharan V; Walden-Monroe T; Sutter D (2010). *Georgia Tech's Vision for Ultra-miniaturized Device and Systems Packaging*. 14 (pp. 14 - 18)

- 11) Karevan M; Pucha RV; Bhuiyan MA; Kalaitzidou K (2010). *Effect of Interphase Modulus and Nanofiller Agglomeration on the Tensile Modulus of Graphite Nanoplatelets and Carbon Nanotube Reinforced Polypropylene Nanocomposites*. 11 (4) (pp. 325 - 331)
- 12) Kim I; Pucha RV; Peak RS; Sitaraman SK (2008). *Development of reliability allocation and assessment algorithms for designing multilevel microelectronic systems*. 5 Journal of Microelectronics and Electronic Packaging, (1) (pp. 12 - 25)
- 13) Kumbhat N; Raj PM; Pucha RV; Tsai JY; Atmur S; Bongio E; Sitaraman SK; Tummala RR (2007). *Novel ceramic composite substrates for high-density and high reliability packaging*. 30 IEEE Transactions on Advanced Packaging, (4) (pp. 641 - 653)
- 14) Lee KJ; Damani M; Pucha RV; Bhattacharya SK; Tummala RR; Sitaraman SK (2007). *Reliability modeling and assessment of embedded capacitors in organic substrates*. 30 IEEE Transactions on Components and Packaging Technologies, (1) (pp. 152 - 162)
- 15) Kumbhat N; Raj PM; Pucha RV; Sundaram V; Bongio E; Sitaraman S; Tummala RR (2007). *A novel low CTE, high stiffness ceramic composite core*. 18 Circuits Assembly, (1) (pp. 28)
- 16) Varadarajan MG; Lee RJ; Bhattacharya SK; Pucha R; Tummala RR; Sitaraman S (2006). *Printed circuit board (PCB) miniaturization by embedded passives and sequential build-up (SBU) process methodology*. 86 Journal of the Indian Institute of Science, (6) (pp. 639 - 654)
- 17) Hegde S; Pucha RV; Sitaraman SK (2004). *Enhanced reliability of High-Density Wiring (HDW) substrates through new base substrate and dielectric materials*. 15 Journal of Materials Science: Materials in Electronics, (5) (pp. 287 - 296)
- 18) Pucha RV; Hegde S; Damani M; Tunga K; Perkins A; Mahalingam S; Ramakrishna G; Lo GC; Klein K; Ahmad J (2004). *System-level reliability assessment of mixed-signal convergent microsystems*. 27 IEEE Transactions on Advanced Packaging, (2) (pp. 438 - 452)
- 19) Pucha RV; Tunga K; Pyland J; Sitaraman SK (2004). *Accelerated thermal cycling guidelines for electronic packages in military avionics thermal environment*. 126 Journal of Electronic Packaging, Transactions of the ASME, (2) (pp. 256 - 264)
- 20) Pucha RV; Ramakrishna G; Mahalingam S; Sitaraman SK (2004). *Modeling spatial strain gradient effects in thermo-mechanical fatigue of copper microstructures*. 26 International Journal of Fatigue, (9) (pp. 947 - 957)
- 21) Pyland J; Pucha RV; Sitaraman SK (2002). *Thermomechanical reliability of underfilled BGA packages*. 25 IEEE Transactions on Electronics Packaging Manufacturing, (2) (pp. 100 - 106)
- 22) Pucha RV; Pyland J; Sitaraman SK (2001). *Damage metric-based mapping approaches for developing accelerated thermal cycling guidelines for electronic packages*. 10 International Journal of Damage Mechanics, (3) (pp. 214 - 234)

- 23) Zavattieri PD; Raghuram PV; Espinosa HD (2001). *Computational model of ceramic microstructures subjected to multi-axial dynamic loading*. 49 Journal of the Mechanics and Physics of Solids, (1) (pp. 27 - 68)
- 24) Raghuram PV; Krishna Murty AV (1999). *High precision coupled bending-extension triangular finite element for laminated plates*. 72 Computers and Structures, (6) (pp. 763 - 777)
- 25) Raghuram PV (1995). *A high precision thickness-stretch deformation element for the analysis of symmetric laminates under extension*. 2 Mechanics of Composite Materials and Structures, (3) (pp. 181 - 202)
- 26) Govindarajan R; Krishna Murty AV; Vijayakumar K; Raghuram PV (1993). *Finite element estimation of elastic interlaminar stresses in laminates*. 3 Composites Engineering, (5) (pp. 451 - 466)

B2. Conference Presentation with Proceedings (Refereed)

