DARRYLL J. PINES

Nariman Farvardin Professor and Dean

University of Maryland
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MAJOR RESEARCH FIELDS:

Research interests include: structural health monitoring and prognosis of rotating and non-rotating structural components, smart sensors, adaptive, morphing and biologically inspired structures with applications to aircraft, and rotorcraft systems. Additional research interests in the design, development, guidance, navigation and control of spacecraft and uninhabited aerospace vehicles.

EDUCATION:

Massachusetts Institute of Technology
Doctor of Philosophy *in Mechanical Engineering, February, 1992*
Thesis Title: "Wave Propagation Sensors for Structural Control"
Thesis Advisor: Professor Andreas von Flotow
Thesis Committee: Professors Jean-Jacque Slotine, Stephen Crandall, David Miller

Developed directional wave propagation sensors using shaped polyvnylidene fluoride (PVDF) material for structural control of one-dimensional structures. Developed new feedforward control methodology for slender 1-dimensional waveguides.

Massachusetts Institute of Technology
Master of Science*, Mechanical Engineering, June, 1988*
Thesis Title: "Active Control of Bending Wave Propagation at Acoustic Frequencies"
Thesis Advisor: Professor Andreas von Flotow, CEO of Hood Technology

Implemented novel feed-forward control methodology to control vibration at acoustic frequencies from a one-dimensional structure. Validated the concept of wave control for structures.

University of California at Berkeley
Bachelor of Science in Mechanical Engineering, June, 1986
Inducted into Pi Tau Sigma Honor Society
Academic Advisor: C. Dan Mote, President of NAE, former President of UMD

EXPERIENCE:

University of Maryland, A. James Clark School of Engineering, College Park, MD

1/09 to Present **Nariman Farvardin Professor of Engineering and Dean:**
Serving as chief academic administrator and Dean of the A. James Clark School of Engineering. The School has approximately 218 tenured-tenure track faculty, 150 support staff, 200 research faculty, 4500 undergraduate students, and 2100 graduate students. The annual state budget is approximately $60M. The Clark School has annual research expenditures of $178M. The school maintains and operates 18 buildings on campus.

Major Accomplishments:

University of Maryland, Department of Aerospace Engineering, College Park, MD

10/06 to 1/09 **Professor and Chair:**
Served as chief academic administrator for approximately 20 tenure/tenure track faculty, 10 support staff and a total undergraduate and graduate student body of over 550. Responsible for vision, strategic plan and direction of department's undergraduate, graduate and research programs. Total annual research expenditures are approximately $20M. Major accomplishments include:

- Established four new Dept. Staff, Student and faculty awards
- Established *STEM Partnership* with Parkland Magnet Middle School, and local area high schools to focus interest on Aerospace Technology
- Established Research and Education *STEM Partnership* with NAVAIR, CSM, SMHEC and Clark School in Southern Maryland. Pathway for high-school and 2 year institution students with an interest in engineering and jobs in Southern Maryland.
- Established Faculty Seminar Program at Peer AE Departments
- Established Graduate Student Visitation Program to enhance graduate student recruitment
- Encouraged Faculty to take IPAs to enhance careers/visibility.
- Upgraded Aerospace Undergraduate Laboratories: (Wind Tunnels)
- Financed UG/Grad Student Competition Teams to challenge students. Students placed first in over ten competitions (NASA, AHS, AIAA, ASME, SAMPE, AUVSI)
- Enhanced Dept. Visibility by improving communications literature
- Hired 3 new faculty members, (2 are now tenured)
- Established 2 endowed professorships for dept. faculty.
- Improved US News rankings: ***6th in Undergraduate, 8th Graduate.*** Highest dept. rankings in college of engineering and in history of college.

DARPA
Tactical Technology Office and Defense Sciences Office, Arlington, VA

10/03-6/06 **Program Manager:** Developed and managed programs in unmanned systems, advanced structures and space systems to enable the next generation of capability for the warfighter. Responsible for developing and managing a

portfolio of programs with funding totals in excess of $75 million. Upon departure from DARPA, transitioned 1 program to the Army Missile Command. Contributions to aerospace and the DoD include the nano air vehicle for rapid insertion, technology for long endurance aircraft, and a revolutionary LEO navigation and timing technology for DoD space assets. Specific Programs include:

Major Programs Initiated:

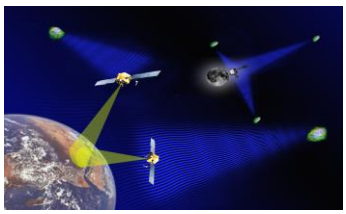
1. Program Title: Sensor Dart

Program Scope: Develop an affordable air delivery system that is capable of delivering unattended ground sensors (UGS) out to a range of 45 to 75 km with precision emplacement accuracy of 50 m at 500 m spacing for situational awareness. First ever UGS delivered capable from a UAV. Memorandum of agreement signed with the Army for transitioning technology.
Performers: Sandia National Laboratory/Aerovironment.
Schedule: 10/04-7/06
Total Funding Level: $13.5M

2. Program Title: Long Gun

Program Scope: Development of a Low Cost expendable recoverable UAV/munition for Early Expeditionary Forces. System consists of a tri-mode VIS/LWIR/LLL sensor with laser spot recognition capability, a heavy fuel engine, a ducted fan and an carry multiple sensor fused weapons. Platform engineered to achieve 30 hr performance at altitude.
Performers: L3 Communication/Geneva Aerospace/UEL LTD.
Schedule: 10/04-10/07
Total Funding Level: $12.5M

3. Program Title: X-ray Source Based NAVigation for Autonomous Position Determination (XNAV)



Program Scope: Develop a revolutionary navigation capability based on X-ray sources for autonomous time, position and attitude determination. The primary focus in on developing a payload that can track and observe X-ray sources with a WFOV camera for attitude determination and a NFOV instrument for timing and position determination. Memorandum of agreement signed with NASA to demonstrate technology.
Performers: Ball Aerospace Corp, LANL, APL, NIST, NRL, MIT, BNL.
Schedule: 6/05-10/09
Total Funding Level: $50M

4. Program Title: Nano Air Vehicle (NAV)

Program Scope: Develop an affordable, lightweight, small nano-scale air vehicle systems for complex urban missions including outdoor to indoor reconnaissance and sensor emplacement.
Phase I Performers: Lockheed-Martin, AV Inc., Draper and Micropropulsion.

Phase II Performer: AV Inc.
Schedule: 3/06-12/10
Total Program Funding Level: $29M
Awards: Winner of Awards and Recognition from Popular Science and Time Magazine. AV became final performer.
http://www.time.com/time/covers/0,16641,20111128,00.html
http://www.popsci.com/bown/2011/awards
http://www.youtube.com/watch?v=a8ZbtZqH6Io

5. Program: Nightowl-Precursor to Vulture-Scope: Initiated some of the enabling technologies to develop a high altitude persistent stare platform that stay aloft for 5 years. Key enabling technologies include lightweight stiff and reliable structures, low Reynolds number, low mach number aerodynamics, efficient energy and propulsion systems and system reliability. These seedlings were the precursor to the current **DARPA Vulture Program.**

6. Seedlings/SBIR Programs:

1. Morphing Inflatable Air Vehicle-MIAV: ILC Dover
2. Miniature Autopilot for UAVs: Athena Technologies, Inc.
3. Solid State MAV-SSMAV: Athena Technologies, Inc.
4. HyperJAM, RAMJET Projectile: Applied Physics Laboratory/JHU.
5. Long Endurance Autonomous Powered Parafoil-LEAPP, Atair Aerospace.
6. Periodic Cruise Flight Control-PCC: Sysense, Inc.
7. MASSpatch: Extreme Diagnostics and Virginia Tech
8. SBIR Topic 1: Centeye, Inc., Nascent Technologies
9. SBIR Topic 2: Mide Corp, TechnoSciences Corp.
10. SBIR Topic 3: Hood Technology Corp., Continental Controls, Intelligent Microsystems Technology. Flexrotor technology.

Total Funding Level: $3.4M

University of Maryland Academic Appointments in Aerospace Eng.:

1/09 to Present **Farvardin Professor of Aerospace Engineering**
7/04 to Present **Professor:**
10/02 to 9/06 **Associate Chair:**
7/99 to 6/04 **Associate Professor:**
3/95 to 6/99 **Assistant Professor:**

Duties include developing original research ideas, supervising undergraduate and graduate research projects, providing classroom instruction, advising students and serving the professional and academic community.

<u>Other Positions Held at University of Maryland</u>

SLOAN Doctoral Scholars Program:

6/96 to Present **Director:** Initiated program w/ faculty co-Principal Investigators A. Amde, M. Harris, P. Mead and H. Russell **to increase the number of underrepresented minority Ph.D.'s** in four Departments within the College of Engineering: Aerospace, Civil, Chemical, and Mechanical Engineering. The initial program involved 11 faculty members in four Departments. Maryland was one of first institutions to obtain a Sloan grant to address this

issue of underrepresented students pursuing doctoral studies. Program successes include the following:

- Enrollment: 44 doctoral students in college of engineering
- Graduation: 18 students have earned their doctoral degrees
- Placement: 2 are now Assistant Professors, 1 tenured Associate Professor, others in industry, government, etc.

GEM Fellowship Program

11/99 to Present **Director:** Responsible for **recruitment and retention of underrepresented M.S. and Ph.D. students** in the A. James Clark School of Engineering. Over the past 11 years approximately 25 underrepresented students have earned a Masters, or Doctoral degree in one of the nine graduate programs in engineering.

NASA SAMPEX Flight Experiment

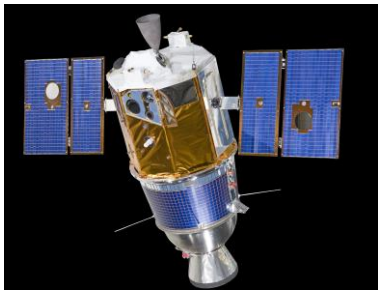
1/99-to 9/2004 **Director:** Supervision of a group of undergraduate students to support orbit and attitude determination of the first Small Explorer's satellite named SAMPEX. For 5 years, undergraduate students handled complete day to day operation of the satellite tracking and orbit determination including uploading the most recent state vector of the satellite through a tracking and data relay station. The University of Maryland was one of the first universities to have undergraduate students actually computing the orbit of an actual in-service satellite. Four students supported the operation in Flight Dynamics Laboratory on a daily basis.

Engineering Council:

9/99 to 8/02 **Chairman:** Assumed the responsibilities of leading the shared governance arm of the General Assembly of the A. James Clark School of Engineering. Conducted a salary survey study, and a review of the entire Academic, Promotion and Tenure policies in the college.

Lawrence Livermore National Laboratory, Livermore, CA

2/92 to 1/95 **Mechanical Engineer:** Member of the Applied Research Engineering (ARED) and New Technologies Engineering (NTED) Divisions in the Mechanical Engineering Department at LLNL. Matrixed to O-Division's Advanced Technology Program (ATP) to work on uninhabited aircraft and space related projects.



Clementine Spacecraft: Performed first detailed structural analysis on Clementine-1 third generation LLNL sensors-(Lidar, IR, UV/VIS and Star Tracker cameras). Assisted in formulating a final trajectory guidance algorithm for the Clementine-1 spacecraft as it approached the asteroid 1620-Geographos. Helped develop attitude control laws for spacecraft orientation. ***The Clementine spacecraft was the first to discover water near the south pole. A replica now sits in the National Air and Space Museum.***

MSTI-3 Spacecraft: Developed detailed 6-DOF models of the Clementine-1 and Miniature Sensor Technology Integration-MSTI-3 satellite dynamics for mission planning studies. Analyzed various tracking algorithms for target

state vector estimation on the MSTI-3 program. Served as project engineer for procurement of an advanced lightweight gimbal for the MSTI-3 program. Implemented passive/active vibration isolation solutions to reduce jitter for various cameras.

