MISSION STATEMENT

Inspired by our land-grant identity and guided by our motto, Ut Prosim (That I May Serve), Virginia Tech is an inclusive community of knowledge, discovery, and creativity dedicated to improving the quality of life and the human condition within the Commonwealth of Virginia and throughout the world.
SUMMARY OF ACCOMPLISHMENTS

During his 35 years at Virginia Tech, Wing Ng has worked tirelessly to build a reputation as a genuinely caring faculty member for his students. This is true in both his classroom teaching and his mentoring of graduate students. One of Ng’s most significant contributions as a teacher and scholar at Virginia Tech has been his role in the education of more than a generation of engineers who have achieved their own distinguished careers after graduation. While Ng has established an outstanding record as a researcher and entrepreneur, he has never lost sight of one of the most important missions of a research university: the mentoring of students. He has directed over 120 PhD dissertations and master’s theses, and is currently mentoring eight graduate students as their major advisor. Four of his PhD students have received national society awards for their research, and three are currently faculty members at Old Dominion University, West Virginia University, and George Mason University. Despite his busy schedule, Ng always finds time to interact with his students and influence their careers. As a result of his devotion to teaching, Ng has received four Certificates of Teaching Excellence from the College of Engineering, as well as the Dean’s Award for Excellence in Teaching. He also won the Sporn Award from Virginia Tech for excellence in teaching engineering subjects (an award given each year to one engineering faculty member). In addition, he received the university’s William E. Wine Award in recognition of “a history of university teaching excellence” and is a member of the Academy of Teaching Excellence.

As a researcher in mechanical engineering, Ng focuses his work on the areas of fluid mechanics, heat transfer, and aero-acoustics of energy systems and propulsion. He has won several best paper awards, among other research awards, and he has more than 300 publications in some of the most respected journals and conferences in his field. In addition, he has received two patents, written three book chapters, and edited three books. Ng has given many invited lectures, both in the U.S. and abroad, and he has received research funding from U.S. and overseas government agencies. The impact of his research has immediately led to better products in gas turbine-related areas. His research is also supported by industry, including international companies such as Rolls-Royce, Honda, United Technologies, General Electric, Siemens, Honeywell, Northrop-Grumman, and Caterpillar. His work has resulted in over 35 years of continued funding from government and industry (~$60 million), which is a testimony to Ng’s reputation as a world-renowned researcher.

In 2019, Ng was named an Alumni Distinguished Professor (ADP) at Virginia Tech. This professorship is a preeminent appointment, recognizing remarkable scholarship and service, as well as extraordinary teaching that has influenced the lives of generations of students. As a professor, Ng has improved the economic competitiveness of the Commonwealth of Virginia in two significant ways. His research with Rolls-Royce has led to the building of a new aircraft engine manufacturing plant in Prince George County, creating hundreds of high tech jobs. He also founded a technology spin-off company, Technology in Blacksburg (or Techsburg). For 20 years, Techsburg has provided important services to the U.S. aerospace and gas turbine industries. Ng incorporates this entrepreneur experience extensively in his classes, as well as in his mentoring of graduate students, constantly reminding his students what is expected of them in industry. As a result of this activity, Ng was inducted into the Virginia Tech Faculty Entrepreneur Hall of Fame.

Teaching

During his more than 35 years of teaching, Ng has seen an enormous amount of change. When he started teaching in 1984, required classes for the Mechanical Engineering major had fewer
than 30 students, and he usually knew all of the students in the class by name. In contrast, some recent required junior-level classes that he has taught have had over 120 students. Despite such changes, Ng has maintained positive Student Perceptions of Teaching (SPOT) scores, much above that of the department average. Being reared in Hong Kong and educated in Boston, Ng also spoke with a heavy Chinese/Bostonian accent when he started teaching at Virginia Tech. At times, students may have had problems understanding him, but for Ng good teaching has nothing to do with the language barrier. It is about determination and commitment.

Ng believes that cultivating a respectful and engaging classroom environment is an important aspect in the learning process. If students are motivated, they will put forth the extra effort to learn. To help foster this type of atmosphere, Ng utilizes several strategies. First, he always makes sure he is well prepared for class, thus communicating that he cares about students’ time. In addition, he creates opportunities for interaction during lecture. This interactivity not only piques students’ interest in the material, but it sends a message that their participation during class is expected and a vital component of the learning process. Third, he seeks students’ input and feedback at mid-term to make improvements as needed. Ng asks his students to write a half page of comments on how the course can be improved in terms of lectures, homework, readings, and so forth. Using their feedback, he tries to implement their suggestions for the second half of the semester. The students truly value the opportunity to provide input during the semester, and they appreciate that Ng listens to their feedback and takes it seriously. This goes a long way in creating an atmosphere of mutual respect. He also incorporates humor into his lectures when appropriate to liven up what could be perceived as dry and tedious.