- 1) Pucha, RV., Thurman, CJ; Yow,R; Meeds, CR; and Hirsch, J (2018). *Engagement in Practice: Socio-technical Project-based Learning Model in a Freshman Engineering Design Course*. ASEE Annual Conference & Exposition.
- 2) Pucha, RV; Levy,B; Linsey,J; Newton, SH; Alemdar, M; and Utsching, T. (2017). *Assessing Concept Generation Intervention Strategies for Creativity Using Design Problems in a Freshman Engineering Graphics Course*, ASEE Annual Conference & Exposition.
- 3) Hirsch,J; Yow,R; O'Brien,S; Pucha, RV; Wisdom,N; Realff, M; Zegura, E (2017) *Socio-technical Approaches to Sustainable Community Development in Atlanta*. Atlanta Studies Symposium, Apr.26.
- 4) Hilton E, Li W, Newton SH, Alemdar M, Pucha R, Linsey J. (2016). *The Development and Effects of Teaching Perspective Free-Hand Sketching in Engineering Design*. ASME. International Design Engineering Technical Conferences. doi:10.1115/DETC2016-60250.
- 5) Pucha, RV, Newton, SH., Alemdar, M., and Utschig, TT (2016) *Process-Oriented Intervention and Reflection Strategies for Creativity in Student Design Projects*. 4th international conference on design creativity, Atlanta, GA.
- 6) Pucha R; Utschig TT; Newton SH; Alemdar M; Moore R; Noyes CR (2016). *Critical and creative thinking activities for engaged learning in graphics and visualization course*. ASEE Annual Conference and Exposition, Conference Proceedings. <https://www.asee.org/public/conferences/64/papers/16041/view>
- 7) Demir K; Gandhi S; Ogawa T; Pucha R; Smet V; Sundaram V; Raj PM; Tummala R (2015). *First demonstration of copper-plated through-package-via (TPV) reliability in ultra-thin 3D glass interposers with double-side component assembly*. Proceedings - Electronic Components and Technology Conference (pp. 666 - 671)
- 8) Demir K; Armutlulu A; Tong J; Pucha R; Sundaram V; Tummala R (2014). *First demonstration of reliable copper-plated 30µm diameter through-package-vias in ultra-thin bare glass interposers*. Proceedings - Electronic Components and Technology Conference (pp. 1098 - 1102)

- 9) Bhuiyan A; Pucha RV; Kalaitzidou K (2013). *Characterization of cnt orientation and diameter distribution in CNT/polymer composites by image analysis*. Annual Technical Conference - ANTEC, Conference Proceedings (pp. 2024 - 2027)
- 10) Pucha RV; Utschig TT; Liang SY (2013). *Use of process-oriented approaches in content-intensive courses: Some insight in teaching / learning of machine design*. ASEE Annual Conference and Exposition, Conference Proceedings
- 11) Demir K; Ramachandran K; Sato Y; Chen Q; Sukumaran V; Pucha R; Sundaram V; Tummala R (2013). *Thermomechanical and electrochemical reliability of fine-pitch through-package-copper vias (TPV) in thin glass interposers and packages*. Proceedings - Electronic Components and Technology Conference (pp. 353 - 359)
- 12) Mishra D; Raj PM; Khan S; Kumbhat N; Wang Y; Addya S; Pucha RV; Choudhury A; Sundaram V; Tummala R (2011). *Co-W as an advanced barrier for intermetallics and electromigration in fine-pitch flipchip interconnections*. Proceedings - Electronic Components and Technology Conference (pp. 916 - 920)
- 13) Sukumaran V; Bandyopadhyay T; Chen Q; Kumbhat N; Liu F; Pucha R; Sato Y; Watanabe M; Kitaoka K; Ono M (2011). *Design, fabrication and characterization of low-cost glass interposers with fine-pitch through-package-vias*. Proceedings - Electronic Components and Technology Conference (pp. 583 - 588)
- 14) Chen Q; Bandyopadhyay T; Suzuki Y; Liu F; Sundaram V; Pucha R; Swaminathan M; Tummala R (2011). *Design and demonstration of low cost, panel-based polycrystalline silicon interposer with through-package-vias (TPVs)*. Proceedings - Electronic Components and Technology Conference (pp. 855 - 860)
- 15) Bhuiyan MA; Pucha RV; Karevan M; Kalaitzidou K (2011). *Modeling the effect of filler-matrix contact and fillers' agglomeration on effective modulus of polymer nanocomposites*. Annual Technical Conference - ANTEC, Conference Proceedings (pp. 661 - 664)
- 16) Krishnan G; Fuhun L; Sundaram V; Pucha R; Kennedy S; Baars D; Dobrick J; Guo D; Neill J; Paul S (2008). *High performance organic dielectrics and high density substrates for next generation system on a package (SOP) technology*. Proceedings - Electronic Components and Technology Conference (pp. 2101 - 2104)
- 17) Pucha RV; Hegde S; Damani M; Lee KJ; Tunga K; Perkins A; Mahalingam S; Lo G; Klein K; Ahmad J (2007). *Design-for-reliability tools for highly integrated system-onpackage technology*. EuroSime 2007: International Conference on Thermal, Mechanical and Multi-Physics Simulation Experiments in Microelectronics and Micro-Systems, 2007
- 18) Kumbhat N; Raj PM; Pucha RV; Sundaram V; Bongio E; Sitaraman S; Tummala RR (2007). *Packaging Substrates-A Novel Low CTE, High Stiffness Ceramic Composite Core-A new substrate meets attributes for solder joint reliability, dielectric reliability, low warpage and microvia*. Circuits Assembly (pp. 28 - 29) San Francisco, CA: Miller Freeman Publications, c1990-.
- 19) Kim I; Pucha RV; Peak RS; Sitaraman S (2007). *System-design-for-reliability tools for highly integrated electronic packaging systems*. Proceedings - Electronic Components and Technology Conference (pp. 1809 - 1814)

