Ph.D. Candidate

Department of Mechanical Engineering and Energy Processes
Southern Illinois University Carbondale
1230 Lincoln Dr., Carbondale, IL 62901-6603
Phone: (618) 555-1212 Office: (618) 555-1111 Fax: (618) 555-2222
E-mail: gradstudent@siu.edu

EDUCATION

Southern Illinois University Carbondale, Carbondale, IL May 2011 – May 2015
Ph.D. in Engineering Science, Concentration: Mechanical Engineering GPA: (4.0/4.0)
Dissertation: *Bond Strength Evaluation in Composite Adhesive Joints Using NDE and DIC Methods*
Dissertation advisor: Dr. Tsuchin Philip Chu

Southern Illinois University Carbondale, Carbondale, IL August 2009 – May 2011
M.S., Mechanical Engineering GPA: (3.8/4.0)
Thesis: *Intelligent Systems Approach in Detecting Defects in Aircraft Composites by Using Air-Coupled Ultrasonic Testing*
(***Outstanding Master's Thesis Award***)
Thesis advisor: Dr. Tsuchin Philip Chu

University of Evansville, Evansville, IN August 2004 – May 2008
B.S., Mechanical Engineering GPA: (3.75/4.0)

RESEARCH INTERESTS

- Experimental Mechanics: Image correlation and Digital Image Correlation
- Finite element modeling and simulation
- Strength characterization of adhesively bonded composite structures
- Non-destructive Evaluation (NDE): Ultrasonics and Infrared Thermography
- Aerospace composites: Carbon-Carbon (C/C) Composites, Carbon Fiber Reinforced Panels (CFRP), Thermo-plastic composites, and Honeycomb materials
- Composite Repairs
- Machine learning and Artificial Intelligence Approach for an automated defect detection, classification, and characterization in aerospace composites;
- Ultrasonic and Infrared Thermal Signal Processing: Noise Reduction, Segmentation, Feature Extraction, and Classification
- Fracture mechanics
- Monitoring and characterizing fatigue damage in aerospace composites
- Microstructural and morphological characterization of materials
- Automotive braking materials

RESEARCH EXPERIENCE

Laboratory Supervisor & Graduate Research Assistant January 2011 – Present
Intelligent Measurement and Evaluation Laboratory
Department of Mechanical Engineering and Energy Processes
Southern Illinois University Carbondale, Carbondale, IL

- Managed and mentored several graduate and undergraduate students in conducting research, preparation, submission, and publication of research findings.
- Collaborated and lead numerous projects that were a direct outcome of several industries/governmental agencies need.
    1. Prediction of bond strength in composite joints by using hybrid NDE and Digital Image Correlation (DIC) methods (ongoing effort with the Boeing Company).
    2. Non-destructive characterization of kissing bonds in adhesive joints (NAVY STTR project - Collaborated with Dr. Jaswinder Singh Sandhu, President, Santec Systems, Inc.).
    3. NDE of composite repairs (Collaboration with Keven Mitchell, Prof. Aviation Technologies, SIUC and Sandia National Laboratories).
    4. Intelligent NDE expert system for carbon based composites used for aircraft and aerospace applications (Funded by Boeing Company).
    5. Automated circular air-coupled ultrasonic approach for Carbon/Carbon aircraft brake applications (Funded by Center for Advanced Friction Studies, SIUC).
- Worked with Airstar Inc. and received $40,000 worth air-coupled ultrasonic instruments and software.
- Developed short NDE modules for the development of NDE courses in SIUC.
- Prepared various external and internal grant proposals, technical project reports, and delivered presentations.

Graduate Research Assistant August 2009 – July 2013

Center for Advanced Friction Studies
Southern Illinois University, Carbondale, IL

- Worked on several projects aimed at developing effective non-destructive evaluation (NDE) techniques for commercial Carbon/Carbon composites aircraft brake disks by using air-coupled ultrasonic and infrared thermography methods.
- Developed an automated circular air-coupled ultrasonic NDE technique for Carbon/Carbon composites aircraft brake disks applications.
- Collaborated with industries and individuals working in braking materials for automotive and aircraft applications.