To motivate students in his undergraduate classes to study, Ng holds evening study sessions the night before his tests and final examinations. This provides an opportunity for students to ask questions and study as a group, which is much appreciated by the students. They feel that the professor is trying at least as hard as they are. The following are several comments from students regarding the study sessions:

- Prof. Ng’s attitude and patience are unparalleled by any other instructors I have yet experienced at Tech. …after class sessions were extremely helpful to the course. In addition, it should be said that Ng tries at least as hard as his students, if not more.
- He hosted help sessions before exams and also tried to give us tips to succeed after college.
- He was well prepared for every class and answered questions in detail. Held review sessions prior to the tests.

Along with cultivating a positive classroom environment, Ng works diligently to ensure that his students see connections between the curriculum and the “real world.” Using his experience as an entrepreneur, as well as his work with industry, Ng gives a lecture each semester to his undergraduate classes on career advice (i.e., what is expected of them in industry, what graduate school is like). During the lecture, Ng also shares his experience of what is required to be an entrepreneur. Students love this lecture. Below are example student comments from the end-of-semester instructor evaluations regarding this specific lecture:

- This is the first time I’ve had a professor who takes time in class to discuss what we plan to do after we graduate. I think this was valuable. It helped put things in perspective.
- He is the only teacher who ever expressed any concern in one’s future and we had invaluable class discussions on graduate school vs. industry that helped me decide what to do with my life. Definitely one of the Mechanical Engineering Department’s best teachers.
Finally, Ng’s contributions in support and inclusion of students from diverse backgrounds are also exemplary. He has guided many female engineers, as well as African-American and Hispanic students, for their PhD dissertations and MS theses. He provides extra effort in mentoring students on their research and guides them through their curriculum. Furthermore, he has routinely hired underrepresented graduate and undergraduate students to work in his lab, helping them gain valuable research experience. His care and devotion to the needs of underrepresented students provide an environment for them to succeed (see letter of support from Ms. Tamar Daniels).

Discovery

Ng engages in basic and applied research for aerospace companies, gas turbine industries, and government laboratories with a focus on unmanned air vehicles (UAV), aero-propulsion, gas turbines, and turbo-machinery. His research has resulted in safer air transport, reduced fuel consumption, and decreased environmental impacts from propulsion engines. Ng’s research is supported by the government—including the Department of Defense, NASA, and the Department of Energy—and industry. Ng has served as the principal investigator or co-principal investigator of 94 research grants totaling more than $17 million.

A testimony to Ng’s creativity is that he developed and built several innovative wind tunnel facilities. These unique wind tunnels are short duration test facilities, resulting in a very cost-effective way of obtaining critical data that can help engine companies improve their products, at a fraction of the cost that would be obtained in a steady state facility. In several instances, Ng’s team has also worked with industrial Original Engine Manufacturers (OEM), such as Pratt & Whitney (United Technologies), GE, Honeywell, Rolls-Royce, Siemens, Northrop-Grumman, Honda, and Solar Turbines (a Caterpillar Company), to create new concepts and ideas, resulting in patents that significantly improved their products. Further evidence of Ng’s ingenuity is the fact that he has received two patents. The first one is a method to reduce noise from a gas turbine engine. His spin-off company, Techsburg, was founded to commercialize this idea. His second patent is a technique to measure in-flight thrust of propulsion engines. The sponsor, Rolls-Royce, is planning to use this technique for its products.

Throughout his career, Ng has won several major awards for his professional achievements. In 2019, he was elected to become a Fellow for the American Institute of Aeronautics & Astronautics (AIAA) for his “sustained contributions to improve gas turbine engines, ground testing, and propulsion systems through roles as both an entrepreneur & a professor.” This is among the highest honors for aerospace engineers. He is also an elected Fellow of the American Society of Mechanical Engineers (ASME). He received the Dean’s Award for Excellence in Research at Virginia Tech and was granted a Teetor Award from the Society of Automotive Engineers in recognition of significant contributions to teaching, research, and student development. ASME honored him with the Flag Award in testimony of high regard among colleagues and deep appreciation for valued service in advancing the engineering profession. Additionally, Ng received a certificate of recognition from NASA for his contributions to the supersonic through-flow compressor technology, and he was a recipient of a Japanese Government Research Award for Foreign Specialists to lecture in Japan.