- 20) Varadarajan MG; Lee KJ; Bhattacharya SK; Bhattacharjee A; Wan L; Pucha R; Tummala RR; Sitaraman S (2006). *Studies on design, fabrication and reliability assessment of embedded passives on a high-density interconnect (HDI) organic substrate using a sequential build-up process*. 2006 Conference on High Density Microsystem Design and Packaging and Component Failure Analysis, HDP'06 (pp. 188 - 198)
- 21) Lee KJ; Pucha R; Varadarajan M; Bhattacharya S; Tummala R; Sitaraman S (2005). *Reliability assessment of embedded capacitors in multilayered microvia organic substrates*. Proceedings - 2005 International Symposium on Microelectronics, IMAPS 2005 (pp. 98 - 103)
- 22) Zheng J; Klein KM; Pucha R; Sitaraman SV; Merlin D; Rajalakshmi S; Sarma DSR; Gewirtz A; Sitaraman SK (2005). *Nano-cantilevers for an ultra-sensitive bio-assay*. 2005 NSTI Nanotechnology Conference and Trade Show - NSTI Nanotech 2005 Technical Proceedings (pp. 402 - 405)
- 23) Kumbhat N; Raj PM; Pucha RV; Atmur S; Doraiswamy R; Sundaram V; Bhattacharya S; Sitaraman SK; Tummala RR (2005). *Recent advances in composite substrate materials for high-density and high reliability packaging applications*. Proceedings - Electronic Components and Technology Conference (pp. 1364 - 1372)
- 24) Kumbhat N; Hegde S; Raj PM; Pucha RV; Doraiswami R; Hayes S; Atmur S; Bhattacharya S; Sitaraman SK; Tummala RR (2004). *Novel board material technology for next-generation packaging*. Proceedings of the International Symposium and Exhibition on Advanced Packaging Materials Processes, Properties and Interfaces (pp. 247 - 252)
- 25) Hegde S; Pucha RV; Guidotti D; Liu F; Chang YJ; Tummala R; Chang GK; Sitaraman SK (2004). *Design, fabrication, and reliability testing of embedded optical interconnects on package*. Proceedings - Electronic Components and Technology Conference (pp. 895 - 900)
- 26) Sundaram V; Tummala R; White G; Lim K; Wan L; Guidotti D; Liu F; Bhattacharya S; Pulugurtha RM; Abothu IR (2004). *System-on-a-Package (SOP) substrate and module with digital, RF and optical integration*. Proceedings - Electronic Components and Technology Conference (pp. 17 - 23)
- 27) Mahalingam S; Hegde S; Ahmad J; Pucha RV; Sundaram V; Liu F; White G; Tummala R; Sitaraman SK (2004). *Materials, processes and reliability of mixed-signal substrates for SOP technology*. Proceedings - Electronic Components and Technology Conference (pp. 1630 - 1635)
- 28) Damani M; Pucha RV; Bhattacharya S; Tummala R; Sitaraman S (2004). *Physics-based reliability assessment of embedded passives*. Proceedings - Electronic Components and Technology Conference (pp. 2027 - 2031)
- 29) Tunga K; Kacker K; Pucha RV; Sitaraman SK (2004). *Accelerated thermal cycling: Is it different for lead-free solder?*. Proceedings - Electronic Components and Technology Conference (pp. 1579 - 1585)
- 30) Kumbhat N; Raj PM; Pucha RV; Sundaram V; Doraiswami R; Bhattacharya S; Hayes S; Atmur S; Sitaraman SK; Tummala RR (2004). *Next generation of package/board materials technology for ultra-high density wiring and fine-pitch reliable*

interconnection assembly. Proceedings - Electronic Components and Technology Conference (pp. 1843 - 1850)

- 31) Tunga K; Pyland J; Pucha RV; Sitaraman SK (2003). *Field-use conditions vs. thermal cycles - A physics-based mapping study*. Proceedings - Electronic Components and Technology Conference (pp. 182 - 188)
- 32) Mahalingam S; Hegde S; Ramakrishna G; Pucha RV; Sitaraman SK (2003). *Material interaction effects in the reliability of High Density Interconnect (HDI) boards*. American Society of Mechanical Engineers, Electronic and Photonic Packaging, EPP (pp. 165 - 170)
- 33) Ramakrishna G; Pucha RV; Sitaraman SK (2002). *Micro-scale plasticity effects in microvia reliability analysis*. Proceedings - Electronic Components and Technology Conference (pp. 1304 - 1309)
- 34) Hegde S; Pucha RV; Takahashi A; Takano N; Sitaraman SK (2002). *Thermomechanical reliability of high density wiring substrates*. Thermomechanical Phenomena in Electronic Systems -Proceedings of the Intersociety Conference (pp. 919 - 925)
- 35) Hegde S; Pucha RV; Sitaraman SK (2002). *Selection of optimal materials and geometry for reliability of high density wiring substrates*. Proceedings - Electronic Components and Technology Conference (pp. 446 - 451)
- 36) Hegde S; Pucha RV; Takahashi A; Takano N; Sitaraman SK (2002). *Thermomechanical reliability of high density wiring substrates*. InterSociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems, I THERM (pp. 919 - 925)
- 37) Tunga K; Pyland J; Pucha RV; Sitaraman SK (2002). *Study on the choice of constitutive and fatigue models in solder joint life prediction*. ASME International Mechanical Engineering Congress and Exposition, Proceedings (pp. 329 - 335)
- 38) Hegde S; Pucha RV; Sitaraman SK (2002). *Enhanced reliability of high density wiring (HDW) substrates through new dielectric and base substrate materials*. American Society of Mechanical Engineers, Electronic and Photonic Packaging, EPP (pp. 283 - 290)
- 39) Hegde S; Pucha RV; Sitaraman SK (2002). *Enhanced reliability of High Density Wiring (HDW) substrates through new dielectric and base substrate materials*. ASME International Mechanical Engineering Congress and Exposition, Proceedings (pp. 283 - 290)
- 40) Tunga K; Pyland J; Pucha RV; Sitaraman SK (2002). *Study on the choice of constitutive and fatigue models in solder joint life prediction*. American Society of Mechanical Engineers, Electronic and Photonic Packaging, EPP (pp. 329 - 335)
- 41) Pyland J; Pucha R; Sitaraman S (2001). *Effect of underfill on BGA reliability*. Proceedings - Electronic Components and Technology Conference (pp. 85 - 90)
- 42) Pucha RV; Ramakrishna G; Sitaraman SK (2001). *Mechanics issues at micro-scale modeling of electronic packages*. ASME International Mechanical Engineering Congress and Exposition, Proceedings (pp. 2135 - 2144)