RAPTOR-UAVs: Developed environmental test plans for LLNL's High Altitude Long Endurance Unmanned Aerial Vehicles-UAV titled RAPTOR-Demonstrator and RAPTOR Pathfinder. Responsible for Aeroelastic and Dynamic Analysis of second prototype UAV. Also developed a design for an integrated payload/gimbal platform for tracking targets. Served as mechanical lead for payload integration.

PATHFINDER-UAV: Worked with Aerovironment and NASA personnel to help design and analyze cooling fins for electric motors on the NASA ERAST Program aircraft know as Pathfinder. ***This vehicle was the prototype developed before Helios.***

Special Projects Group: Helped to design and develop numerous spacecraft design configurations for various space missions. Worked on active noise and vibration cancellation experiments.

Tether Applications, LaJolla, CA

6/90-7/90 **Engineering Consultant:** Designed an experimental testbed to study the dynamics and control of a "smart tether tip" concept for retrieving orbiting satellites.

Massachusetts Institute of Technology, Cambridge, MA

6/88-8/88 **Research Assistant:** Analyzed the dynamics and control of a Tethered Sub-Satellite System (TSS).

Chevron U.S.A., El Segundo Refinery, El Segundo, CA

Sum: (85,86,87) **Engineer:** Designed Morpholine Injection Compound. Supervised shutdowns of NH_3-H_2S, NH_3, and Jet Fuel Plants. Developed PEIS Database for the Refinery's Heat Exchangers. Inspected faulty equipment such as compressors, condensers, distillation columns and pumps. Prepared technical reports concerning the upgrade and cleaning of storage vessels. Conducted investigations on the effects of reducing the amount of hazardous waste generated by the Refinery.

MAJOR RESEARCH ACCOMPLISHMENTS:

Graduate M.S. and Ph.D. Research on Large Space Structure Control

•One of the first researchers to develop novel feedforward control methods using wave suppression and cancellation strategies using piezoelectric actuators and sensors on large flexible space structures. Member of team that pioneered the development and modeling of spatially convolving PDVF wave sensors for structural control. These sensors and control approach now find wide application in the smart structures community for a variety of applications.

Structural Health Monitoring of Large Scale Systems and Rotorcraft HUMS

•Pioneered the development of a simple mobile *remote health monitoring system for civil structures* using spread spectrum modems and conventional data acquisition system (similar system being marketed by Strain Monitoring Inc. and other corporations). This work was supported by the *National Science Foundation's CAREER Program* and has been highly cited by industry as one way to conduct health monitoring on large civil infrastructure.

•Pioneered the use of *dereverberated wave mechanics and spectral finite element methods* for damage detection in one-dimensional structures with applications to aircraft, rotorcraft and civil structures. This approach is now being applied to health monitoring of high temperature structures for reusable launch vehicles under the NASA URETI program.

•One of the first researchers to develop *damage detection/health monitoring techniques for rotating structures* including flexbeams, blades and helicopter transmissions. Developed a new methodology for examining faults in helicopter transmissions involving the discrete harmonic wavelet packet transform and a normalized energy metric. Algorithms have been coded up as part of a Health and Usage Monitoring System marketed by Rockwell Science Center (now formally affiliated with the Boeing Corp.). Health Transmission HUMS research has won the **best paper award twice** in the HUMS Sessions at the AHS in years 2001 and 2003 respectively. Recently awarded a NRTC RITA contract to implement new algorithms on Bell 206B Helicopter and Boeing's CH47-Chinook main transmissions.

•One of many researchers developing novel sensing techniques for damage interrogation in two dimensional structures. Techniques have applications to passive and active damage interrogation methodologies. Two sensing techniques are being developed. One involves local stress/strain sensors and the other involves piezoelectric elements as phased arrays for damage interrogation.

•Pioneered the use of a new time-frequency method referred to as the Empirical Mode Decomposition/Hilbert-Huang Transform to analyze vibration signatures of damaged structures. Now researchers in the field are attempting to apply this new signal processing tool to a variety of structural dynamic problems.

High Speed Flight Dynamics and Control

•Pioneered the analysis of Periodic Hypersonic Cruise trajectories for global reach/space access. Major contributor to the HyperSoar concept invented by Preston Carter (of LLNL). (Articles appearing in Space News, Aviation Week-(cover of Farnborough Edition), LA Times, Washington Times, USA Today, ABC, Discovery Channel. This work has been cited and one of the main reasons for DARPA's creation of the FALCON Program. Periodic work was cited by DARPA management as a key reason for pursuing the program.

Micro and Nano Air Vehicles Research

•Lead University of Maryland team that developed the first micro co-axial rotorcraft air vehicle system-MICOR at the University of Maryland. System weighs approximately 100 grams and can hover for 20 minutes. This work was instrumental in helping Maryland win a competitive MURI grant on Micro Hovering Air Vehicles from the Army Research Office. Based on this research I initiated a DARPA revolutionary

program **on Nano Air Vehicles-NAV for indoor operation** to meet military requirements.

•Lead University of Maryland team (w/ Prof. Chopra, Wereley and Hubbard) on morphing air vehicle research. Developed telescopic wing system based on pneumatic pressure. Boeing, AFRL and DARPA has developed an interest in this new technology.

Navigation Using Celestial X-ray Sources

•Pioneered a revolutionary idea for spacecraft navigation (w/ Suneel Sheikh). Spacecraft are capable of determining their time, position and attitude using celestial X-ray sources anywhere in the galaxy. **Idea lead to DARPA XNAV program and University of Maryland 2003 Patent of the Year Award** in the physical sciences division.

Non-GPS Navigation Using Geomagnetic Fields

•Pioneered a revolutionary idea for air vehicle **navigation that uses the earth's geomagnetic field coupled with measurements from magnetometers and gravity gradient instruments** (w/ Justin Richeson). Such sensors when coupled with an extended kalman filter can yield accurate position determination of subsonic, supersonic and hypersonic aircraft. May lead to a future DARPA program.

DEVELOPMENT OF EXPERIMENTAL FACILITIES:

- Developed Miniature Telemetry Data Acquisition System for the Hover Test Stand located in the Smart Structures Lab at the University of Maryland.
- Developed Remote monitoring system for data acquisition using wireless spread spectrum modems. Technique was implemented on experimental and in-service building structures.
- Developed Transmission Test Rigs for Geartrain Diagnostics/Prognostic research as well as active transmission noise and vibration control studies.
- Hydraulic 1-axis shake table for seismic loading of scaled bridge and building structures (w/ Norman Wereley). This facility is located in the Smart Materials and Structures Laboratory.
- Laser vibrometer system for measuring vibrations on various structural elements including beam and plate structures.
- Established the Autonomous Vehicle Laboratory in the J. Kim Building. (with Prof.'s J. Sean Humbert).
- Established the Spacecraft Propulsion Laboratory in the J. Kim Building (with Prof. R. Sedwick)
- Developed miniature hover test stand for Micro Air Vehicle development. In the process of purchasing a low Reynolds number wind tunnel facility, rapid prototyping system and a high speed camera system for MAV research.
- Created an Army MAST Microsystems Robotic Demonstration Center in the Manufacturing Building as a "showcase facility" for miniature ground, air and underwater robotic activities.
- Renovated the Manufacturing Building to house the Alfred Gessow Rotorcraft Center in the Department and upgrade Test Facilities, graduate student offices and conference room facilities.

2. Research, Scholarly, and Creative Activities

Google Scholar Citation Search:

- Total Citations: **4789**
- Total Publications:**251**
- Hindex = **35**

a. Refereed Research Publications

1. Books authored

[1] Structural Health Monitoring Using Guided Lamb Waves, by Byungseok Yoo and Darryll J. Pines, in preparation.

[2] Spacecraft Navigation Using Celestial X-ray Sources, edited by Suneel Sheikh and Darryll Pines, in preparation.

[3] D.J. Pines, The Story About Gamera: A Human Powered Helicopter, in preparation

2. Books/Proceedings edited

[1] D.J. Pines, Ed. (1996), Proceedings of the NSF Workshop on Application of Smart Structures Technology to Large Civil Structures, University of Maryland, College Park, Maryland, NSF Report.

[2] A. Aktan, D. Pines and D. Inman, Editors (2000), Proceedings of the NSF Workshop on Health Monitoring of Long Span Bridges, UC Irvine, Irvine Ca., 2000, NSF Report.

[3] S.C. Liu and D.J. Pines (2002), Proceedings of Smart Systems for Bridges, Structures, and Highways, SPIE, 378 pages.

[4] Norman M. Wereley, Inderjit Chopra, and Darryll J. Pines, Editors (2002), Proceedings of the Twelfth International Conference on Adaptive Structures and Technologies, CRC Press, 2002.

3. Chapters in Books

[1] D.J. Pines, (2002) **"Structural Health Monitoring Using Wave Dynamics"**, Encyclopedia of Smart Materials, John Wiley & Sons, Inc., p.520-545.

[2] D.J. Pines et al., (2003**)** "**50 Plus Years of Aerospace Engineering Education and Research at the University of Maryland",** AIAA Progress in Aerospace Education Book Series, Edited by B. McCormick.

[3] L. Salvino, and D.J. Pines, **"Chapter 11: EMD and Instantaneous Phase Detection of Structural Damage"**, Hilbert-Huang Transform: Introduction and Applications**,** Edited by Norden E. Huang and Samuel S.P. Shen, CRC Press.

[4] D. Pines and A. Purekar, **"Health Prognostics Using Phased Array Sensors",** Adaptive Structures: Application to Aerospace Systems, AIAA Progress in Aerospace Education Book Series, edited by N.M. Wereley, D. Lougoudas, and G. Lieseutre..

[5] J. Blondeau et al., **"Pneumatic Morphing UAVs"**, AIAA Progress in Aerospace Education Book Series, edited by N.M. Wereley, D. Lougoudas, and G. Lieseutre.

[6] S. Sheikh and D. Pines (2006), **Chapter 7: X-ray Pulsar Navigation**, **Navigation Options for Planetary Exploration,** NASA Internal Publication of Space Communication Working Group**.**

[7] D.J. Pines and L. W. Salvino, **Damage Detection Using The Hilbert-Huang Transform**, in Encyclopedia of Structural Health Monitoring, W. Staszewski, Ed. (John Wiley & Sons, 2008)

[8] D. J. Pines and S. Sheikh, (2011) **"Pulsar Navigation",** McGraw-Hill Yearbook of Science & Technology 2011, McGraw-Hill, New York, 2011, pp. 265-268.