In addition, Ng has received four best paper awards, all for papers co-authored with his graduate students and colleagues. Ng’s most recent best paper award, given by the ASME in 2013, recognized his paper titled, “Study of Micro-particle Rebound Characteristics Under High Temperature Conditions.” The paper provides experimental data that allow aircraft engine
manufacturers to design their engines to be more resilient to volcanic ash and sand ingestions. This work has significant impact because it allows military aircrafts to operate in a desert environment and allows commercial aircrafts to fly through volcanic ash without forcing an engine shut down.

Ng also received a best paper award in 2006 from the AIAA. The paper, “Un-cooled Fiber-Optic Pressure Sensor for Gas Turbine Engines, operation to 1922°F and 500 psig,” describes the development and testing of a high temperature sensor that can be used to measure the combustion temperature inside an aircraft propulsion engine. The measurement in such a harsh environment was unprecedented, and the sensor will allow engine manufacturers to better monitor the condition of in-flight engines for reduced fuel consumption and environmental impact.

In 2003, Ng received another best paper award from AIAA for “Thermoelectric Power Generation for Unmanned Air Vehicle (UAV) Applications.” This was the first time in which the use of waste heat recovery from an engine on a UAV was demonstrated to provide electrical power for use for onboard electronics. This technology extended the range of the UAV to provide competitive advantage for military and commercial platforms.

Ng received his first best paper award from ASME in 2002 for “An Active Flow Distortion Control System for Serpentine Inlets.” Serpentine inlets are used in military aircrafts to reduce radar signature, but can lead to engine instability due to inlet flow distortion. Ng, working with Lockheed-Martin, was able to develop a technique to control the flow to reduce engine flow distortion, resulting in more robust air platforms for the military.

In addition, Ng’s research and scholarship have impacted the gas turbine and aerospace industries, both in the U.S. and abroad. Some examples are highlighted below.

- As a key contributor to a team led by Honeywell Aerospace, through wind tunnel and flight tests, Ng’s team has documented the aerodynamic characteristics, reduced the acoustic signature, and improved the controllability of the 13-inch T-Hawk hovering Unmanned Air Vehicle. The T-Hawk was used in combat in Iraq and Afghanistan, and in civilian reconnaissance in the Japanese nuclear power plant damaged by the tsunami (Wall Street Journal, April 20, 2011). (See letter of support from Honeywell.)
- Working with Northrop-Grumman, through wind tunnel and flight tests, Ng’s team has significantly improved noise characteristics while maintaining aerodynamic performance of the flight vehicles. Results are expected to impact current and future generations of military and commercial aircrafts. (See letter of support from Northrop-Grumman.)
- Research was conducted with GE Aircraft Engines and Pratt & Whitney to improve the aerodynamic performance of low pressure turbines (LPT) for very high-altitude propulsion turbine engines. The results showed significant reduction in fuel consumption and improved the range for future aircrafts. (See letter of support from Pratt & Whitney.)

The ability of Ng’s team to creatively and innovatively deliver test results and engineering solutions to U.S. industry continues to attract companies to work with Ng. This work enables customers to develop next generation propulsion and energy generation systems that give U.S. industry a global advantage in future product development.

Integration of Knowledge

Curricular Development: Based on his research in propulsion and gas turbines, Ng developed two new courses to meet the critical needs of students who are interested in careers in gas
turbines. His Aircraft Engines & Gas Turbines course, which is designed as an elective and technical class for undergraduate seniors, provides basic engineering principles in the design of gas and steam turbines and their operation. His new graduate-level course in Advanced Gas Turbines & Propulsion provides more in-depth theory in the design of gas turbine components. Some of the course content was drawn from Ng’s research projects, and the students learn first-hand how research from Ng’s lab has impacted the design of gas turbine engines. Ng’s effort in teaching these courses is one of the reasons that Virginia Tech graduates are highly sought after by gas turbine companies such as Rolls-Royce, GE, Pratt & Whitney, and Siemens.

**Discovery and Teaching:** Ng frequently incorporates the knowledge he has gained from his research programs into the teaching of his undergraduate classes. By sharing real-life examples of his research in solving industrial problems, Ng helps students become more motivated to learn the course materials. Ng also organizes lab tours for his undergraduate students to experience how his research relates to their classes. Below are student comments from course evaluations regarding Ng’s lab tours and his ability to relate course materials to real-life engineering problems:

- The tour of the lab at the end of the semester as well as the career advice were very helpful and much appreciated. I’ve never had a professor do that before.
- Related material to real world applications and used good analogies to explain difficult topics.
- He worked through examples and gave real world applications to problems.