Graduate Research Assistant March 2010 – June 2010

Department of Educational Psychology and Special Education
Southern Illinois University Carbondale, Carbondale, IL

- Developed subroutine and functions in FORTRAN 95 for estimating item parameters of the mixed model by using Marginal Maximum Likelihood Estimation (MMLE)/ Expectation Maximization EM algorithm.

TEACHING EXPERIENCE

Instructor December 2010 – May 2011; July 2013 – Present

ME 475: Machine Design; **ME 492 – Independent Study**

Department of Mechanical Engineering and Energy Processes
Southern Illinois University Carbondale, Carbondale, IL

- Develop course syllabi; design and grade weekly homework; assign group work, midterm, and final exams; design and grade a design project with weekly progress reports; as well as helping students understand and apply the principles of mechanical design.
- Push and challenge students to go beyond the materials presented in the class and tried them to engage in the educational experience.
- Help student enhance their critical thinking abilities by explaining them some of the difficult problems from a different perspective.
- Introduce and foster ethical values and understanding of sociocultural values in engineering to students.

Teaching Assistant August 2009 – December 2009; August 2011 – December 2011

Department of Mechanical Engineering and Energy Processes

Southern Illinois University Carbondale, Carbondale, IL

- Collaborated with Professors in preparing course material and grading policies, improving communication skills.
- Organized several help sessions beyond office hours to assist students understand, solve homework problems, and succeed in the classes.
- Evaluated students' homework, tests, exams and kept record of the scores using Excel

Undergraduate Teaching Assistant August 2005 – May 2008

Department of Mechanical Engineering

University of Evansville, Evansville, IN

- Delivered individual and group tutoring support to reinforce key concepts in Statics and Machine Design courses.
- Assisted professor in preparing course materials and helped in grading assignments and exams.

Math Tutor January 2005 – December 2007

Academic Advising

University of Evansville, Evansville, IN

- Provided one-on-one or small group tutoring support to freshmen and sophomore undergraduate students.
- Helped to foster independent learning and problem solving skills among students.

PROFESSIONAL EXPERIENCE

Associate Software Implementation Consultant August 2008 – July 2009

NajaNaja Ltd., Streamwood, IL

- Provided support to clients in the development of software test plans and execution of testing cycles during the client's conversion process to ensure for accuracy and customer satisfaction.

Engineering Intern November 2006 – April 2007

Whirlpool Corporation

Mechanical Structure and Refrigeration Department, Evansville, IN

- Developed a five year cost migration map for master control boards of different refrigerator units for cost and design analysis.

HONORS AND AWARDS

- ASNT Young NDT Professional Award, 2014
- SIU Doctoral Research Assistantship, 2014
- Best Poster Presentation Award, 2013
- Top 3 Finalist- Saluki Idea Competition, 2013
- SIU Doctoral Graduate Fellowship, 2012
- SIU Alumni Association Outstanding Master's Thesis Award, 2011
- ASNT Research Fellowship Award, 2010
- ASNT Travel Reimbursement Award 2010, 2011, 2012, 2013, 2014
- Roehrs-Schneeberger Memorial ASNT Scholarship, 2010
- Outstanding Academic Achievement Student Award, University of Evansville, 2005
- Overseas International Student Award, University of Evansville, 2004

PENDING GRANTS

- "A Novel Approach for Evaluating Adhesively Bonded Joints Using Hybrid NDE and DIC Methods, National Science Foundation – CMMI: Mechanics of Materials, PI – Tsuchin Philip Chu and Co-PI – name, $ 546,529 (*under review*).

CONTRACTUAL AND SPONSORED RESEARCH

Collaborated with PIs and given lead responsibility to prepare proposals and conduct research.