43) Pyland J; Pucha R; Sitaram S (2000). *Does underfilling enhance BGA reliability?*. Proceedings of the Electronic Packaging Technology Conference, EPTC (pp. 241 - 245)

44) Pucha RV; Utschig TT *Computer-Aided-Nano-Design Education in the Engineering Curriculum: Scope and Challenges*. Proceedings of 2009 ASEE Southeast Section Conference. <http://se.asee.org/proceedings/ASEE2009/papers/PR2009066PUC.PDF>

C. Other Publications and Creative Products

Provisional Patents

US 61/378,625, “Stress-Decoupling Through Via-Structures, Materials and Methods”, Raj, P.M., Kumbhat, N. Pucha, R.V., Sundaram, V., and Tummala, R.R., 2010

US60/587,945, “Trench-Via Shape Design for Improved Mechanical and Electrical Reliability of On-Chip Interconnect with Cu/Low-K,” Zheng, J., Sitaraman, S.K., and Pucha, R.V., 2004.

US60/591,508, “Cu/low-K Interface Adhesion Enhancement Through Nano-Colonies of Adhesive Materials,” Zheng, J., Sitaraman, S.K., and Pucha, R.V., 2004.

D. Presentations

- Pucha, R.V (2016). Creative and Critical Thinking Skills for Engaged Learning in Cornerstone Design Course. Poster Presentation, *Celebrating Teaching Day*, Student Center Ball room, Georgia Tech.
- Pucha, R.V (2014). Integrated Design-Analysis tools for Manufacturing of Nanocomposites with Engineered Properties. Invited Talk, *Mechanical Engineering Seminar Series*, Auburn University.
- Zweben, C., Hu, H., Pucha, R.V., Sitaraman, S.K., Tummala, R., Qu, J. and White, G. (2001). Development of the next generation of base substrates: concepts and analytical methods. *The International Symposium & Exhibition on Advanced Packaging Materials*, Braselton, Georgia, USA.
- Espinosa, H.D., Pucha, R.V., and Patanella, A. (1999). Dynamic compression-shear testing of brittle materials with specimen recovery. *The 15th US Army Symposium on Solid Mechanics*, Myrtle Beach, South Carolina, USA.
- Pucha, R.V., Dwivedi, S., Zavattieri, P.D. and Espinosa, H.D. (1998). Modeling size effects in brittle materials undergoing damage and fragmentation. *The 13th U.S. National Congress of Applied Mechanics*, University of Florida, USA, June 1998.
- Patanella, A.J., Arrieta, H.V., Fischer, M., Xu, Y., Pucha, R.V., and Espinosa, H.D. (1998). Pressure – shear recovery experiments in brittle materials. *ICEM – 98*, Oxford, UK, 24-28, August 1998.
- Pucha, R.V., Govindarajan, R., Kanmani, T. and Krishna Murty, A.V. (1990). Estimation of interlaminar stresses through finite elements. *The 42nd Annual general body meeting, Aeronautical Society of India*. Calcutta, India.

E. Grants And Contracts

E1. As Co-Principal Investigator

Title: SUSTAINABLE MANUFACTURING VIA MULTI-SCALE PHYSICS-BASED PROCESS MODELING...
Agency: THIRD WAVE SYSTEMS/MINNEAPOLIS, MN
Amount: 809,968.00
Role: co-PI
Collaborators: Shreyes Melkote (PI), Roshan Vengazhiyil (co-PI), John Morehouse (co-PI), Raghuram Pucha (co-PI)
Period of Contract: 09/01/2012 - 12/30/2015
Title: Multidisciplinary Materials Information Network Seed Grant
Agency: Institute of Materials, Georgia Tech
Amount: 15,000.00
Role: co-PI
Collaborators: Dr. Kyriaki Kalaitzidou (PI) and Dr. Surya Kalidindi (Co-PI)
Raghuram Pucha (co-PI)
Period of Contract: September 1, 2014 - June 30, 2015

E2. As Senior Personnel or Contributor

Title: REVAMP (Research Experience for Student Veterans in Advanced Manufacturing and Entrepreneurship)
Agency: NSF Research Experience for Undergraduates (REU) grant
Amount: 360,000.00
Role: Contributor
Collaborators: Chun (Chuck) Zhang (PI), John Morehouse (Co-PI)
Period of Contract: Summer 2014 – Summer 2017