4. Journal Articles

[1] von Flotow, AH; Miller, DW; Pines, DJ; (1988) "Modeling Structural Acoustics for Active Control", *J. of Acoustical Society of America, 83 (51): S6-S7.*

[2] D.J. Pines and A.H. von Flotow, (1990) **"Two Non-linear Control Approaches for Retrieval of a Thrusting Tethered Sub-satellite"**, *J GUID CONTROL DYNAM 13 (4): 651-658 JUL-AUG 1990.*

[3] D.J. Pines and A.H. von Flotow, (1990) **"Active Control of Bending Wave Propagation at Acoustic Frequencies"**, *J SOUND VIB 142 (3): 391-412 NOV 8 1990.*

[4] E.J. Fleurisson, D.J. Pines and A.H. von Flotow, (1993) **"Trajectory Design, Feedforward and Feedback Stabilization of Tethered Spacecraft Retrieval",** *J GUID CONTROL DYNAM 16 (1): 160-167 JAN-FEB 1993.*

[5] L.C. Ng and D.J. Pines, (1997) "**Characterization of Ring Laser Gyro Performance Using the Allan Variance Method",** *J GUID CONTROL DYNAM 20 (1): 211-214 JAN-FEB 1997.*

[6] D.J. Pines, (1997) **"Detection of Utility Pole Rot Damage by Measuring the Reflection Coefficient,"** *J NONDESTRUCT EVAL 16 (1): 43-56 MAR 1997.*

[7] K.A. Lakshmanan and D.J. Pines, (1997) **"Modeling Damage in Composite Rotorcraft Flexbeams Using Wave Mechanics"**, *SMART MATER STRUCT 6 (3): 383-392 JUN 1997*

[8] D.J. Pines and A.H. von Flotow, (1997) **"Spatially Convolving Wave Sensors for Structural Control: Part I Analytical Development"**, *J INTEL MAT SYST STR 8 (11): 929-952 NOV 1997..*

[9] D.J. Pines and A.H. von Flotow, (1997) **"Spatially Convolving Wave Sensors for Structural Control: Part II Experimental Verification"**, *J INTEL MAT SYST STR 8 (12): 1059-1072 DEC 1997.*

[10] Pines, DJ, and Hiraishi H., **"Special issue on smart materials and structures technology: Application to large civil infrastructure - Preface,"** *SMART MATERIALS & STRUCTURES Volume: 7 Issue: 5 Pages: U3-U3, OCT 1998*

[11] K.A. Lakshmanan* and D.J. Pines, (1998) **"Damage Identification of Chordwise Crack Size and Location in Uncoupled Composite Rotorcraft Flexbeams"**, *J INTEL MAT SYST STR., Vol. 9, No. 1, 146-155, February, 1998.*

[12] J. Kiddy* and D.J. Pines, (1998) **"A Constrained Damage Detection Method for Simultaneously Updating Mass and Stiffness Matrices** *AIAA J 36 (7): 1332-1334 JUL 1998.*

[13] J. Kiddy* and D.J. Pines, (1998) **"Eigenstructure Assignment Technique for Damage Detection in Rotating Structures"**, *AIAA J 36 (9): 1680-1685 SEP 1998*

[14] D.J. Pines and P. A.L. Lovell*, (1998) **"Conceptual Framework for a Remote Wireless Health Monitoring System for Civil Structures"**, *SMART MATER STRUCT 7 (5): 627-636 OCT 1998.*

[15] D.J. Pines and P.A. Lovell*, (1998) **"A Remote Demonstration System to Enhance Engineering Classroom Instruction and Student Learning"**, *International Journal of Engineering Education, Vol. 14,257-264, 1998.*

[16] P.H. Carter, D.J. Pines and L.vE. Rudd*, (1998) **"Approximate Performance of Periodic Hypersonic Cruise Trajectories for Global Reach"**, *J AIRCRAFT 35 (6): 405-412 NOV-DEC 1998.*

[17] L.vE. Rudd*, P.H. Carter and D.J. Pines, (1999)**"Sub-Optimal Damped Periodic Hypersonic Cruise Trajectories for Parameterized Altitude Profiles",** *J AIRCRAFT 36 (2): 405-412 MAR-APR 1999.*

[18] P. D. Samuel*, D.J. Pines, and D. Lewicki, (2000)**"A Comparison of Stationary and Non-stationary Transforms for Detecting Faults in Helicopter Gearboxes",** *J AM HELICOPTER SOC 45 (2): 125-136 APR 2000.*

[19] F. Rankins*, and D.J. Pines, (2000) **"A Relative Heat Load Comparison of Vehicles Flying Hypersonic Transatmospheric Trajectories",** *J SPACECRAFT ROCKETS 37 (4): 491-498 JUL-AUG 2000.*

[20] L. Rudd, D. Pines and P. Carter, (2000) **"Long Range Performance of Periodic Hypersonic Cruise Trajectories"**, *J GUID CONTROL DYNAM 23 (4): 756-758 JUL-AUG 2000*

[21] A. Purekar* and D.J. Pines, (2000) **"Detecting Damage in Non-Uniform Beams Using the Dereverberated Transfer Function Response",** *SMART MATER STRUCT 9 (4): 429-444 AUG 2000.*

[22] P.H. Carter, D.J. Pines and L.vE. Rudd* (2000), **"Approximate Performance of Periodic Hypersonic Cruise Trajectories for Global Reach"**, *IBM J RES DEV 44 (5): 703-714 SEP 2000.*

[23] P.D. Samuel* and D.J. Pines, (2001) **"Classifying Helicopter Gearbox Faults Using a Normalized Energy Metric"**, *SMART MATER STRUCT 10 (1): 145-153 FEB 200l.*

[24] Jun Ma* and D. Pines, (2001)"**Dereverberation and its application to Damage Detection in One-Dimensional Structures",** *AIAA J Vol 39 (5), 902-918, 2001.*

[25] J. Kiddy and D.J. Pines, (2001) **"Experimental Validation of a Damage Detection Technique for Helicopter Main Rotor Blades"**, *P I MECH ENG I-J SYS 215 (I3): 209-220 2001.*

[26] D. Pines and A.E. Aktan, (2002) **"Status of Structural Health Monitoring of Long Span Bridges in the U.S",** *Prog. Struct. Engng Mater Vol. 4 (4); 382-390 2002.*

[27] A. Hood* and D. Pines, (2002) **"Feasibility of a Linear Phased Acoustic Array for Health Monitoring of Gears",** *J ACOUST SOC AM 112 (6): 2849-2857 DEC 2002.*

[28] L. Liu* and D. Pines, (2002) **"The Influence of Static Gear Design Parameters on Gear Tooth Damage Sensitivity",** *J MECH DESIGN 124 (4): 794-804 DEC 2002.*

[29] J. Ma* and D. Pines, (2003) **"Detecting Damage in a Building Structure Model Under Seismic Excitation Using Dereverberated Wave Mechanics"**, *ENG STRUCT 25 (3): 385-396 FEB 2003.*

[30] Salvino, Liming W; Pines, Darryll J; Todd, Michael D; Nichols, Jonathan; (2003) **"Signal processing and damage detection in a frame structure excited by chaotic input force,"** *Smart Materials and Structures 639-650, 2003.*

[31] F. Bohorquez*, P. Samuel*, J. Sirohi*, L. Rudd*, and D. Pines, (2003) **"Design, analysis and hover performance of a rotary wing micro air vehicle",** *J AM HELICOPTER SOC 48 (2): 80-90 APR 2003.*

[32] D. Richards, and D. Pines (2003), **"Passive Reduction of Gear Mesh Vibrations Using a Periodic Drive Shaft"**, *J SOUND VIB 264 (2):* 317-342 *JULY 2003.*

[33] Wereley, NM, Chopra, I., Pines, DJ, "**Twelfth international conference on adaptive structures and technologies - Preface,"** *JOURNAL OF INTELLIGENT MATERIAL SYSTEMS AND STRUCTURES Volume: 14 Issue: 7 Pages: 407-408, JUL 2003*

[34] L. Liu and D. Pines, (2004) **"Sensitivity of Vibration Based Fault Metrics to Spur Gear Crack Damage and Diametral Pitch Variations",** *Journal of the American Helicopter Society. Vol. 49, no. 3, pp. 288-299. July 2004*

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6. Electronic Publications

7. Refereed Abstracts

none

8. Other

none

b. Non-refereed Research Publications

1. Books

none

2. Conference Papers

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[47] J. Ma and D. Pines, (Invited Paper) **"Structural Health Monitoring Using the non-resonant transfer function response"**, Paper No. ACC99-1040-04, *American Control Conference*, San Diego, CA, June 2-4, 1999.

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[49] P. Samuel, J. Sirohi, R. Perel, L. Rudd and D. Pines, **" Design and Analysis of a Micro-Coaxial Rotorcraft",** *AHS :Vertical Lift Design Conference*, San Francisco, CA, Jan 19-21, 2000.

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[51] D. Richards and D. Pines, **"The Effect of Damage on Spur Gear Vibrations"**, Paper No. 3671-32 , *7th Annual SPIE Smart Structures* Symposium, March 5-9, 2000, Newport Beach, CA.

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[54] P. Samuel, and D. Pines, **"Vibration Separation and Diagnostics of Planetary Geartrains"**, *American Helicopter Society 56th Annual Forum*, Virginia Beach, Virginia, May 2-4, 2000.

[55] D. Pines, "**System Identification and Health Monitoring of Civil Infrastructure"**, *2000 ACC Conference*, Chicago, June 28-30.

[56] Lael Rudd, D. Pines and C. Tarpley, **"Stability and Control of Engine Integrated Waverider"**, *AIAA Joint Propulsion Conference*, July 11-14, 2000, Huntsville, AL

[57] D. Pines, **"Health Monitoring of Civil Infrastructure Using Spectral Finite Elements"**, *ASD Conference*, December 11-13, 2000, Hong Kong, China.

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[62] L. Liu and D. Pines, **"Static Effects of Tooth Crack on a Spur Gear Pair"**, *International Conference on Mechanical Transmissions (ICMT)*, April 4-7, 2001, China.

[63] D. Richards and D. Pines, "**Passive Reduction of Gear Mesh Vibration Using a Periodic Shaft**", AIAA SDM Conference, April 16-19, 2001, Seattle, Washington.

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[65] P. Samuel and D. Pines, **"Planetary Gearbox Diagnostics Using Adaptive Vibration Signal Representations**", *American Helicopter Society 57th Annual Forum*, Virginia Beach, Virginia, May 9-11, 2001.

[66] J. Schultz and D. Pines, **"Feasibility of Atmospheric Penetration to Control Right Ascension"**, *Guidance, Navigation and Control Conference*, NASA Goddard Space Flight CenterJune 2001, Greenbelt, Maryland.

[67] P. Samuel and D. Pines, **"Adaptive Signal Representations for Helicopter Transmission Diagnostics"**, 3rd *International Workshop on Structural Health Monitoring*, September, 2001, Stanford, California.

[68] J. Ma and D. Pines, **"A comparison of modal and wave-based damage detection approaches for one-dimensional structures"**, 3rd *International Workshop on Structural Health Monitoring*, September, 2001, Stanford, California.

[69] D. Pines and L. Salvino, **"Health Monitoring of Structures Using Empirical Mode Decomposition and Phase Dereverberation"**, *Mechanics and Materials Conference*, June 26-29, 2001.

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[71] F. Bohorquez and D. Pines, **"Feasibility of Adaptive MAVs",** *12th Annual International Conference on Adaptive Structures Technology*, University of Maryland, College Park, MD, October 12-14.

[72] A. Purekar and D.J. Pines, **"Interrogation of Beam and Plate Structures Using Phased Array Concepts"**, *12th Annual International Conference on Adaptive Structures Technology*, University of Maryland, College Park, MD, October 12-14.

[73] J. Ma and D. Pines, **"Detecting Multiple Damage Types/Locations in a Scaled Building Structure,"** Paper No. 3671-32 , 9*th Annual SPIE Smart Structures Symposium*, March 17-21, 2002, San Diego, CA.

[74] F. Bohorquez and D. Pines, "**Design and Development of a Biomimetic Device for Micro Air vehicles,"** Paper No. 3671-32 , 9*th Annual SPIE Smart Structures Symposium*, March 17-21, 2002, San Diego, CA.

[75] D. Pines and L. Salvino, **"Health Monitoring of One-Dimensional Structures Using Empirical Mode Decomposition and the Hilbert-Huang Transform,"** Paper No. 3671-32 , 9*th Annual SPIE Smart Structures Symposium*, March 17-21, 2002, San Diego, CA.

[76] A. Singh and D. Pines, **"Active/Passive Control of a Periodic Driveshaft"**, Paper No. 2002-1547, 43rd AIAA/ASME/AHS SDM/Adaptive Structures Forum , April 24-26, 2002, Denver, Co.

[77] A. Asiri, A. Baz and D. Pines, "Periodic Struts for Gearbox Support System," *INTER-NOISE 2002*, Dearborn, Michigan, USA on 2002 August 19-21.

[78] A. Purekar and D. Pines, **"A Phased Sensor/Actuator Array for Detecting Damage in 2-D Structures,"** Paper No. 2002-1547, *43rd AIAA/ASME/AHS SDM/Adaptive Structures Forum* , April 24-26, 2002, Denver, Co.