- "Application of NDE and DIC Techniques on Underground Coal Mine Pillars," Illinois Clean Coal Institute, PI - Tsuchin Philip Chu, $74,572 (*under review*)
- "Compression Imagining Phase Array Ultrasound Interrogator (CIPHOR)," sponsored by Air Force Office of Scientific Research (AFSOR), U.S. Air Force, PHASE-I, PI - Russel Kurtz and Tsuchin Philip Chu, $ 150,000, 08/01/2014 – 05/30/2015.
- "Bondline and Kissing Bond Assessment Using Acoustography," sponsored by office of Naval Research, U.S. Navy, PHASE-I, PI - Jaswinder Singh Sandhu and Tsuchin Philip Chu, $80,000 07/01/2013-01/30/2014.
- "Ultrasonic Non-Destructive Evaluation Intelligent System for Composite Structure Inspection," sponsored by Boeing, PI - Tsuchin Philip Chu, $45,894, 7/1/2010 – 12/31/2011.
- "Intelligent Non-Destructive Evaluation Expert System for Aircraft Carbon/Carbon Composite Brakes Using Infrared Thermography and air-couple ultrasonic," ASNT Fellowship Grant Award, PIs - Tsuchin Philip Chu and name, $15,000, 7/1/2010-6/30/2011.
- "Development of Circular Air-Coupled Ultrasonic Testing Technique for the Inspection of C/C Composite Aircraft Brake Disks," sponsored by CAFS, PI - Tsuchin Philip Chu, $30,000, 6/2010-5/2011.
- "Non-Destructive Evaluation of Carbon/Carbon Brakes Using Air-Coupled Ultrasonic Inspection Systems- Phase II," sponsored by CAFS, PI - Tsuchin Philip Chu, $30,000, 2/2009-5/2010.

PATENTS

1. Georgeson, G., Poudel, A., Chu, T., and Grossnickle, J., "Systems and Methods for Analyzing a Bondline," *Patent Pending with U.S.P.T.O.*

PUBLICATIONS

Journal Publications:

1. Li, S., Poudel, A., and Chu, T. P., 2015, "Ultrasonic Defect Mapping Using Signal Correlation for NDE," *RNDE*, Volume 26. Issue 3, DOI: 10.1080/09349847.2014.967900.
2. Poudel, A., Kanneganti, R., Li, S., Gupta, L., and Chu, T. P., "Classification of Ultrasonic Echo Signals to Detect Embedded Defects in CFRP Panels," *International Journal of Microstructure and Materials Properties.* (*under review*).
3. Poudel, A., Mitchell, K., Chu, T., Neidigk, S., and Jacques, C., "Non-Destructive Evaluation of Composite Repairs by Using Infrared Thermography, " *Journal of Composite Materials.* (*under review*).
4. Poudel, A., Strycek, J., and Chu, T.P., "Air-Coupled Ultrasonic Testing of Carbon/Carbon Composite Aircraft Brake Disks," *Materials Evaluation* Vol. 71, No. 8, pp. 987-994, 2013.
5. Li, S., Poudel, A., and Chu, T.P., "Fuzzy Logic Based Delamination Detection in CFRP Panels," *Informatica*, Vol. 37, pp. 359-366, 2013.
6. Poudel, A. and Chu, T.P., "Intelligent NDE Expert System for Aircraft Carbon/Carbon Composite Brakes Using Infrared Thermography and Air-Coupled Ultrasound," *Materials Evaluation*, Vol. 70 No. 10, pp.1219-1229, October 2012.
7. Chu, T.P., Don, J., Pan, Y.C., and Poudel, A., "Defect Characterization in Commercial Carbon-Carbon Composites," *World Journal of Engineering*, Vol. 9 No. 6, pp., 2012.