Title: SCITRAIN UNIVERSITY
Agency: US DEPT OF EDUCATION/GENERAL
Amount: 907,833.00
Role: Contributor
Collaborators: Robert Todd (PI)
Period of Contract: 10/01/2008 - 10/01/2012

Title: PRC EMBEDDED ACTIVES & PASSIVES (EMAP) CONSORTIUM
Agency: VARIOUS
Amount: 2,600,000.00
Role: Contributor
Collaborators: Rao Tummala (PI)
Period of Contract: 01/08/2007 - 05/31/2012

Title: ADVANCED PACKAGING PROGRAM
Agency: DUPONT TECHNOLOGIES/RESEARCH TRIANGLE PARK, NC
Amount: 568,000.00
Role: Contributor
Collaborators: Rao Tummala (PI)
Period of Contract: 09/01/2004 - 04/30/2008

Title: CERAMIC MATRIX COMPPSITE BOARDS FOR SOP AND SIP ELECTRONIC PACKAGING
Agency: STARFIRE SYSTEMS/WATERVLIET, NY
Amount: 800,264.00
Role: Contributor
Collaborators: Rao Tummala (PI)
Period of Contract: 11/01/2002 - 11/24/2005

Candidate's Share:

Title: ERC - LOW COST ELECTRONIC PACKAGING
Agency: NATIONAL SCIENCE FOUNDATION (NSF)/GENERAL
Amount: 29,606,169.00
Role: Contributor
Collaborators: Rao Tummala (PI)
Period of Contract: 11/01/1994 - 10/31/2006

Mechanical Design of Embedded Capacitor Stack against Delamination Failures (consultant to DuPont): March 2007 - June 2007

Contributor: Microstructure Evaluation and Reliability Assessment tool for Lead-free Component Insertion in Army Electronics: Contract number: W911NF-06-1-0304 August 2006 – July 2008

Contributor: A Partnership between Dupont and Packaging Research Center (PRC) in Advanced Integrated Package with 2007 Attributes. August 2004 - August 2005

Contributor: Ceramic Matrix Composite Boards for Next-generation Micro/nano Electronic Systems, Funded by National Institute of Standards and Technology (NIST) through Advanced Technology Program (ATP): January 2003 - December 2005

Contributor: Chip Seal: Physics of Failure Reliability Models of SiC Passivated Seal for Plastic Encapsulated Microcircuits (PRC Development for LCP Substrates): June 2001 – June 2002

Air Products ME UG Research Award, Georgia Tech, Spring 2014 (Student: Kristin Hansen), Spring 2015 (Student: Won sup Song), Spring 2016 (Student: Kwon Lee)

Undergraduate Research Opportunities Program (UROP), Georgia Tech:
GTRC PURA: 2506U16 (Fall 2016), 2506V00 (Spring 2017), 2506Q91 (Fall 2015), 2506Q96 (Fall 2015), 2506Q29 (Summer 2015), 2506L00 (Spring 2014), 2506H91 (Fall 2013), 2506G19 (Spring 2012), 2506G20 (Spring 2012), 2506F28 (Summer 2011), 2506C22 (Fall 2009), 2506B72 (Summer 2009), 2506B36 (Spring 2009), 2506B38 (Spring 2009), 25066YX (Fall 2008).

E3. Proposals Submitted But Not Funded

Title: COLLABORATIVE RESEARCH: POLYMER NANOCOMPOSITES WITH ENGINEERED TENSILE...
Sponsoring Agency: NATIONAL SCIENCE FOUNDATION (NSF)/GENERAL
Amount Requested: 226,059
PI: KALAITZIDOU, KYRIAKI
Co-PI: PUCHA, RAGHURAM
Status: Decline
Submitted Date: 09/17/2014

Title: COLLABORATIVE RESEARCH: POLYMER NANOCOMPOSITES WITH ENGINEERED TENSILE...
Sponsoring Agency: NATIONAL SCIENCE FOUNDATION (NSF)/GENERAL
Amount Requested: 233,204
PI: KALAITZIDOU, KYRIAKI
Co-PI: PUCHA, RAGHURAM