[79] J. Schultz and D. Pines, "**Stability and Control of a Spacecraft with Flexible Booms During a Shallow Aero-assist"**, *AIAA Guidance, Navigation and Control Conference*, Aug. 1-3, 2002, Monterey, California.

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[81] P. Samuel and D. Pines, **"Transmission Diagnostics Using Adapted Lifting"**, *HUMS2003*, February 11-12, 2003, Melbourne, Australia.

[82] C.K. Wakah, M. Majid, A. Dasgupta and D. Pines, **"A Multi-functional Stress/Strain Sensor for Damage Prognostics"**, *AIAA Adaptive Structures*, April, 2003, Norfolk, VA

[83] C.K. Wakah, M. Majid, A. Dasgupta and D. Pines, "**Monitoring the Health of Structures Using a Distributed Piezoelectric Stress/Strain Sensor",** 10*th Annual SPIE Smart Structures Symposium*, March 17-21, 2003, San Diego, CA.

[84] D. Pines and L. Salvino, "**Sensitivity of Hilbert Magnitude and Phase to structural damage**", 10*th Annual SPIE Smart Structures Symposium*, March 17-21, 2003, San Diego, CA

[85] Liming W. Salvino, Darryll J. Pines, Michael Todd and Jonathan Nichols, **"Signal Processing and Damage Detection in a Frame Structure Excited by Chaotic Input Force"**, 10*th Annual SPIE Smart Structures Symposium*, March 17-21, 2003, San Diego, CA

[86] A. Purekar, "**Detecting Damage in 2-Dimensional Structures Using a Steerable Phased Piezoelectric Sensor/Actuator Array**", *AIAA Adaptive Structures Conference*, April, 2003, Norfolk, VA

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[89] D. Pines (Invited), "**Smart Sensors for Health Monitoring",** *ICESS03*, July 2003, Corfu Greece.

[90] J. Blondeau and D. Pines, **"Wind Tunnel Testing of a Morphing Variable Aspect Ratio Wing",** *2nd AIAA "Unmanned Unlimited" Systems,Technologies, and Operations—Aerospace, Land, and Sea Conference and Workshop & Exhibit*, 15-18 September 2003, San Diego, CA.

[91] F. Bohorquez and D. Pines**, "Hover Performance of Rotor Blades at Low Re for Rotary Wing MAVs, an Experiemental Study",** *AUVSI Conference*, July, 2003, Baltimore, MD

[92] C.K. Wakha, M. Majid, A. Dasgupta and D. Pines, **"A Dual-Stiffness Sensor for Health Prognostics of Structures"**, *3rd International Workshop on Structural Health Monitoring*, 15-17 September, 2003, Stanford, CA.

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[100] Richeson, J. and Pines, D. **"Staging Condition Effects on Optimal Trajectory Hypersonic TSTO Systems",** *13th AIAA/CIRA International Conference on Space Planes and Hypersonic Systems and Technologies*, Capua, Italy, May 16-20, 2005, AIAA-2005-3245.

[101] Conroy, J., Samuel, P., Pines, D., "**The Evaluation of Navigation Capabilities using Optic Flow Sensors on a Miniature Rotary-Wing Platform"**, *Presented at the American Helicopter Society 61^st Annual Forum*, Grapevine, TX June 1-3, 2005.

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[104] S.I. Sheikh, D.J. Pines, P.S. Ray, K.S. Wood, M.N. Lovellette and M.T. Wolff**, "The Use of X-ray Pulsars for Spacecraft Navigation"**, *AAS Conference*, Big Sky, Montana.

[105] C.Wakha, P. Samuel, D. Pines **"Damage Detection in Composite Patches using a Stiffness/Energy Sensor"**, *12thAIAA/ASME/AHS Adaptive Structures Conference*, 19-22 April 2004, Palm Springs, California.

[106] C., Wakha, P. Samuel, D.J. Pines, **"A smart composite patch for the repair of aircraft structures"**, *12th Annual SPIE Smart materials and Structures Symposium*, 6-10 March 2005, San Diego, California.

[107] Salvino, Liming, Pines, Darryll, Costanzo, Frederick; Przybysz, John "**Damage assessment of an isolation system**", **Proc. SPIE. Vol. SPIE-5768, pp. 387-398. 2005.**

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[110] Liu, Lin, and Pines, Darryll, **"Analysis of U.S. Civil Rotorcraft Accidents Caused by Vehicle Failure or Malfunction, 1998 – 20004",** AHS International 60th Annual Forum: New Frontiers in Vertical Flight Proceedings. 2005

[111] Bohorquez, F., and Pines, D.J., **"Rotor and Airfoil Design for Efficient Rotary Wing Micro Air Vehicles,"** AHS International 60th Annual Forum: New Frontiers in Vertical Flight Proceedings. 2005

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[114] Celestine Wakha, Darryll J. Pines **"A dynamic dual stiffness sensor in helicopter health and usage monitoring",** Proceedings of 62nd Annual Forum of the American Helicopter Society, Phoenix, AZ, May 2006.

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[119] Conroy, J., Samuel, P., Pines, D., **"Development of an MAV Control and Navigation System,"** Presented at the American Institute for Aeronautics and Astronautics Infotech@Aerospace Conference, Arlington VA, Sept 26-29, 2005.

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[121] Henry, J., and Pines, D.J., **"A Mathematical Model for Roll Dynamics by Use of a Morphing-Span Wing"**, 44th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, 2007.

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[123] Richeson, J. and Pines, D., **"Gravity Gradiometer Aided Inertial Navigation within Non-GNSS Environments,"** *ION GNSS 2007 Conference*, Ft. Worth, Texas, Sept. 25-28, 2007. Session A3, Paper #1. ION GNSS Sponsored Student Paper).

[124] Baldwin, C., Kiddy, J., Samuel, P.D., Coker, J., and Pines, D., 2007**, "Fiber optic sensors monitoring transmission ring gears,"** Proceedings of the SPIE Optics East Conf., Boston, MA.

[125] Coker, J., Pines, D., Samuel, P.D., Kiddy, J. and Baldwin, C., 2008, **(Invited) "Fiber Bragg gratings for detection of planetary gear damage in helicopter transmissions,"** *Proceedings of the Fifth Int. Conf. on Condition Monitoring and Machinery Failure* Prevention Tech., Edinburgh, United Kingdom, July 14-18, 2008.

[126] Ulrich, E., Pines, D., **"Planform Geometric Variation and its Effect on the Autorotation Efficiency of a Mechanical Samara"**, *AHS 64th Annual Forum*, Montreal Canada, April 29, 2008.

[127] B. Yoo, D. Pines, A.S. Purekar, **"Guided Lamb Wave Interrogation of a Curved Composite Plate [0/90] Using the Hilbert-Huang Transform Approach"**, *Proceedings of the ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems*, October 28-30, 2008, Ellicott City, Maryland

[128] M. Shoemaker and D.J. Pines, **"Orbit Determination around the Moon Using Optical Data Only,"** IAC 2008, September 29 thru October 3, 2008, Glasgow, Scotland.

[129] Jared Grauer, University of Maryland, College Park, MD; Joseph Conroy, University of Maryland, College Park, MD; James Hubbard, University of Maryland, College Park, MD; Darryll Pines, University of Maryland, College Park, MD, "**System Identification of a Miniature Helicopter**, AIAA-2008-6898 *AIAA Atmospheric Flight Mechanics Conference and Exhibit*, Honolulu, Hawaii, Aug. 18-21, 2008

[130] Jared Grauer, University of Maryland, College Park, MD; Joseph Conroy, University of Maryland, College Park, MD; James Hubbard, University of Maryland, College Park, MD; James Humbert, University of Maryland, College Park, MD; Darryll Pines,University of Maryland, College Park, MD, **"Field Calibration of Inertial Measurement Units for Miniature Unmanned Aircraft**," AIAA-2009-2064, AIAA *Infotech@Aerospace Conference and AIAA Unmanned Unlimited Conference*, Seattle, Washington, Apr. 6-9, 2009.

[131] Yoo, B., Purekar, A. S. and Pines, D. J., 2009, "**2-D Directional Phased Array using Piezoelectric Paint to Detect Damages in Isotropic Plates,**" *Proceedings of the ASME*

2009 Conference on Smart Materials, Adaptive Structures and Intelligent Systems, SMASIS2009-1396.

[132] Robert Vocke, University of Maryland, College Park, MD; Timofey Spiridonov, University of Maryland, College Park, MD; Darryll Pines, University of Maryland, College Park, MD, "**Design and Construction of All-Composite UAVs Utilizing a Modified VARTM Process,"** AIAA-2010-184, *48th AIAA Aerospace Sciences Meeting Including the New Horizons Forum and Aerospace Exposition*, Orlando, Florida, Jan. 4-7, 2010.

[133] Jared Grauer, University of Maryland, College Park, MD; Evan Ulrich, University of Maryland, College Park, MD; James Hubbard, University of Maryland, College Park, MD; Sean Humbert, University of Maryland, College Park, MD; Darryll Pines, University of Maryland, College Park, MD, "**Model Structure Determination of an Ornithopter Aerodynamics Model from Flight Data**," AIAA-2010-41,48th AIAA Aerospace Sciences Meeting Including the New Horizons Forum and Aerospace Exposition, Orlando, Florida, Jan. 4-7, 2010.

[134] Ulrich, E., Grauer, J., Farouke, I., Pines, D., Humbert, J.S., and Hubbard, Jr., J.E., **"Control Model for a Robotic Samara: Dynamics about a Coordinated Helical Turn"**, 2010 American Control Conference, Baltimore, MD, June 2010.

[135] Steven Gerardi, Evan Ulrich, J. Sean Humbert, Darryll Pines, **"Hover Stabilization of a Controllable Mechanical Samara,"** AIAA Guidance, Navigation, and Control Conference, 2010, 10.2514/6.2010-7873

[136] Jared Grauer, Evan Ulrich, James Hubbard, Darryll Pines, James Humbert, **"System Identification of an Ornithopter Aerodynamics Model,"** AIAA Atmospheric Flight Mechanics Conference, 2010, 10.2514/6.2010-7632

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[138] Kevin D. Anderson, Darryll Pines, **"Experimental Validation of Pulse Phase Tracking for X-ray Pulsar Based Spacecraft Navigation,"** (AIAA 2013-5202), AIAA Guidance, Navigation, and Control (GNC) Conference, 2013, 10.2514/6.2013-5202.

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[140] K. D. Anderson and D. J. Pines, **"Analysis of Phase-Tracking Methods for Low Flux Millisecond Period X-ray Pulsars to Aid Spacecraft Navigation,"** *Institute of Navigation ITM*, January 2015.

[141] B. Yoo, S-M. Na, A. B. Flatau, and D. J. Pines, **"Influence of Particle Size and Filling Factor of Galfenol Flakes on Sensing Performance of Magnetostrictive Composite Transducers,"** IEEE Transactions on Magnetics, 2015.

[142] K. Anderson, D.J. Pines and S.I. Sheikh, **"Investigation of Combining X-ray Pulsar Phase Tracking Estimates to Form a 3D Trajectory"**, *39th Annual American-Astronautical-Society Rocky Mountain Section Guidance, Navigation and Control Conference*, Breckenridge, CO Date: FEB 05-10, 2016.

[143] B. Yoo and D. J. Pines, "**A magnetostrictive phased array sensor using a nickel comb patch for guided Lamb wave-based damage detection"**, *Conference on Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems*, Portland, OR, MAR 26-29, 2017

[144] J. McCullum, B. Yoo, D.J. Pines, **"Structural health monitoring of a composite F/A-18 wing section using a sparse piezoelectric transducer array",** *Conference on Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems*, Denver, CA Date: MAR 05-08, 2018.

3. United States Patents

[1] with Felipe Bohorquez, Jayant Sirohi, "Biomimetic mechanism for micro aircraft", nondisclosure submitted to U. of Maryland Technology Licensing Office filed September 14, 2001. Nondisclosure Number PS-2001-076. Issued on September 6, 2005 (*2001 Invention of the Year Finalist*). Patent Number = 6,938,853.