In support of Ng’s effort in integration of teaching and research, Professor Ken Ball, Dean of the School of Engineering at George Mason University (and formerly Head of the Mechanical Engineering Department at Virginia Tech), wrote: “Wing’s research program allows many VT students to engage in cutting-edge, state-of-the-art research. Wing has advised many graduate students, and also employs many undergraduate students in his research program. Wing’s flourishing research program also allows him to incorporate realistic industry-based engineering problems, methods, and solutions in his classroom teaching. …Wing defies the stereotype of a faculty researcher who is isolated from the classroom and students. Indeed, Wing uses his research program to enrich the educational experience of every student with whom he interacts.”

However, learning is a life-long process and extends beyond degree programs. As part of Ng’s efforts to educate other engineers, he has taught several short courses in the U.S. and abroad. These courses focused on topics such as state-of-the-art improvements on electric power generation and on gas turbine propulsion. Furthermore, Ng has presented invited keynote addresses and seminars at a variety of institutes and conferences, both nationally and internationally. His most recent keynote in 2018 was presented in Berlin, Germany on in-flight thrust measurements for gas turbine propulsion engines.

**Service**

Some of Ng’s most important service contributions relate directly to his involvement in the economic development of the Commonwealth of Virginia. Of note is Ng’s role in the development of the Rolls-Royce Crosspointe aircraft engine manufacturing plant in Prince George, Virginia. In early the 2000s, Rolls-Royce (RR), Derby, England, decided to build a new aircraft engine manufacturing plant in the U.S. Five states were on the final list, and the Commonwealth of Virginia was one of them. Ng, who already had a working relationship with RR through contract research, was involved, together with Virginia economic development officers, to convince a group of high-level RR executives that Virginia, with its fine institutions of higher learning, would be the right place to locate their new plant.
Dr. Richard C. Benson, President and Eugene McDermott Distinguished University Chair of Leadership at the University of Texas, and former Dean of Engineering at Virginia Tech, offered the following testimony: “Professor Ng, as a well-established Rolls-Royce-funded researcher, was critical in helping convince Rolls-Royce (RR) to choose the State of Virginia to build this new plant. In September 2004, Dr. Ng was invited to join a dinner meeting in Roanoke with high-level Rolls-Royce executives from Derby, England to discuss Virginia Tech’s activities in jet engine propulsion. Dr. Ng was the only member of the VT engineering faculty invited to that crucial meeting. At the signing ceremony with President Steger at the Inn and Conference Center, Dr. Ric Parker, the RR director of research and technology, singled-out Dr. Ng for praise and was very clear in attesting to his critical role in elevating Virginia Tech ....”

In addition to his efforts to bring Rolls Royce to the Commonwealth, Ng has also influenced economic development with his own company. In 1998, with approval from Virginia Tech, Ng founded a high tech, spin-off company (Techsburg). As a full-time faculty member at Tech, Ng’s role in the company is limited to less than one day per week. As a result of this outreach activity, Ng was inducted into the Virginia Tech Faculty Entrepreneur Hall of Fame in 2017. This Hall of Fame recognizes Virginia Tech faculty members who have made substantial contributions in their roles as university faculty and in the private sector through engagement in successful start-up ventures. Ng also uses his company to enhance the academic experience of Virginia Tech students.

Again, from President Richard C. Benson, “Dr. Ng continues to provide leadership and strategic planning for this 16-employee, applied research and development firm. Much of the work is proprietary and secret, with focus areas in unmanned vehicles, aero-propulsion and turbomachinery. Clients include aerospace companies, gas turbine industries and government laboratories. Techsburg is an excellent example of the broader benefits that arise in the New River Valley when top-tier research expertise is matched with entrepreneurial skill, as is the case with Dr. Ng.”

At Virginia Tech, Ng has served on many committees. Three examples are worth mentioning:

1. Ng served as chair of the Executive Committee of the Engineering Faculty Organization, representing about 300 engineering faculty and participating in weekly meetings with the dean and department heads in the College of Engineering. He provided feedback to the dean and department heads from the perspective of the faculty members and was instrumental in helping to steer the direction of the College of Engineering.

2. At the university level, due to his extensive experience in working with industry, Ng was invited to serve on the advisory board of the Institute for Critical Technologies & Applied Science (ICTAS). Ng, using his experience as an engineer, helped promote cross-college research between engineering, science, and veterinary medicine.

3. Also at the university level, Ng has evaluated dossiers for university-wide teaching awards as a Fellow of the Academy of Teaching Excellence. Ng also served as a member of promotion and tenure committees at the university level (twice), for the College of Engineering (three times), and for many times in his department.