Status: Decline
Submitted Date: 02/24/2014

V. Education

A. Courses Taught (Total number of students taught to date: 5018)

Year	Term	Course Number	Course Title	Credit Hours	No. of Students
2018	Fall	1770 H & I	Intro to Engr Graphics	3	83
2018	Fall	COE 2001L	Statics	2	57
2018	Summer	4041 A	Computer Graphics & Cad	3	17
2018	Summer	MLDR 8803	Special Topics QML	3	14
2018	Spring	1770 B & D	Intro to Engr Graphics	3	83
2018	Spring	6124	Finite Element Mehtod	3	61
2017	Fall	1770 B,H & I	Intro to Engr Graphics	3	123
2017	Fall	COE 3001H	Deformable Bodies	3	62
2017	Summer	COE 3001B	Deformable Bodies	3	63
2017	Summer	4041 A	Computer Graphics & Cad	3	13
2017	Spring	1770 A,B & I	Intro to Engr Graphics	3	130
2016	Fall	1770 A, B, H & I	Intro to Engr Graphics	3	182
2016	Fall	4698PUC	Research Assistantship	1	1
2016	Fall	4699PR3	Undergraduate Research	3	4
2016	Spring	1770 A, B, D & I	Intro to Engr Graphics	3	185
2016	Spring	4698PR3	Research Assistantship	3	2
2016	Spring	4699PR3	Undergraduate Research	3	4
2016	Spring	2699PR3	Undergraduate Research	3	1
2016	Spring	4699PR2	Undergraduate Research	2	1
2016	Summer	2699PR3	Undergraduate Research	3	1
2016	Summer	4699PR3	Undergraduate Research	3	1
2016	Summer	4041A & B	Computer Graphics & Cad	3	22
2015	Fall	2698PR3	Research Assistantship	3	1
2015	Fall	4699PR3	Undergraduate Research	3	5
2015	Fall	4698PR3	Research Assistantship	3	1
2015	Fall	1770 A, B, H & I	Intro to Engr Graphics	3	191
2015	Spring	1770 E, F & G	Intro to Engr Graphics	3	132
2015	Spring	4698PUC	Research Assistantship	3	4
2015	Spring	4699PUC	Undergraduate Research	3	2
2015	Summer	4041 A & B	Computer Graphics & Cad	3	20
2015	Summer	4698PR3	Research Assistantship	3	1
2015	Summer	4699PR2	Undergraduate Research	2	2
2015	Summer	4699PR3	Undergraduate Research	3	2
2015	Summer	2699PR3	Undergraduate Research	3	1
2014	Fall	1770 D, E, G & F	Intro to Engr Graphics	3	166
2014	Fall	2699PUC	Undergraduate Research	3	2
2014	Fall	4698PUC	Research Assistantship	3	1
2014	Fall	4699PUC	Undergraduate Research	3	6
2014	Spring	4699PUC	Undergraduate Research	3	1
2014	Spring	1770 A, B, D & E	Intro to Engr Graphics	3	178
2014	Spring	4698PUC	Research Assistantship	3	2
2014	Summer	4041 A & B	Computer Graphics & Cad	3	21
2014	Summer	4699PUC	Undergraduate Research	3	3
2014	Summer	2698PUC	Research Assistantship	3	1
2013	Fall	1770 A, B, E & I	Intro to Engr Graphics	3	156
2013	Fall	4699PUC	Undergraduate Research	3	3
2013	Spring	1770 B, C, E & F	Intro to Engr Graphics	3	156
2013	Spring	4698PUC	Research Assistantship	3	1

2013	Spring	2699PUC	Undergraduate Research	3	1
2013	Spring	4699PUC	Undergraduate Research	3	1
2013	Summer	4699PUC	Undergraduate Research	3	5
2013	Summer	2699PUC	Undergraduate Research	3	1
2012	Fall	2699PUC	Undergraduate Research	3	1
2012	Fall	1770 A & E	Intro to Engr Graphics	3	77
2012	Fall	4699PUC	Undergraduate Research	3	4
2012	Fall	3180 B & RCC	Machine Design	3	78
2012	Fall	3001H	Deformable Bodies	3	67
2012	Spring	1770 B, C, E & F	Intro to Engr Graphics	3	156
2012	Spring	4698PUC	Research Assistantship	3	2
2012	Spring	2699PUC	Undergraduate Research	3	2
2012	Spring	4699PUC	Undergraduate Research	3	2
2012	Summer	4699PUC	Undergraduate Research	3	3
2011	Fall	3180B,RPY& RCC	Machine Design	3	91
2011	Fall	1770 B, C & E	Intro to Engr Graphics	3	117
2011	Fall	4699PUC	Undergraduate Research	3	2
2011	Spring	1770 B, E, C & F	Intro to Engr Graphics	3	154
2011	Spring	4699PUC	Undergraduate Research	3	3
2011	Summer	4041 A & B	Computer Graphics & Cad	3	21
2010	Fall	1770 B, C, E & F	Intro to Engr Graphics	3	156
2010	Spring	1770 B, C, E & F	Intro to Engr Graphics	3	156
2010	Spring	4699PUC	Undergraduate Research	3	2
2009	Fall	4698PUC	Research Assistantship	3	1
2009	Fall	1770 B, C, E & F	Intro to Engr Graphics	3	155
2009	Fall	4699PUC	Undergraduate Research	3	1
2009	Spring	1770 B, C, E & F	Intro to Engr Graphics	3	156
2009	Spring	4698PUC	Research Assistantship	3	2
2009	Summer	4041 A & B	Computer Graphics & Cad	3	27
2009	Summer	4698PUC	Research Assistantship	3	1
2009	Summer	4699PU2	Undergraduate Research	2	1
2008	Fall	4698PUC	Research Assistantship	3	1
2008	Fall	1770 A, B, D & E	Intro to Engr Graphics	3	159
2008	Fall	4699PUC	Undergraduate Research	3	1
2008	Spring	1770 A, C, D & F	Intro to Engr Graphics	3	160
2008	Spring	4041 A & B	Computer Graphics & Cad	3	44
2008	Summer	4041 A & B	Computer Graphics & Cad	3	37
2007	Fall	1770 A,B,D,E&I	Intro to Engr Graphics	3	197
2007	Fall	4041 A & B	Computer Graphics & Cad	3	25
2007	Spring	1770 A,B,D,E&I	Intro to Engr Graphics	3	187
2007	Spring	4041 A & B	Computer Graphics & Cad	3	28
2007	Summer	4041 A & B	Computer Graphics & Cad	3	28
2006	Fall	1770 A,B,D,E&I	Intro to Engr Graphics	3	183
2006	Fall	4041 A & B	Computer Graphics & Cad	3	29
2006	Spring	4041 A & B	Computer Graphics & Cad	3	44
2006	Spring	1770 A,B,D,E&G	Intro to Engr Graphics	3	190
2006	Summer	4041 A & B	Computer Graphics & Cad	3	27
2005	Fall	1770 A, D, E & H	Intro to Engr Graphics	3	148