[2] with S. Sheikh, K. Wood and P. Ray, "Navigational system and method utilizing sources of pulsed celestial radiation", nondisclosure submitted to U. of Maryland Technology Licensing Office filed July 18, 2003. Nondisclosure Number: PS-2004-090. Issued on March 27, 2007. (2003 University of Maryland Invention of the Year Winner) Patent Number = 7,197,381.

[3] w/ E. Ulrich, "Controllable Miniature Mono-Wing Aircraft." Nondisclosure filed on September 19, 2008. Issued on Feb. 5, 2013. Patent Number=8,366,055.

[4] w/Conroy, J. , Sheikh, Suneel, Spiridonov, Timofey., Invention Disclosure-PS-2009-090, "Method and system for determining relative displacement and heading for navigation", Patent Issued (February 10, 2015), Patent Number= 8,954,271.

[5] with Abhijit Dasgupta, Development of MEMS based Stress/Strain Sensor for Structural Health Prognostics, nondisclosure submitted to U. of Maryland Technology Licensing Office, filed September 14, 2001. Nondisclosure Number PS2001-075.

[6] w/ J. Kiddy, J. Coker and P. Samuel, "A Fiber Optic Sensor Band for Monitoring Machinery Vibrations", nondisclosure submitted to University of Maryland Technology and Licensing Office filed July 1, 2007. Patent Pending.

[7] w/Byungseok Yoo, Two-dimensional center of pressure sensor systems, devices, and methods US Patent App. 16/162,647, 2019

4. Reports, Monographs, Extension Publications

[1] Carter, P H; *Pines*, *D* J; vonEggers Rudd, L, Advancement and Refinement of HyperSoar Modeling, Report Number: DE2002-793451; UCRL-ID-137756.

[2] Lewicki, David G.; Samuel, Paul D.; Conroy, Joseph K.; Pines, Darryll J, .Planetary Transmission Diagnostics, NASA/CR-2004-213068; E-14544 , 20040501; May 2004

5. Book Reviews, Other Articles, Notes

[1] R.Bielawa, Rotary Wing Structural Dynamics, AIAA Series Textbook, 2003.

6. Other OpEd pieces

OpEd Piece: *Baltimore Sun* newspaper, April 17, 2013

Pines, D, "**Prizing success in aerospace innovation-Cash rewards help fire the competitive spirit that leads to scientific advances,"** http://articles.baltimoresun.com/2013-04-17/news/bs-ed-science-prizes-20130417_1_advances-aerospace-innovation

c. Presentations

1. Invited talks

[1] Invited Speaker, **"Wave Sensors for Structural Control"**, Department of Aerospace Engineering, University of Maryland, College Park, MD, October 1994.

[2] Invited Speaker, **"A lightweight high performance gimbal for space applications",** Department of Mechanical Engineering, Howard University, Washington, D.C., April 7, 1995.

[3] Lecturer, **"The Principles of Flight"**, Tuskegee Airmen Flight Academy, Oakland International Airport, North Field, Oakland, CA., July 11-12, 1995.

[4] Invited Speaker, **"What is a Smart Structure"**, AIAA Chapter Meeting, University of Maryland, College Park, February 15 , 1996.

[5] Invited Speaker, **"What is Engineering"**, Multicultural Focus Day, University of Maryland at College Park, September 21, 1996.

[6] Invited Speaker, **"Damage Detection in Rotorcraft Flight Structures Using Local and Global Modeling Approaches"**, Tuskegee University, Tuskegee, Alabama, Tuesday, October 8, 1996.

[7] Invited Speaker: Seminar: **"Application of Smart Materials and Structures to Large Civil Structures"**, W*orkshop on Smart Materials and Structures, Mechanical Engineering*, UMCP, Friday, October 11, 1997

[8] Invited Panelist, **"The Sloan Distinguished Scholars Program at the University of Maryland"**, *Sloan Workshop on Increasing the Number of Minority Ph.D's in Science and Engineering*, Stanford University, Stanford California, October 24-25, 1996.

[9] Invited Speaker, **"Damage Detection Using Wave Element-by-Element Sensitivity Analysis"**, Notre Dame University, South Bend, Indiana, February 21, 1997.

[10] Invited Speaker, **"Fault Detection in Rotorcraft Flight Stuctures",** Department of Mechanical Engineering, Howard University, Washington, D.C., April 4, 1997.

[11] Workshop Participant: **"US-Japan Workshop on Structural Control"**, Kyoto, Japan, June 28-July 1, 1998.

[12] Invited, **"Micro to Macro Aerospace Vehicles: Emerging Trends in Low and High Speed Flight"** , The Aerospace Corporation, El Segundo, Ca. May 16. 2001.

[13] Invited Lecture, **"Ongoing R/D in the US on Structural Health Monitoring"**, Assisi, Italy, October, 2001.

[14] Invited Speaker, "**Activities at Maryland in Micro Air Vehicle Research"**, Lawrence Livermore National Laboratory, Livermore, California, November 12, 2001.

[15] Invited Speaker, **"Morphing Micro Air Vehicles"**, NASA Langley Research Center, October 31, 2001.

[16] Invited Speaker, **"Micro Air Vehicles"**, Virginia Tech, Blacksburg, VA, December 6, 2001.

[17] Invited Speaker, **"UAVs and MAVs: The Next Century of Flight"**, College Park, MD, Oct. 22, 2002. Presented to University of Maryland Alumni Association.

[18] Invited Speaker, **"Micro Air Vehicles"**, Univ. of Maryland Dialogue with the Dean, College Park, MD, May 11, 2003

[19] Invited Speaker, **"UAVs and MAVs: The Next Century of Flight"**, Hampton University, Hampton, VA, July 11, 2003.

[20] Invited Seminar Speaker: **"Smart Sensors for Structural Health Monitoring"**, Dept. of Mechanical Engineering, Georgia Tech, Atlanta, GA, November 16, 2003.

[21] Invited Panelist, "**Flight Dynamics and Navigation of MAVs"**, *First US-European Competition and Workshop on Micro Air Vehicles Conference*, Germany, September 20-24, 2005.

[22] Invited Panelist, "**Challenges Facing Micro Air Vehicle Development"**, *AIAA Infotech Conference*, Arlington, VA, September 26-29, 2005.

[23] Invited Keynote Speaker: **"Interstellar Navigation: Navigating via X-ray Sources"**, *AAS/AIAA Spaceflight Mechanics Meeting*, Breakenridge, Colorado, February, 4, 2006.

[24] Keynote Speaker: **"DARPA Nano Air Vehicle Program",** 2nd US-European Competition and Workshop on Micro Air Vehicles," Sandestin, Florida, October 30 thru November 2, 2006.

[25] Invited Seminar Speaker: **"The 21st Century of Flight"**, New Mexico State University, Dec. 6, 2006.

[26] Invited Seminar Speaker: **"Challenges Facing Small Scale Flight"**, University of Michigan, Dept. of Aerospace Engineering, November 21, 2006.

[27] Invited Seminar Speaker: **"Challenges Facing Small Scale Flight: The Development of Micro and Nano Air Vehicles"**, University of Minnesota, AEM Seminar Series, March 23, 2007.

[28] Invited Seminar Speaker: **"XNAV: A New Way to Navigate to the Outer Planets"**, University of Maryland Alumni Association, Howard County, Maryland, November, 2007.

[29] Invited Luncheon Speaker: **"MESA and the Future"**, *2008 Annual MESA Competition*, Baltimore, Maryland, June 18, 2008.

[30] Aerospace Corporation Invited Seminar Speaker: **"Two New Navigation Methods for Aerospace Systems"**, September 4, 2008, El Segundo, California.

[31] Institute for Defense Analysis Luncheon Keynote Speaker, **"Future of Space Navigation"**, Arlington, Virginia, May, 2009.

[32] Congressional Panelist: **"K-12 STEM Education"**, House Committee on Science and Technology, Dirksen Office Building, Washington, DC, October, 2010.

[33] Invited Talk: NSBE Aerospace Conference Panelist: **Navigating Beyond our Solar System**, Los Angeles, California, February 2010.

[34] Invited Speaker: ASEE Engineering Deans Institute-EDI **Panelist for K-12 Engineering Education**, St. Petersburg Florida, April, 2010.

[35] Invited Speaker: **Emerging Non-GPS Navigation Technology for Aerospace Systems,**" Applied Physics Laboratory Colloquium, Laurel, MD February 28, 2011.

[36] Moderator: "**Engineering Colleges and Competitions: Innovation thru Engineering Competitions & Prizes,"** ASEE Engineering Deans Institute, Moderator-Panel on Engineering Competitions, Kuai, Hawaii, April 2012.

[37] Invited Speaker: **"Evolving to a New Normal in Engineering Education,"** MEAM Seminar Series, University of Pennsylvania, Philadelphia, PA, November 27, 2012,.

[38] Invited Speaker: **"E-Portfolios and Engineering Design-A possible model for an AP in Engineering,"** Workshop on Future Research Needs in Advanced Manufacturing from Industrial Perspective, Arlington, VA., August 12-13, 2013.

[39] Invited Talk: **Globalization, Partnerships and Sustainable Engineering Projects in Africa**, 5th African Regional Conference on Engineering Education", Lagos, Nigeria, September 9-12, 2013.

2. Conference Presentations

See conference papers

3. Posters

[1] D. Pines and L. Salvino, "Health Monitoring of Structures Using Empirical Mode Decomposition", Engineering Mechanics Conference, San Diego, CA., June 2001.

[2] A. S. Purekar and D.J. Pines, "A Direct Field Approximation to infer Damage in Tapered Rotorcraft Flexbeams", 4th ARO Workshop on Smart Structures Technology, Penn State, August, 1999.

[3] A. Hood and D. J. Pines, “University of Maryland Modeling and Testing of a Multifunctional Sensor”
[4] Paul D. Samuel and D. J. Pines, “University of Maryland Helicopter Transmission Diagnostics”
[5] Jason S. Kiddy and D. J. Pines, “University of Maryland A Model–Based Damage Detection Technique for Helicopter Rotor Blades”

4. Other

d. Other examples of creative or scholarly work

e. Contracts and Grants

Summary of Funding:

Total Principal Investigator funding:	**$37,319,006**
Total Funding as a co-PI and Team Member	**$32,751,339**
Total Research Funding as PI, co-PI or Team Member	**Approx. >$70M**

Funding as Principal Investigator

Dates	Title	Role	Agency/Corporation	Share for duration	Total
1/96-9/96	Dual Fuel Design of a Hypersonic Waverider	PI	McDonald Douglas Corp.	$39,195	$39,195
6/96-5/00	Sloan Distinguished Scholars Program	PI	Alfred P. Sloan Foundatio	$286,730	$286,730
6/96-5/01	"Remote Sensing of Damage in Large Civil Structures Using Embedded Sensors"	PI	NSF	$200,000	$200,000
10/96-5/97	US-Japan Workshop on Health Monitoring of Large Civil Infrastructure	PI	NSF	$20,479	$20,479
2/98-1/99	"Validation of a Wireless Integrated Networked Sensor (WINS) Concept for Planetary Gear Transmission Diagnostics"	PI	Rockwell Science Corporation	$73,000	$73,000
01/04 – 12/04	Control of Gear Clash Noise	PI	Sikorsky Aircraft Corp.	$15,000	$15,000
1/98-1/01	“Robust Fault Diagnosis in Planetary Geartrains"	PI	NASA-Glenn	$244,000	$244,000
10/99-5/00	Analysis of Periodic Hypersonic Cruise Trajectories	PI	Lawrence Livermore National Laboratory	$20,000	$20,000
10/99-9/04	SAMPEX Operation	PI	NASA Goddard Space Flight Center	$450,000	$450,000
03/01 – 09/02	Development of a Low Cost Long Range UAV	PI	NAVMAR Corp.	$110,000	$253,000