Conference Publications:

1. Poudel, A., Shrestha, S., Sandhu, J.S., Chu, T.P., and Pergantis, C., "A Comparison of Acoustography with other NDE Methods for F.O. Inclusions detection in Carbon Epoxy Laminates," *Proceedings of ASNT Fall Conference*, Charleston, SC, October 27-30, 2014.
2. Chu, T.P. and Poudel, A., "Digital Image Correlation Techniques for Aerospace Applications," *Proceedings of ASNT Fall Conference*, Charleston, SC, October 27-30, 2014.
3. Hassen, A.A., Poudel, A., Chu T.P., Yester, M., and Vaidya, U.K., "Tracing Defects in Glass Fiber/Polypropylene Composites Using Ultrasonic C-Scan and X-Ray Computed Tomography Methods," *Proceedings of ASNT Fall Conference*, Charleston, SC, October 27-30, 2014.
4. Poudel, A., Sandhu, J.S., Chu, T.P., and Pergantis, C., "Porosity Measurement in Carbon Fiber Epoxy Laminates by Using Acoustography," *Proceedings of 23rd Annual Research Symposium and Spring Conference*, Minneapolis, MN, March 24-27, 2014.
5. Sameeuddin, S., Poudel, A., Li, S., Chu, T.P., and Pan, Y.P., "Automated Defect Classification Using Artificial Neural Networks," *Proceedings of 23rd Annual Research Symposium and Spring Conference*, Minneapolis, MN, March 24-27, 2014.
6. Mitchell, K., Poudel, A., Li, S., and Chu, T.P., "Nondestructive Evaluation of Composite Repairs," *Proceedings of ASNT 2013 Fall Conference*, Las Vegas, NV, November 4-7, 2013.
7. Li, S., Zhou, X., Poudel, A., and Chu, T.P., "Defect Mapping Based on Signal Correlation for Ultrasonic NDE," *Proceedings of ASNT 2013 Fall Conference*, Las Vegas, NV, November 4-7, 2013.
8. Jiao, K., Zhou, C., Gupta, E., Poudel, A., Chu, T.P., and Kohli, P., "Actuator Fabricated Using Sensitive Microbelts with High Aspect Ratio," *Proc. 246th ACS National Meeting - Polymeric Materials*, Vol. 246, Indianapolis, IN, Sept. 8, 2013.
9. Li, S., Poudel, A., and Chu, T.P., "Super-Resolution in Ultrasonic NDE," *Proceedings of SEM 2013 Annual Conference and Exposition on Experimental and Applied Mechanics, Session 61, NDT of Composites,*, Lombard, IL, June 3-5, 2013.
10. Li, S., Poudel, A., and Chu, T.P., "Polynomial Fitting Techniques for IRT Inspection," *Proceedings of SEM 2013 Annual Conference and Exposition on Experimental and Applied Mechanics, Session 61, NDT of Composites,*, Lombard, IL, June 3-5, 2013.
11. Poudel, A., Kanneganti, R., Gupta, L., and Chu, T.P., March 18-21, 2013, "Nearest Mean Classifier for Defect Classification in CFRP Panels," *Proceedings of 22nd Annual Research Symposium and Spring Conference*, Memphis, TN.
12. Li, S., Poudel, A., and Chu, T.P., "Super-Resolution Image Reconstruction for Ultrasonic NDE of Carbon Composites," *Proceedings of 22nd Annual Research Symposium and Spring Conference*, Memphis, TN, March 18-21, 2013.
13. Poudel, A., Chu, T.P., and Filip, P., "Application of Ultrasonic Non-Destructive Evaluation in Braking Materials," Proceedings of 30th Annual SAE Brake Colloquium & Exhibition, San Diego, CA, September 23-26, 2012.
14. Poudel, A., Chu, T.P., and Filip, P., "C/C Composite Brake Disk Non-Destructive Evaluation by IR Thermography," Proceedings of SPIE Thermosense: Thermal Infrared Applications XXXIV, Vol. 8354, Baltimore, MD, April 23-27, 2012.
15. Poudel, A. and Chu, T.P., "Intelligent NDE Expert System for Aircraft Carbon/Carbon Composite Brake Disks by Using Infrared Thermography and Air-Coupled Ultrasonic Testing," Proceedings of 21st Annual Research Symposium and Spring Conference, Dallas, TX, March 19-23, 2012.
16. Li, S., Poudel, A., and Chu, T.P., "An Image Enhancement Method for Ultrasonic NDE of CFRP Panels," Proceedings of 21st Annual Research *Symposium and Spring Conference*, Dallas, TX, March 19-23, 2012.
17. Poudel, A., Chu, T.P., Pan, Y.C., and Filip, P., "A Circular Air-coupled Ultrasonic Testing Technique for the Inspection of Commercial Carbon-Carbon Composite Aircraft Brake Disks," *Proceedings of 2011 ASNT Fall Conference,* Palm Springs, CA, October 24-28, 2011.
18. Chu, T.P., Don, J., Pan, Y.C., and Poudel A., "Non-Destructive Evaluation of Carbon-Carbon Composites Using Infrared Thermography," *Proceedings of 19th Annual ICCE*, Shanghai, China, July 24-30, 2011.
19. Pan, Y.C., Iqbal, A.S., Poudel, A., Iqbal, S., Chu, T.P., and Filip, P., "Three-Dimensional Visualization and Quantification of Carbon-Carbon Composite Aircraft Disk Brakes using a Medical X-ray Computed Tomography Scanner," *Proceedings of ASNT 19th Annual Research Symposium and Spring Conference*, Williamsburg, VA, March 22-26, 2010.