B. Individual Student Guidance

B1. Ph.D. Students

Nature of Guidance: through research collaboration with other Faculty

Rui Liu: Graduated in Fall 2014

Atiq Bhuiyan: Graduated in Spring 2014

B2. M.S. Students

Nature of Guidance: through research collaboration with other Faculty

- KJ Lee: Graduated in Fall 2005
- Manoj Damani: Graduated in Summer 2004
- Krsihna Tunga: Graduated in Spring 2004
- Shahsikanth Hegde: Graduated in Spring 2003
- Gyan Ramakirshna: Graduated in Summer 2002
- James Pyland: Graduated in Spring 2002

B3. Undergraduate Students

Nature of Guidance: Undergrad research option thesis advisor

- Wonsup Song: Spring 2014 – Spring 2016 (Thesis: *Percolation, Electrical Conductivity, and EMI Shield Analysis of CNT Composites*)
- Johnny Worthy: Summer 2011 – Spring 2013 (Thesis: *Design Tools for Simulation of Nanocomposite Material Properties*)

Nature of Guidance: Mentored through UG research for credit or research for pay or UG research awards including President Undergraduate Research Award (PURA) and School of ME UG research awards sponsored by *Air products*.

- Anuja Kandare (Spring 2017 - Present)
- William Chen (Summer 2016 – Present), Jaesoek Cha (Fall 2016), Jieun Seong (Summer 2016 – Fall 2016), Kwon Lee (Spring 2016) Ivan Chen (summer 2016 – Fall 2016), Vikram Krishnaswamy (Spring 2015 – Spring 2016), Miles Chan (Spring 2015 – Spring 2016)
- Robert Ashcom (Summer 2015) , Walter Scott (Summer 2015 – Spring 2016), Kwon Lee (Summer 2015 – Fall 2015), Rebecca Withers (Summer 2015), Yash Gore (Summer 2015)
- Kristin Hansen (Spring 2014), Hannah Littmann (Spring 2014), Patrick Younes (Spring and Fall 2014), Yue Chu (Summer and Fall 2014), Maegan Tucker (Summer 2014), Moriah Mattson (Summer 2014), Thomas Ming (Summer and Fall 2014), Amit Agarwal (Summer 2014), Alejandro Boxill (Fall 2014), Rahul Dunganwal (Fall 2014), Izaak Lakhia (Fall 2014), Scott Wagner (Fall 2014)
- Dhruv Mehta, Summer 2013; John Hooie, Summer 2013; Hannah Littman, Summer 2013; Joshua Price, Summer 2013; Shadi Renno, Fall 2013; Kristin Hansen, Fall 2013; Johnny Worthy: Summer 2011 – Spring 2013; Ravi Haskar: Spring 2013; Davis Hoffman: Spring 2013;
- Joshua Price: Fall 2012; Prakar Srivatsav: Fall 2012; Bob Palmer: Fall 2011 and Spring 2012; Nicole Wisner: Spring 2012; Tapan Asgoankar: Spring 2012; Panos Markou: Spring 2012; Kylie Alea: Spring 2012;
- Parth Jariwala, NASA Summer Fellowship – Summer 2011; Akhil Modi: Summer 2011; Alexis Noel: Spring 2011; Siddarth Gangopadhyay: Spring 2011; Akshay Saxena: Spring 2011;

- Ajeya Karajgikar: Spring 2010 ; Kavneet Seth: Spring 2010, Summer 2009, Fall 2008; Sahil Batta: Fall 2009; Adnan Hannan: Summer 2009 ; Yasaman Nemat-bakhsh: Spring 2009; John Semmens: Spring 2009; Rob Parrish: Fall 2008

Nature of Guidance: Mentored through Summer Undergraduate Research REVAMP award, GTMI, Georgia Tech.

- Summer 2016 (Student: Alisha Whitehead, The University of Texas at Dallas)
- Summer 2016 (Student: Richa Prasad, Purdue University)
- Summer 2015 (Student: Bryson Sin, Virginia Commonwealth University)
- Summer 2014 (Student: Dominic Critchlow, Austin Peay State University)

Nature of Guidance: Mentored through SURE program, Georgia Tech.