07/01 – 06/04	IPA for Alex Lovett to support the development of Autonomous UAVs	PI	OSD	$454,000	$454,000
01/02 – 12/03	Health Monitoring Workshop for Long Span Bridges	PI	Drexel University	$25,000	$25,000
01/00 - 01/03	Feasibility of Atmospheric Penetration for Maneuvering Satellites	PI	NASA-Goddard	$66,000	$66,000
2/02 to Present	Sloan Ph.D. Network	PI	Alfred P. Sloan foundation	$4,000	$28,000
2/00-1/01	Development of a Low Cost UAV	PI	NAVMAR Corp.	$40,000	$150,000
8/01-7/02	Development of Autonomous Low-Cost UAV	PI	NAVMAR/MIPS Phase II	$40,000	$200,000
8/02-9/03	Development of Technologies for UAVs	PI	NAVMAR	$200,000	$200,000
6/02-10/02	Development of Real-Time Health Monitoring System	PI	NASA-Glenn	$40,000	$40,000
8/02-12/02	Periodic Trajectory Research	PI	APL/JHU	$40,000	$40,000
1/03-6/03	Techniques and Models to Relate Useful Life Remaining Predictions to Detectable Fault Conditions in Mechanical Systems	PI	SPA, Inc.	$21,000	$21,000
9/03-9/04	Damage Detection in Composite Patches Using a Stiffness/Energy Sensor	PI	AFRL-Dayton	$43,000	$43,000
6/06-1/08	Development of Fiber Optic Sensor Array System	PI	Mantech	$109,619	$109,619
7/06-/2/07	Damage Detection of Gear Teeth	PI	NASA Glenn	$14,000	$14,000
8/05-3/06	Evaluation of Planetary Gear Carrier Plate Faults	Co-PI	DARPA-Northrop Gruman	$80,000	$80,000
10/05-4/06	"Adaptive Antennas for UAVs"	Co-PI	AFOSR-Toyon Corp	$30,000	$30,000
8/07-9/08	IPA for Mark Lewis		DoD-USAF	$260,141	$260,141
3/08-2/11	Enhanced Fault Detection of Planetary Gears	PI	Bell Helicopters	$900,000	$900,000
10/07-9/12	ONE CUIP PROGRAM	PI	NASA Glenn	$4,000,000	$22,856,855
3/08-6/10	Non-GPS Locator System	PI	DHS	$150,000	$300,000
1/09-12/12	PAX River Education and Research Program	PI	NAVAIR	$300,000	$3.6M
1/13 til 12/17	PAX River Education and Research Program	PI	NAVAIR	$10,000	$5.0M
3/1/13-	NSF:I-Corp Program	PI	NSF	$400,000	$1.25M

2/28/15 Extension thru 2018					
3/1/13	Thinking Like an Engineer to Address Complex Problems Within the Education Enterprise	PI	NSF	$49,987	$49,987
10/1/18-9/30/21	Engineering for US All-E4USA	PI	NSF		$4,000,000
Totals					$41,319,006

Funding as a Task Leader or Co-Principal Investigator:

Dates	Title	Role	Agency/Corporation	Share for duration	Total
6/94-5/97	Structural Health Monitoring of Composite Rotor Blades and Flexbeams	Task Leader	Army Research Office.	$200,000	$1,000,000
6/96-5/2001	Center for Rotorcraft Education and Research Proposal: Contribution on Health Monitoring of Geartrain Transmissions	Task Leader	National Rotorcraft Technology Center	$300,000	$3,000,000
3/98-2/99	Instrumentation for Structural Integrity Studies of Rotorcraft Systems	Task Leader	ARO-DURIP	$50,000	$300,000
10/96-5/97	MURI Center for Rotorcraft Education and Research Proposal: Contribution on Multi-functional Sensors for Active Control and Health Monitoring	Task Leader	ARO-MURI	$300,000	$6,000,000
2/98-1/99	Feasibility Study of Smart Micro-Coaxial Rotorcraft Submunition	Co-PI	Army-Aberdeen Proving Grounds	$50,000	$50,000
01/04 – 12/04	Rotorcraft Center of Excellence Proposal: Contributions on Micro-Rotorcraft, Health Monitoring of Geartrain Transmissions	Task Leader	NRTC-COE.	$1,073,000	$6,000,000
4/00-3/01	Instrumentation for Vibration Control, Structural Integrity, and	Co-PI	ARO-DURIP	$130,000	$164,000

	Stability Augmentation Studies of Rotorcraft Systems				
5/02-10/04	Instrumentation for MAVs	Co-PI	ARO-DURIP	$33,333	$180,425
10/03-9/06	3rd Generation Launch Vehicle Technology	Task Leader	NASA HQ	$520,000	$9,000,000
09/01 – 02/05	Development of a MEMS based Stress/Strain Sensor for Health Prognostics	Co-PI	NSF	$66,000	$300,000
07/02 – 06/03	NIA Task: "Morphing Aircraft Structures Research	Co-PI	NASA-Langley	$60,000	$400,000
6/05-5/09	MURI: Micro-Hovering Aerial Vehicles	Co-PI	ARO	$600,000	$6,000,000
10/03-9/05	IPA Agreement for Pines	Co-PI	DARPA	$356,914	$356,914
10/10-9/15	NSF ADVANCE Program	Co-PI	NSF		$2.7M
			NSF		
Totals				$3,739,247	$32,751,339

INTERNAL PROPOSALS AWARDED:

Principal Investigator:

1. "Active and Passive Control of Acoustics and Structurally Radiated Sound", submitted to the Minta Martin Fund for Aeronautical Research at the University of Maryland, Funding Level ($90,000)
2. "Faculty Summer Salary Request for Damage Detection Research", ($3,500), submitted to Graduate Research Board (GRB)
3. Minta Martin Fellowship for Paul Samuel ($18,000)
4. Minta Martin Fellowship for Lael Rudd ($20,000)
5 w/Wereley, Chopra, Cadou, "Inflatable Morphing Aerial Vehicle Structures", Minta Martin Aeronautical Research Grant, $240,000.

Co-Principal Investigator

6. "Active Control of Rotorcraft Acoustics", submitted to the Minta Martin Fund for Aeronautical Research at the University of Maryland, Funding Level ($20,000).
7. "Instrumentation for Scaled Civil Structure Testing", Aerospace Engineering Dept. ($15,000).
8. w/Wereley, Chopra, Cadou, "Skywalker: Soaring Flight", Minta Martin Fund for Aeronautical Research.

Total Internal Funding: $400,000

f. Fellowships, Prizes, and Awards.

California Alumni Scholar (1982-86)
Chevron Mechanical Engineering Scholarship (1984)
Inducted as Member of Pi Tau Sigma Honor Society (1984)
Boeing Company Scholar (1985)
NACME Scholarship (1985)
Latimer Scholar (1986)
GEM Fellow (1986-88)
Winning Design, Shuttle Soft Docking Contest (1989)
Patricia Roberts Harris Fellow (1988-91)
NACME Alumni Award (1996)
National Science Foundation (NSF) CAREER Award Recipient (1996)
National Academy Frontiers on Research Attendee (1997)
Who's Who in Engineering (1997)
AIAA National Capital Section Young Engineer Award, runner-up, (2000)
Associate Fellow of AIAA (2000)
Fellow of Institute of Physics (2001)
Invention of the Year –Finalist (2001)
AHS Grover E. Bell Award (2002)
Invention of the Year Winner, Physical Sciences and Engineering (2003)
AIAA Adaptive Structures TC Service Award (2006)
DARPA Distinguished Service Medal (2006)
Omicron Delta Kappa Leadership Honor Society Inductee (2006)
NACME Alumni Circle Award Recipient (2009)
Fellow of ASME (2009)
Fellow of AIAA (2010)
GEM Alum Dean of Engineering Excellence Award (2011)
The History Makers-(2012)
Inducted as Honorary Member of Tau Beta PI Honor Society-(2013)
District of Columbia Council of Engineering and Architectural Societies-DCCEAS Lifetime Achievement Award-(2015)
House Speaker's Medallion, Maryland State House-(2015)
UMD President's Commission on Ethnic Minorities Faculty Award (2017)
ASEE 125th Anniversary Gamechanger Recognition (2018)
President's Medal at University of Maryland (2018)
Member of the National Academy of Engineering (2019)

g. Other.

CONFERENCE /PROFESSIONAL SOCIETY BEST PAPER AWARDS

1. Best Paper of HUMS Sessions, (with P. Samuel), **"Planetary Gearbox Diagnostics Using Adaptive Vibration Signal Representations**", *American Helicopter Society 57th Annual Forum*, Virginia Beach, Virginia, May 9-11, 2001.

2. Best Paper of HUMS Sessions, (with P. Samuel) **"Helicopter Transmission Diagnostics Using Constrained Adaptive Lifting,**" *American Helicopter Society 59th Annual Forum,* Phoenix, Arizona, May 9-11, 2003.
3. Best Journal Paper: 2006 Burka Award, (w. S. Sheikh), **"Recursive Estimation of Spacecraft Position Using X-ray Pulsars,"** *Journal of Institute of Navigation*, 2006, vol. 53, n°3, pp. 149-166.
4. Best Paper of the Autonomous Systems Sessions, (with J. Conroy), **"System Identification of a Micro Rotorcraft Using Optic Flow,"** *American Helicopter Society 63rd Annual Forum*, Norfolk, VA, May 21-23, 2007.
5. Best Paper of Session-American Controls Conference, (w/ E. Ulrich, et. al) "**Control Model for Robotic Samara: Dynamics about a Coordinated Helical Turn,"** *American Control Conference-ACC2010*, Baltimore, Maryland, June 30-July 2, 2010.
6. ASME Best Paper Award in Structural Dynamics and Control, **"Damage Detection in Thin Composite Laminates Using Piezoelectric Phased Sensor Arrays and Guided Lamb Wave Interrogation,"** A.S. Purekar and D.J. Pines, *Journal of Intelligent Material Systems and Structures*, July 2010; vol. 21, 10: pp.995-1010.
7. HUMS Session Best Paper, **"Sun Gear Fault Detection on an OH-58C Helicopter Transmission,"** A. Hood and D. J. Pines, American Helicopter Society 67th Forum, June, 2011.
8. Best Paper of the 2013 AIAA Guidance, Navigation and Control Conference, **"Experimental Validation of Pulse Phase Tracking for X-ray Pulsar Based Spacecraft Navigation,"** (AIAA 2013-5202), AIAA Guidance, Navigation, and Control (GNC) Conference, 2013, 10.2514/6.2013-5202. Kevin D. Anderson, Darryll Pines,

BEST PAPER AWARDS-GRADUATE STUDENT COMPETITIONS

8. Lovell, Philip, **"Damage Detection in a Bolted Joint"**, *3rd Place, SPIE Smart Materials and Structures Conference, 1997.*
9. Bohorquez, Felipe, **"Hover Performance of Rotor Blades at Low Reynolds Numbers for Rotary Wing Micro Air Vehicles",** *1st Place, AHS Robert Lichten Regional Award, 2002.*
10. Sheikh, Suneel, **"Navigation Using X-ray Pulsars Research"**, *1st Place, AIAA Guidance, Navigation and Control Conference, Austin, Texas, 2004.*
11. Purekar, Ashish, **"Directional Piezoelectric Filters for Structural Health Monitoring of 2-D Structures"**, *2nd Place, SAMPE, Long Beach, CA, 2005.*
12. Samuel, Paul, **"Design of an Adaptive MAV for stability and control"**, *1st Place, Design Session, 62nd AHS Forum, 2005.*
13. Richeson, Justin, **"Gravity Gradiometer Aided Inertial Navigation within Non-GNSS Environments,"** Institute of Navigation GNSS 2007 Conference, Fort Worth, TX, Sept. 25-28, 2007. (Best Paper in Session A3),

3. Teaching and Advising

a. Courses taught in the last ten years.

