

# ARNAB GUPTA

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Blacksburg Virginia, USA

## PROFILE

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Ph.D. candidate in Engineering Mechanics, with additional experience in automotive safety research. Experienced in studying the mechanics, damage evolution and non-destructive evaluation of fiber reinforced composites, especially using Acoustic Emission. Proficient in performing mechanical experiments, data analysis and statistical data processing. Skilled in computer programming.

Seeking full-time positions where my research background (wave propagation, composite mechanics, ultrasonic testing) and my engineering and data analysis experience can be applied in new and challenging areas.

## EDUCATION

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- Ph.D. in Engineering Mechanics** (GPA: 3.68) *Spring 2017*  
Virginia Tech., Blacksburg, VA
- Bachelor of Mechanical Engineering**, (First Class) *May 2007*  
Jadavpur University, Kolkata, India

## RESEARCH EXPERIENCE

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**Ph.D. Candidate — Engineering Mechanics** Aug 2007 - Present  
*Dept. of Biomedical Engineering and Mechanics (formerly Engg. Science & Mechanics)* *Blacksburg, VA*

- Dissertation **Title:** Monitoring Progressive Damage Development in Laminated Fiber Reinforced Composite Materials. **Adviser:** Dr. John C. Duke, Jr.
- Interests Improve the identification and diagnosis of internal structures and patterns in complex anisotropic systems.  
  
Wave propagation and Ultrasonic Testing methods in anisotropic media, Acoustic Emission (AE), Structural Health Monitoring.  
  
Improve understanding of performance, health state and failure of in-service components.
- Experiments Record damage development using piezoelectric sensors in composite specimens under tensile loads. Evaluate and analyze acquired spontaneous and simulated AE signals.
- Data Analysis Implement statistical and data analysis techniques (e.g. cluster analysis, wavelet analysis) using MATLAB to analyze ultrasonic stress wave signals.

**Graduate Research Assistant — Center for Advanced Automotive Research** Jan 2011 - May 2016  
*Virginia Tech Transportation Institute* *Blacksburg, VA*

- *Relevant Skills* MATLAB, Mercurial, SQL, database handling, technical writing. Applying data processing and computer programming skills to a wide variety of research problems in transportation safety, human factors engineering and connected vehicle systems.
- Authorship Authored and co-authored project final reports and research proposals. Revamped and modernized, then contributed to and maintained, the VTTI central MATLAB code repository. Wrote documentation for using MATLAB and Mercurial with VTTI systems.
- Sensor Fusion Assessed the utility of vehicle-mounted Inertial Measurement Units (IMUs) for dead reckoning and sensor fusion applications. Implemented adaptive digital filters for noise reduction and improved data accuracy.
- Connected Vehicles Characterized root causes of issues with implementation of next generation Vehicle-to-Vehicle communication and crash avoidance systems, using MATLAB and other software.
- Gap Acceptance Designed and fine-tuned video data reduction protocols to study traffic patterns at intersections. Analyzed driver preferences about choosing gaps while merging into traffic. Provided statistical analysis and visualization of analysis results.

## SKILLS

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<b>Research</b>	Experienced in engineering laboratory work and mechanical testing experiments, data and statistical analysis, signal processing.
<b>Programming</b>	MATLAB, Mathematica, C/C++, Shell Scripting. Familiar with Python, Perl.
<b>Software</b>	SQL, HTML5 and CSS3, L <sup>A</sup> T <sub>E</sub> X and B <sub>I</sub> B <sub>T</sub> E <sub>X</sub> , version control systems such as Mercurial. Familiar with image editing and other usual Mac and Windows software.
<b>Operating Systems</b>	macOS, Windows, Unix
<b>Photography</b>	Received Acceptances — including five from FIAP ( <i>Fédération Internationale de l'Art Photographique</i> ) — from international contests at Linz, Austria and Moscow, Russia. Formerly, member of <i>Jadavpur University Photographic Club</i> .

## GRADUATE COURSES

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- Continuum Mechanics
- Composite Analysis
- Wave Propagation in Solids
- Statistics in Research
- Applied Tensor Analysis
- Theory of Plates and Shells
- Mechanics of Composite Materials
- Introduction to Finite Element Methods
- Multiscale Modeling of Damage in Composites
- Digital Signal Processing in Mechanical Measurements
- Advanced Musculo-Skeletal Biomechanics
- Mechanical and Structural Vibrations

## SERVICE

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- Serve as panel jury member with the Graduate Honor Society (GHS) at Virginia Tech.
- Serve as reviewer for Society for Automotive Engineers (SAE) technical papers.
- Serve on Graduate School committee to select the Virginia Tech Graduate Student of the Year 2017.
- Served on committee to identify and nominate the Chief Justice of the Virginia Tech Graduate Honor Society, who was then appointed by the University President.

## TEACHING EXPERIENCE

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**Graduate Teaching Assistant — Instructor** Aug 2007 - Dec 2010  
*Department of Engineering Science & Mechanics* Blacksburg, VA

- Instructor for *ESM 3064: Mechanical Behavior of Materials* lab for 7 semesters and multiple lab sections each semester. Responsible for assessing student performance, grading lab reports and assigning final grades.
- Provide theoretical foundation for experiments. Help students with conceptual understanding of theory and practice of the experiments. Lead the setting up and running of experiments by students.
- Mechanical testing experiments involved using, among others, Instron and MTS universal testing machines, different hardness testing machines, and Charpy notch-impact testing machines.

## PUBLICATION AND RECENT PRESENTATIONS

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- Mar 2014 A. Gupta and J. C. Duke, Jr., *Tracking Progressive Damage Development in Composite Materials*, at the 23rd Annual ASNT Research Symposium and Spring Conference, Minneapolis, MN.
- Apr 2012 A. Gupta and J. C. Duke, Jr., *Characterizing Damage Development in Crossply Laminates Using Simulated Acoustic Emission*, *Materials Evaluation*, April 2012, Vol. 70, No. 4.
- Jun 2011 A. Gupta and J. C. Duke, Jr., *Detecting Damage Transitions in Laminated Composites using Acoustic Emission*, at the 12th International Symposium on Nondestructive Characterization of Materials (NDCM-XII), Blacksburg, VA.
- Mar 2011 A. Gupta and J. C. Duke, Jr., *Characterizing Damage Development in Cross-Ply Laminates Using Acoustic Emission*, at the 20th Annual ASNT Research Symposium and Spring Conference, San Francisco, CA.
- Mar 2010 J. C. Duke, Jr., D. Harold and A. Gupta, *Assessment of Service-induced Damage for Sustainment of Composite Material Structures*, at the 19th Annual ASNT Research Symposium, Williamsburg, VA.