- Summer 2018 (Student: Michael Johnson, Fort Valley State University)
- Summer 2017 (Student: Samuel Dean, University of Central Florida)
- Summer 2012 (Student: Orlando J. Lopez, University of Puerto Rico)

B4. Service on Thesis or Dissertation Committees

Kaya Demir: PhD, School of Electrical and Computer Engineering, Georgia Tech (Fall 2016)

Faisal Siddiqui: PhD, School of Aerospace Engineering, Georgia Tech (Summer 2015)

Atiq Bhuiyan: PhD, School of Mechanical Engineering, Georgia Tech (Summer 2013)

Ganesh Krishnan: MS, School of Materials Science & Engineering, Georgia Tech (Fall 2008)

Injoong Kim: PhD Student, School of Mechanical Engineering, Georgia Tech (Fall 2007)

C. EDUCATIONAL INNOVATIONS AND OTHER CONTRIBUTIONS

- 1) Students construct knowledge through gathering and synthesizing information, and integrating it with the general skills of inquiry, communication, critical thinking, and problem solving. This process enables students to take ownership of their learning. Freshman engineering core course ME 1770: *Introduction to Engineering Graphics and Visualization* was revamped from lecture-centered time-bound exam based teaching approach to learning-centered project-based teaching/learning course. (see Pucha R; Utsching T (2012). *Learning-Centered Instruction of Engineering Graphics for Freshman Engineering Students*. The Journal of STEM Education: Innovations and Research 13(4), pp. 24 - 33)
- 2) Teaching / Learning methodologies have traditionally seen content and process as competing priorities. Integrating content and process together in the teaching/ learning activities offers the opportunity to increase students' experience with authentic activities while also achieving deeper content understanding. Prior knowledge activation also has strong facilitative effects on learning. Prior knowledge provides learners with a relevant context in which new information can be integrated. Core course ME 3180: Machine Design, was taught with process-oriented CAD activities students learned from ME 1770. (see Pucha RV; Utschig TT; Liang SY (2013). *Use of process-oriented approaches in content-intensive courses: Some insight in teaching /*

learning of machine design. ASEE Annual Conference and Exposition, Conference Proceedings).

- 3) In cornerstone design courses, design thinking skills that support an iterative loop of divergent (creative) and convergent (critical) thinking through project-based learning environments are needed in addition to instruction of graphics and visualization tools. Critical thinking skills have a more established history in academia and in engineering programs, most specifically for teaching problem solving. Universities teach creative thinking skills to a much lesser extent, perhaps because of a lack of understanding of how we define creativity. There are several open research questions on design pedagogy and how effective inquiry, the systematic interplay between divergent and convergent questions that are taught and promoted as part of engineering education. Creative and critical thinking interventions in individual projects with authentic activities for improved learning were introduced in freshman engineering core course ME 1770: Introduction to Engineering Graphics and Visualization. See
(i) Pucha, RV, Newton, SH., Alemdar, M., and Utschig, TT (2016) *Process-Oriented Intervention and Reflection Strategies for Creativity in Student Design Projects*. 4th international conference on design creativity, Atlanta, GA.
(ii) Pucha R; Utschig TT; Newton SH; Alemdar M; Moore R; Noyes CR (2016). *Critical and creative thinking activities for engaged learning in graphics and visualization course*. ASEE Annual Conference and Exposition, Conference Proceedings.
(iii) Pucha, RV; Levy, B; Linsey, J; Newton, SH; Alemdar, M; and Utschig, T. (2017). *Assessing Concept Generation Intervention Strategies for Creativity Using Design Problems in a Freshman Engineering Graphics Course*, ASEE Annual Conference & Exposition.
- 4) In January 2016, Georgia Tech launched a campus-wide academic initiative, “Center for Serve-Learn-Sustain”, aimed at preparing undergraduate students in all majors to use their disciplinary knowledge and skills to contribute to the major societal challenge of creating sustainable communities. The initiative collaborates with faculty in all six Georgia Tech colleges to develop courses and co-curricular opportunities that will help students learn about sustainability and community engagement and hone their skills by engaging in real-world projects with nonprofit, community, government, and business partners. A Socio-technical project-based learning model is currently used in a freshman-engineering course, ME 1770. Contextualized design problems are assigned to engage students throughout the course. See
(i) Pucha, RV., Thurman, CJ; Yow, R; Meeds, CR; and Hirsch, J (2018). *Engagement in Practice: Socio-technical Project-based Learning Model in a Freshman Engineering Design Course*. ASEE Annual Conference & Exposition.
(ii) Hirsch, J; Yow, R; O’Brien, S; Pucha, RV; Wisdom, N; Realf, M; Zegura, E (2017) *Socio-technical Approaches to Sustainable Community Development in Atlanta*. Atlanta Studies Symposium, Apr.26.

VI. Service

A. Professional Contributions

Member: ASME, American Society of Mechanical Engineers
1997 to present

Member: ASEE, American Society for Engineering Education
2005 to present

Senior Member: IEEE, Institute of Electrical and Electronics Engineers
2002 to present

Senior Member
AIAA, American Institute of Aeronautics and Astronautics,
1997 to present

Chair, Pre-College Outreach / STEM K-12, AIAA Atlanta Chapter Fall 2012 – 2017

Associate Editor: Engineering Design Graphics Journal, 2014 - 2018

Technical Reviewer: Design of Materials, Composite Structures, IEEE Transactions on Advanced Packaging, IEEE Transactions on Components and Packaging Technologies, ASME Journal of Electronic Packaging, ESIME 2003: European Conference on Microelectronics Reliability

B. Public and Community Service

Judge: Intel International Science and Engineering Fair, Arizona, 2016

Judge: for Georgia Science and Engineering Fair, Athens GA. 2012 – Present

Selection Judge (Eng. Design division): Georgia Governor's Honors Program 2015 - present

C. Institute Contributions

G. W.W. School Instructional Labs Committee, Fall 2014- present

Mentor, CETL Teaching Fellows program, Fall 2015

Judge, Georgia Tech Undergraduate Research Symposium 2012, 2013

Judge, Georgia Tech InventurePrize 2013