1. General..

Course No.	Course Title	Sem	Instructors	Eval. (4.0)
ENAE-301	Dynamics of Aerospace Systems	F95	Russell/Pines	3.33
ENAE-441	Space Navigation and Guidance	F95	Pines	2.21

ENAE-788Z	S/C Attitude Dynamics & Control	S96	Pines	3.5
ENAE-301	Dynamics of Aerospace Systems	F96	Russell/Pines	3.10
ENAE-441	Space Navigation and Guidance	F96	Pines	3.73
ENAE-741	Interplanetary Navigation and Guid.	F96	Pines	3.41
ENAE-757	Advanced Structural Dynamics	S97	Pines	3.75
ENAE-441	Space Navigation and Guidance	F97	Pines	3.78
ENAE-404	Spacecraft Flight Dynamics	S98	Pines	3.21
ENAE-441	Spacecraft Navigation and Guidance	F98	Pines	3.97
ENAE 757	Advanced Structural Dynamics	S99	Pines	3.22
ENAE 441	Space Navigation and Guidance	F99	Pines	3.60
ENAE 643	Digital Control	S00	Pines	3.10
ENAE 741	Interplanetary Nav. And Guid	F00	Pines	3.47
ENAE 757	Advanced Structural Dynamics	S01	Pines	3.60
ENAE 301	Dynamics of Aerospace Systems	F01	Pines	3.06
ENAE 432	Control of Aerospace Systems	S02	Sanner/Pines	3.41
ENAE 741	Interplanetary Nav. And Guid	F02	Pines	3.34
ENAE 432	Control of Aerospace Systems	S03	Sanner/Pines	3.37
ENAE 482	Aircraft Design: Design, Build and Fly	S03	Pines	3.69
ENAE 423H	Vibration and Aeroelasticity	F03	Pines	3.70
ENAE 499	Design, Build and Fly Team	F05	Pines	3.58
ENAE 200	Aerospace Profession-II	S06	Pines	3.33
ENAE 482	Aircraft Design: Design, Build and Fly	S06	Pines	3.55
ENAE-602	S/C Attitude Dynamics/Control	S06	Pines	3.01
ENAE 200	Aerospace Profession-II	S07	Pines	3.48
ENAE 482	Aircraft Design: Design, Build and Fly	S07	Pines	3.41
ENAE-602	S/C Attitude Dynamics/Control	S07	Pines	2.96
ENAE 100	Introduction to Aerospace Profession	F07	Pines	3.10
ENAE 499	Independent Study	F07	Pines	3.80
ENAE 200	Aerospace Profession-II	S08	Pines	3.42
ENAE-499	AE Independent Study	S08	Pines	3.70
ENAE 482	Aircraft Design: Design, Build and Fly	S08	Pines	3.58
ENAE-741	Interplanetary Navigation and Guid.	S08	Pines	3.11
ENAE 100	Introduction to Aerospace Engineering	F09	Pines	3.33
ENES-181	Dialog with the Dean	F09-15	Pines	3.5

2. Specialized.

ENAE 441 Spacecraft Navigation and Guidance: Added an exciting new component to the course involving student projects to observe celestial and man-made orbiting bodies. Students conducted optical sightings of orbiting bodies and determined their orbital parameters.

Created four new courses in the department including:
ENAE 482: Aircraft Design: Design, Build and Fly Competition
ENAE 757: Advanced Structural Dynamics:
ENAE 788Z: Spacecraft Attitude Dynamics and Control
ENAE 741: Interplanetary Navigation, Guidance and Control:

3. University Honors, College Park Scholars, GEMSTONE, and other special programs.

Not applicable

4. Independent Study, Tutorial, Post-doc, Internship Supervision.

Numerous students have participated in independent study and internships.

b. Course or Curriculum Development.

Re-structured several ongoing courses in the Aerospace Engineering Curriculum (ENAE 301, ENAE 404, ENAE 441).

Contributed to the development of a laboratory control system demo with Dr's Sanner and Atkins called *TableSat* with support from NASA Goddard.

c. Manuals, Notes, Software, Webpages, and Other Contributions to Teaching.

c. Teaching Awards and Other Special Recognition.

AWARDED ANNUALLY

Department of Aerospace Engineering

[1] Broken Propeller Teaching Award (96-97)
[2] Broken Propeller Teaching Award (97-98)
[3] Faculty Mentor of the Year Award (01-02)
[4] Faculty Mentor of the Year Award (02-03)

A.James Clark School of Engineering

[5] E. Robert Kent Engineering Junior Faculty Teaching Award (F2000)

University of Maryland

[6] Advisor of Year Award (2004)

e. Advising: Other Than Research Direction.

1. Undergraduate

Advise 100s of undergraduates within the department.

2. Graduate

Advise approximately 7 underrepresented graduate student scholars per year (3 GEM Fellows and 4 Sloan Fellows per year). Approximate 60 students who are typically underrepresented at the graduate level have graduated with MS or PhD degrees.

3. Other advising activities

f. Advising: Research Direction.

1. Undergraduate

1. Hirokazu Ishii (SUM 95)	*Foreign Exchange student from Japan, Research Project: "Development of directional actuators".*
2. David Burton (F95)	*UDC, Research Topic: "Impact Detection Using piezofilm sensors on an isotropic plate"*
3. James Mensah,	*"Development of Smart Civil Infrastructure Testbed:.*

4. Nicole Smith (F96)	*"Embedded piezoelectric sensors in a concrete matrix for damage assessment using Wavelet Analysis" .*
5. Lael Rudd (F96)	*"Development of electronics for piezoelectric amplifier".*
6. Chochai Hansupicon (S97)	*"Development of an Active Pitch Link for Blade Excitation".*
7. Drew Hykin (S97, F98),	*"Survey of MEMS technology for Structural Health Monitoring".*
8. Falcon Rankins (S98, S98)	*"Development of Hypersonic Waverider Design Code".*
9. Natalya Etina (S99),	*"Prognostic Research on Planetary Geartrains"*
10. Nathan Burnside, (S99)	*"Transmission Prognostics and Reconfiguration"*
11. Prosobchok Poonsong, (S99)	*"Development of Autonomous Flight Controller for UAV"*
12.Emmie Helms, (S00)	*"Open Loop Control of a UAV"*
13. Justin Richeson, (S02-F02)	*"Development of a Morphing Telescopic Wing"*
14. Dan Shafer,(F02-S03)	*"Deformable Control Surface Performance"*
15 Tamar Bah, (F02)	*"Development of oscillating airfoil for MAVs"*
16. Joeseph Conroy(Su02-S03)	*"Real-time LabView System for Transmission Diagnostics"*
17. Evandro Valente, (F02)	*"Development of a Controlled Flapping MAV"*
18. Matt Guernsy (Su03)	*"Experimental Investigation of Structural Damage on a Isotropic Using EMD and a Phased Array"*
19. Neil Fortner (Su03)	*"Development of Real-Time GUI Interface for EMD-Hilbert-Huang Transform"*
20. Rafael Austin (Su03)	*"Experimental Investigation of Low Reynolds Rotors for Hovering Co-axial MAVs"*
21. Geoff Slypher (Su03)	*"Development of a Co-axial Swashplate for MAV Lateral Control"*
22. Doug Short (Su06)	*"Development of a Magnetometer Based Attitude Algorithm for MAVs"*
23. Cyrus Mohammed (S07-F07)	*"Development of Autopilot for fixed wing aircraft"*
24. Chuh Park. (F07-S09)	*"Development of a Passive Mechanical Samara as a Payload Delivery System"*
25. Steve Girardi (F07-Su11)	*"System ID and Altitude Control of a Mechanical Samara"*

2. Master's

1. Kodanate A. Lakshmanan (8/97)	*"Damage Detection in Composite Rotorcraft Flexbeams Using local Wave Models", now back in India.*
2. Jason S. Kiddy (11/97)	*"A Sensitivity Based Element-by-Element Update Method for Health Monitoring of Rotating Structures", formerly with SPA, Inc., CEO of Aither Engineering*
3. Lael Rudd (5/98)	*"Performance of Periodic Hypersonic Cruise Trajectories for Long Range", now with Aerospace Corporation, Adjunct Professor at UCLA.*
4. Philip A.L. Lovell (1/01)	*"Damage Detection in Bolted Joints Using Spectral Wave Finite Elements", now with Norththrop Grumman*
5. Paul D. Samuel (6/99)	*"A Comparison of Stationary and Non-stationary Methods for Detecting Faults in Helicopter Gearboxes"*
6. Ashish Purekar (4/00)	*"Detecting Damage in Beams with Non-Uniform Geometries", now with TechnoSciences Corp.*

7. Glenn Karlsons (4/00)	*"Angular Rotations using nonlinear Euler Angles", now with NAVAIR.*
8. Don Richards (7/01)	*"Passive Gear Mesh Vibration Reduction Using an Isotropic Periodic Shaft", now with Aerospace Corporation*
9. Falcon Rankins (3/02)	*"Integral Heat Loads of Vehicles flying Periodic Cruise Trajectories", Instructor: Hampton University..*
10. Sylvan Morel-Fatio (11/02)	*"UAV Performance Enhancement Using Piezoelectric Synthetic Jet Actuators", back in France working for Aerospatiale and ESA.*
11. Amit Singh (3/03)	*"Active/Passive Control of a Periodic Rotating Shaft", now with Entron.*
12. Julie Blondeau(11/03)	*"Design of a Pneumatic Spar for a Variable Span Wing", now with Rotor and Wing.*
13. Prasobchok Poonsong (5/03)	*"Design and Testing of a Variable Camber Wing", back in Thailand in the Air Force*
14 Justin Richeson (9/05)	*"Sensitivity of Optimal Ascent Trajectories for TSTO Missions", now with SpaceX Corp.*
15. Joseph Conroy (11/05)	*"Development of a minature avionics package for a hovering MAV", PhD Candidate*
16. Dan Everson(11/05)	*"Development of a Forced Oscillation Technique for Determination of MAV Stability Characteristics", job offer with NSWC-Carderock*
17. Janissa Henry (5/06)	*Now working for Prince George's County Schools as a Math Teacher at Georgia State Univ.*
18. Arnaud Azemour (12/06)	*"Progressive Impact Damage in Composite Structures Using the Hilbert-Huang Transform", "Now working for AIRBUS"*
19. Michael Shoemaker(5/08)	*"Orbit Determination of Objects Orbiting the Moon Using Optical Data Only" Doctoral student in Japan.*
20. Tim Spiridinov (12/10)	*"A Human Gait Based Relative Foot Sensor for Personal Navigation"*

Masters Candidates

21. Joe Coker (2012)	*"Vibration Separation Using Fiber Optic Sensors"*

3. Doctoral

1. Jason Kiddy, (7/99)	*"A Modal Based Damage Detection Method for Helicopter Main Rotor Blades", Founder and President, Aither Engineering, Greenbelt, Maryland.*
2. Lael Rudd, (11/00)	*"Longitudinal Dynamic Stability and Control Characteristics of Mission Oriented Hypersonic Vehicles", Aerospace Corporation, Los Angeles, California. Also Adjunct Faculty at UCLA.*
3. Jun Ma, (4/01)	*"Structural Health Monitoring and Damage Detection Using Dereverberated Wave Mechanics", United Technologies Research Corporation, Hartford, Connecticut.*