Abstract Presentations:

1. Pan, Y.P., Zimmermann, B., Poudel, A., McGee, C., and Chu, T.P., "The NDE Applications for Parylene Thin Film Coating Inspection," *Proceedings of 22nd Annual Research Symposium and Spring Conference*, Memphis, TN, March 18-21, 2013.
2. Poudel, A., Waghray, A., Chu, T.P., Wood, D., Petznick, S., and Filip, P., "Comparison of NDE methods of Commercial C/C Composite Brake Disks During Post-Cured and Carbonization Stages," *Proceedings of 2012 ASNT Fall Conference*, Orlando, FL, October 29-November 1, 2012.
3. Poudel, A., Lane, M., Li, S., and Chu, T.P., "NDE of Commercial C/C Brake Disks Standards Using Air-coupled Ultrasonic Testing," *Proceedings of Nondestructive Evaluation of Aerospace Materials and Structures III*, St. Louis, MO, June 4-5, 2012.
4. Poudel, A., Li, S., Chu, T.P., Palmer, D., and Engelbart, R., "Neural-Fuzzy Approach in Detecting and Classifying Foreign Object Inclusions in CFRP Panel by Using Ultrasonic Testing,' *Proceedings of 2011 ASNT Fall Conference*, Palm Springs, CA, October 24-28, 2011.
5. Poudel, A., Li, S., Chu, T.P., Palmer, D., and Engelbart, R., "An Intelligent Systems Approach for Detecting Delamination Defects due to Impact Damage in CFRP Panel by Using Ultrasonic Testing," *Proceedings of 2011 ASNT Fall Conference*, Palm Springs, CA, October 24-28, 2011.
6. Liu, C., Huang, M., Pan, Y.C., Chu, T.P, and Poudel, A., "Detection of Flaws in Honeycomb Composites Using Infrared Thermography," *Proceedings of 2011 ASNT Fall Conference*, Palm Springs, CA, October 24-28, 2011.
7. Poudel, A., and Chu, T.P., "An Intelligent Systems Approach for Detecting Defects in Commercial Carbon-Carbon Composite Aircraft Brake Disk by using Air-Coupled Ultrasonic Testing," *Proceedings of 20th Annual Research Symposium and Spring Conference*, San Francisco, CA, March 21-25, 2011.
8. Poudel, A., Strycek, J., Chu, T.P., and Filip, P., "Defects Characterization and Verification in Commercial Carbon-Carbon Composite Aircraft Disks," *Proceedings of 2010 ASNT Fall Conference*, Houston, TX, November 14-19, 2010.