4. Lin Liu, (2/03)	*"Design Rules to Enhance HUMS Sensitivity to Spur Gear Faults", SpectraQuest Inc., Richmond, Virginia. Currently employed at Sikorsky Aircraft Corporation.*
5. Joseph Schultz, (5/03)	*"Stability of Flexible Spacecraft during a Shallow Aeromaneuver", Currently employed at ATK (formerly Swales Aerospace), Greenbelt, Maryland*
6. Paul Samuel, (8/03)	*"Helicopter Transmission Diagnostics Using Constrained Adaptive Lifting", Founder and CEO of Daedalus Corporation, College Park, Maryland.*
7. Suneel Sheikh (9/05)	*"Spacecraft Navigation Using X-ray Pulsars", Founder and CEO of Aster Laboratories, College Park, Maryland.*
8. Ashish Purekar (12/05)	*"Guided Lamb Wave Interrogation of 2-Dimensional Structures Using Piezoelectric Phased Array Sensors and Actuators", at TechnoSciences Corp., Lanham, Maryland.*
9. Felipe Bohorquez (2/19/07)	*"Design, Analysis and Hover Performance of a Co-axial Micro Air Vehicle at Low Reynolds Number", member of technical staff, Daedalus Flight Systems.*
10. Justin Richeson (12/07)	*"Non-GPS Navigation Using Gravity Gradient Models", currently working at SpaceX Corporation.*
11. Adrian Hood, (5/11)	*"Health Monitoring of Helicopter Transmissions Using Static and Dynamic Transmission Error".Member of Technical Staff at US Army Aberdeen Proving Ground.*
12. Joe Conroy (10/11) co-advisor	*"System Identification and Navigation of an MAV using optic flow rate data", Member of Technical Staff Army Research Laboratory, Adelphi, Maryland.*
13 Byungseok Yoo (12/11)	*"Two-Dimensional Phase Array Sensors for Structural Health Monitoring"*
14. Evan Ulrich (6/13)	*"System Design, Analysis and Control of a Novel Mechanical Samara Air Vehicle"*
15. Joseph Coker (12/15)	*"Vibration Separation of Planetary Gear Systems Using Using an Array of Fiber Optic Sensors"*

<u>Doctoral Candidates (Expected Graduation Dates)</u>

16. Kevin Anderson (6/19)	*"Phase Tracking of Pulsars in the X-ray band for navigation"*
17. Barry Wilhite (12/19)	*"Cooperative S/C Navigation Using Hybrid Optical Measurements"*

4. Post-doctoral / Research staff

1. Dr. Lin Liu, "FEM Modeling of a Spur Gear with a Cracked Tooth", previously at SpectraQuest, Richmon, Virginia, Sikorksy Helicopter Corp., and now at Boeing Helicopter in PA.

2. Dr. Paul Samuel, "Damage Detection in a Composite Patch Using Local Sensors", founder of Daedalus Corporation, Gaithersburg, Maryland.

3. Dr. Adrian Hood, Member of Technical Staff, Army Aberdeen.

4. Dr. Byung Yoo, Member of Technical Staff, University of Maryland

g. Extension Activities. Short courses, MFRE, etc.

Organizer, Smart Structures Short Course, 1998, 1999

4. Service

a. Scholarly Service

1. Editorships, Editorial Boards

Editorial Board:
Smart Materials and Structures Journal
Associate Editor:
Journal of Intelligent Material Systems and Structures
International Journal of Structural Health Monitoring

2. Reviewing Activities for Journals

ASME Journal of Vibration and Acoustics
Smart Materials and Structures
Journal of Sound and Vibration
International Journal of Structural Health Monitoring
AIAA Journal
ASCE Journal of Engineering Structures
Journal of Spacecraft and Rockets
Journal of Guidance, Control and Dynamics

3. Review of Other Publications.

4. Scholarly commissions and advisory panels.

b. Professional.

1. Offices and committee memberships held in professional organizations.

American Helicopter Society (AHS), Member
Member, Since 1996
Member, ITT HUMS Technical Committee (00-Present)
Faculty Advisor, Local AHS Student Chapter (00-Present)
Member, AHS Education Committee

American Institute of Aeronautics and Astronautics (AIAA)
Member, Since 1988
Member, Adaptive Structures Technical Committee (98-05)
Vice Chair, Adaptive Structures Technical Committee (02-03)
Chairman, Adaptive Structures Technical Committee (04-06)
Member, Crichlow Award Comm. (2005-06)
Member, Structural Dynamics and Materials Technical Com (98-01)
Member, AIAA Publications Committee (98-Present)
-New Initiatives Subcommittee
-Webpage subcommittee
-Electronic journal subcommittee
-Publications Planning and Review Comm., chair
Member, AIAA Web Committee (2004 to 2006)\
Chair, Search Committee for Journal of Aircraft (S2011)
Chair, Publications, Planning and Review Subcommittee (S10 to Present)

American Society of Mechanical Engineering
Member, Since 1995
Member, Adaptive Structures Technical Committee

Institute of Navigation
Member, Since 2006

2. Reviewing activities for agencies.

Army Research Office
National Science Foundation
National Research Council
Defense Advanced Research Projects Agency

3. Other unpaid services to local, State, and federal agencies.

4. Other non-University committees, commissions, panels, etc.

Technical Committees
Member, CERF ConMat (Smart Materials and Structures), (1997-Present)
Member, AHS ITT Hums Technical Committee (1999-)
Member, ASCE Committee on Structural Performance

Working Group Committees
Member, SPIE International Working Group on Smart Structures
Member, ISAC Working Group on Health Monitoring/Damage Detection.

Conference Program Planning Committees
Member, (SPIE Smart Materials and Structures Planning Committee, March, 1998-03).

Conference/Workshop Chairman
Conference Chair: (NSF sponsored US-Japan Workshop on Smart Structures Technology: Application to Large Civil Structures, November 14, 1996), College Park, MD.
Conference Co-Chairman: (SPIE Smart Bridges, Highways and Buildings Conference, March 1998-03, San Diego, CA.

Chaired Sessions
ASC 13th Technical Conference, September 21-23, 1998, Baltimore, MD.
SPIE Smart Materials and Structures Conf., Feb. 26-29, 1996, San Diego, CA.
SPIE Smart Materials and Structures Conference, March, 1997, San Diego, CA
SPIE Smart Materials and Structures Conf., March, 1998, Newport Beach, CA
SPIE Smart Materials and Structures Conf., March, 1999, Newport Beach, CA
SPIE Smart Materials and Structures Conf., March, 2000, Newport Beach, CA
SPIE Smart Materials and Structures Conf., March, 2001, Newport Beach, CA
SPIE Smart Materials and Structures Conf., March, 2002, San Diego, CA
SPIE Smart Materials and Structures Conf., March, 2003, San Diego, CA
AIAA/ASME/CHE/ASCE Adaptive Struc. Forum April,1996,Salt Lake City, UT
AIAA/ASME/CHE/ASCE Adaptive Struc. Forum April,1997, Orlando, FL
AIAA/ASME/CHE/ASCE Adaptive Struc. Forum April,1998, Long Beach, CA

AIAA/ASME/CHE/ASCE Adaptive Struc. Forum April,1999, Saint Louis, MO
AIAA/ASME/CHE/ASCE Adaptive Structures Forum April,2000, Atlanta, GA
AIAA/ASME/CHE/ASCE Adaptive Structures Forum April ,2001.Seattle, WA
AIAA/ASME/CHE/ASCE Adaptive Structures Forum April ,2002., Denver, CO
AIAA/ASME/CHE/ASCE Adaptive Structures Forum April ,2003., Norfolk, VA
AIAA/ASME/CHE/ASCE Adaptive Struc. Forum April,2004, Palm Spring, CA
AIAA/ASME/CHE/ASCE Adaptive Struc. Forum April ,2005, Saint Louis, MO
AIAA/ASME/CHE/ASCE Adaptive Structures Forum April ,2006., Newport, RI
AIAA/ASME/CHE/ASCE Adaptive Struc. Forum April ,2007, Honolulu, HI
AIAA/ASME/CHE/ASCE Adaptive Structures Forum April ,2008.,Urbanna, IL

Board of Directors
Member, Engility Holdings, LLC (S12 to Present)

5. International activities not listed above.

Member, Strategic Advisory Board, The Petroleum Institute, Abu Dhabi, UAE- (S10 to Present)

6. Consultancies.

c. Campus.

1. Department.

Member, Department Dynamics and Control (96-02)
Member, Dept. Structures, Structural Dynamics and Materials (96-cont)
Member, Search Comm. for Rotorcraft Research Scientist (Sp 95)
Member, Search Comm. for Rotorcraft Assistant Professor (F96)
Member, Search Comm. for Dept. Chair of Aerospace (F96, Sp 97)
Member, Search Comm. for Space Systems Faculty (97-98)
Member, Department Undergraduate Committee (98-02)
Member, Department Plan of Organization Committee (98-01)
Chairman, Dept. Academy of Distinguished Alumni Com. (98-Present)
Member, Dept. of 50th Anniversary Committee (S99-F99)
Member, Dept. Strategic Planning Comm. (F00-S01))
Chairman, Aerospace Faculty Search Committee (S01-F02), Flatau hired.
Member, Aerospace Engineering Self-Study Team (S02-F02)
Chairman, Langley Professor Search Comm. (S03-F03), Hubbard hired
Member, AGRC 25th Anniversary Comm. (S07-F07)

2. College.

Department Representative, Engineering Council (96-99)
Chairman, Engineering Council (99-02)
Member, Dean's Search Committee (S99-S00)
Member, College of Engineering Faculty Awards Committee (F00-F01)
Member, College of Engineering Faculty Affairs Comm. (00-02)
Member, Search Comm. For S^3 Center Director (S00-F01)
Member, Search Comm. For Dept. Chair of Mech. Eng. (F00-S01))
Member, Search Comm. For MTI Director (S01-F01)
Member, Search Comm. For Civil and Env. Engineering Chair (F02-S03)

Member, College Teaching Award Comm. (F02-Present)
Member, Review Committee of Undergraduate Affairs (F03-S04)
Member, Dean's Search Committee (F07-S08)

3. University.

Member, Graduate School Recruitment Committee (95-02)
Member, Student Affairs Committee for Graduate Council (F98-02)
Member, CMPS Dean Review Committee (S03)
Member, Provost Search Committee (S07)
Member, University Strategic Planning Committee (S07-S08)
Co-Chair, China Task Force Committee (S11-S12)
Chair, Search Committee for Dean of College of Computer Mathematical and Natural Sciences-CMNS (F11-S11)
Co-Chair, Search Committee for Vice President for University Relations (S12)
Member, President's Athletic Commission, F12-S13.
Chair, Search Comm. for Institute for Bioscience and Biotechnology, S13-F13
Chair, Search Committee for Dean of Undergraduate Studies, F14-S15
Chair, President's Task Force-Revenue Generating Committee, S15 to S16

4. Special administrative assignments.

Associate Chair in Aerospace Engineering (F02-S06)
Chairman of A. James Clark School Engineering Council (99-02)
Director of GEM Program (F99-Present)
Director of SAMPEX Flight Experiment (F99-S04.)
Director of SLOAN Doctoral Scholars Program (S96-Present)

Other.

c. Community, State, National.

National Academy of Engineering
Member, Frontiers on Engineering Education Com.-1/13 10/15
Chair, Panel Session on E-learning Initiatives-10/13-15/13
Chair, FOEE Committee for 2015 Program
Member, Center Based Research Centers Committee, 2015-2017

National Science Foundation
Member, Advisory Committee to Engineering Directorate (16-17)
Chair, Advisory Committee to Engineering Directorate (17-19)

National Research Council
Member, Committee on Women in Science and Engineering (00-03)
Member, Committee on Decadal Survey of Aeronautics Research (05-06)
Member, Postdoctoral Workshop Attendee, 2015

Academic Advisory Boards
Member, Advisory Board of Aerospace Engineering, New Mexico State University (F07-2010)
Member, Visiting Advisory Board, University of Toledo, 2012-Present
Member, Mechanical Visiting Committee, MIT, 2013-Present
Member, International Advisory Board, Petroleum Institute, 2010-2017
Member, Board of Visitors, University of Washington, 2013- Present

Corporate Boards
Board Member, Engility Corporation, 2012 til January 2019
Board Member, Aurora Flight Sciences, 11/2013 til October 2018
Board Member, Underwriters Laboratory, 10/2018 til Present

e. Service Awards and Honors.