LECTURES, PANELS, SYMPOSIA, VISITS

- **Event Organizer and Moderator**: NDE Engineering Panel Discussion, ASNT Fall Conference, Charleston, SC, October 27-30, 2014.
- **Session Chair**: NDE of Composites I & II, ASNT Fall Conference, Charleston, SC, October 27-30, 2014.
- **Event Organizer**: Student Mixer Event, ASNT Spring Conference, Minneapolis, MN, March 24-27, 2014.
- **Session Chair**: Aerospace and NDE Characterization, ASNT Spring Conference, Minneapolis, MN, March 24-27, 2014.
- **Session Chair**: Aerospace, ASNT Spring Conference, Minneapolis, MN, March 24-27, 2014.
- **Session Chair**: Composites I and II, ASNT Fall Conference, Las Vegas, NV, November 4-8, 2013.
- **Session Chair**: NDE Engineering II, ASNT Spring Conference, Memphis, TN, March 18-21, 2013.
- **Session Chair**: Aerospace I and II, ASNT Fall Conference, Orlando, FL, October 29-November 1, 2012.
- **Session Chair**: Nondestructive Evaluation of Aerospace Materials and Structures III, Afternoon Session II, St. Louis, MO, June 4-5, 2012.
- **Guest Speaker**: Air-Coupled Ultrasonic Testing (ACUT) for the Non-Destructive Evaluation of C/C Composite Aircraft Brake Disks. ASNT St. Louis section September 2010 meeting. Maryland Heights, MO.
- **Guest Speaker**: Hybrid Intelligent System for Carbon/Carbon Composite Aircraft Brake disks by Using Air-Coupled UT. ASNT St. Louis section October 2011 meeting. Maryland Heights, MO.

EXPERTISE

- Experimental Mechanics: Image correlation and Digital Image Correlation
- Non-destructive evaluation: Ultrasonics (conventional, immersion, air-coupled, and Acoustography), Infrared Thermography, Magnetic Particle, Liquid Penetrant.

- Finite Element Methods : ANSYS, COSMOS, UniGraphics
- 3D Modeling : Pro/Engineering, Autodesk Inventor
- Composite Repairs
- Testing of Mechanical Properties
- Light Microscopy and Image/Quantitative Analysis (LM)
- Programming Language: MATLAB, Visual Basics, FORTRAN, CNC Programming
- Ultrasonic and Infrared Thermal Signal Processing: Noise Reduction, Segmentation, Feature Extraction, and Classification
- Artificial Intelligence algorithm for automated defect classification and characterization: Fuzzy Logics, Artificial Neural Networks, Bayes Classifier, Principle Component Analysis, Nearest Mean Classifier, K-Nearest Mean Classifier, Support Vector Machine

OTHER CURRENT PROFESSIONAL POSITIONS

- **Chairman**, Technology Transfer Committee, ASNT Research Council
- **Secretary**, American Society of Non-destructive Testing St. Louis
- **President**, SIU Non-Destructive Evaluation Society
- **Reviewer**, Society of Experimental Mechanics and Materials Evaluation

UNIVERSITY SERVICES

- Designed and developed new webpage for the department of mechanical engineering and energy processes (MEEP).
- Formed registered student organization, SIU Non-Destructive Evaluation Society, to introduce and educate students on non-destructive evaluation (NDE) area.
- Organized non-destructive evaluation (NDE) expo booths for 300+ high school students (attending from 30+ high schools) every year during SIUC Engineering Day from 2012-2014.
- Assisted MEEP and college of Engineering by giving tour to the prospective students and their families.