Externally, Ng has been active in serving as an advisor to the U.S. government. He testified as an expert witness on the National Aerospace Plane program in a hearing before the U.S. House of Representatives’ Committee on Science, Space, and Technology. He has also served as a technical editor for several journals and serves on organizing committees for many national and international conferences.
PERSONAL STATEMENT

Growing up in Hong Kong in the mid-1960s to early-1970s, my first direct contact with Americans was with the U.S. servicemen on their rest and relaxation breaks during their tours of duty in Vietnam. This contact came about because my father was a tailor, who made custom suits for the servicemen. Through this experience, I was impressed with the generosity and the fun-loving nature of the American people, and I had dreamed of one day visiting the USA.

In the beginning of my high school years in Hong Kong, I was a below-average student, did not apply myself, and was hanging out with the wrong group. I was forced to change schools in the ninth grade due to a disciplinary issue. (My friends and I broke into the school and the teachers’ offices after hours.) That was the turning point in my life. After changing to a new high school, I worked very hard and excelled academically, and I became an ‘A’ student. This experience of having to overcome adversity and apply myself had a profound influence on my career. It also relates to how I interact with my students at Virginia Tech. While you may not feel like you have a lot of talent, hard work and dedication will win over.

It was also during my high school years that I again became captivated by the United States – this time by the technological advancements of NASA’s space programs. The success of the Apollo program galvanized my interest in engineering. (I was thirteen when Neil Armstrong landed on the moon.) I was determined to go to the U.S. for my college education. My first choice was to go to MIT; however, I was not accepted. (I am afraid that the admission office might have mistakenly thought that my last name, NG, stood for No Good!) Instead, I enrolled at Northeastern University in Boston. Throughout my undergraduate years, I worked in restaurants, enrolled in the co-op program, and was able to completely pay for my college education. I graduated in the top of my class, held leadership roles in several student organizations, and was a member of the university volleyball team. After graduating, I was finally able to achieve my dream of attending MIT as a graduate student. At Northeastern, I was among the top students, but at MIT, I was an average student. Again, I found myself working very hard to maintain my grades and learning the lesson that hard work will always get you where you want to go. Since then, I have used this principle as a teacher and researcher.

My educational philosophy, for both undergraduate teaching in the classroom and one-on-one graduate student thesis/dissertation advising, is that students are here to learn, and as such, my role as a professor is to motivate them. For teaching in the classroom, my role is to stimulate students’ interests by carefully preparing lectures to challenge their intellectual curiosity so that they want to learn more about the subject. For graduate one-on-one advising of thesis and dissertation research, my requirements for students are (1) they must be able to do independent research, while I provide minimal supervision as needed on a case-by-case basis; and (2) they must, at the time of their graduation, show great improvement in their communication skills, both written and oral, in their technical fields. I spend many hours working with my graduate students to make sure that they can communicate complex, technical engineering ideas in simple, everyday terms so that even non-experts can grasp the concept. This is one of the most important parts of training under my mentorship, and many students have done well in their careers due to their ability to communicate concisely and effectively.

Another significant attribute of my teaching philosophy is the degree to which I show the students how much I care about them as individuals. This goes beyond just teaching in the classroom, where I try to learn each student by name. For example, students have visited my office to discuss a difficult personal or family problem. I have, on many of these occasions, provided personal help for those students who have fallen on hard times due to circumstances beyond their control. (As an example, see reference excerpt from Tyler Jones, Class of 2018.) The fact that these students have opened up to me is a testimony to the caring I show in the classroom, and I do not take that for granted. Despite 35 years of teaching, I continue to enjoy it tremendously and have fun doing so. In my classes, I try to have a sense of humor, and it goes
a long way in the inevitably dry and tedious lecture we have all encountered. As a result, students have given me a funny nickname: NG stands for Nice Guy!

As previously mentioned, my interest in engineering grew from watching the success of the U.S. space programs while growing up in Hong Kong. During my dissertation research at the Gas Turbine Laboratory at MIT, I explored the challenging field of aircraft propulsion engines and land-based gas turbines for power generation. I have continued to do research in these areas since my doctoral dissertation, with the goal of making these products safer, and simultaneously decreasing the environmental impact by reducing noise and emission.

After fulfilling my dream of attending MIT and receiving a PhD in Mechanical Engineering in 1984, I immediately started teaching at Virginia Tech as an Assistant Professor. I was promoted to Associate Professor with tenure in three years (in record time) and to full Professor in three years after that (again in record time). I became an Endowed Professor in 1996 and have held that title ever since. In 2019, I was named an Alumni Distinguished Professor at Virginia Tech. In the beginning of my career at the university, my research was mostly funded by NASA and DoD and involved programs for improving the performance of aerospace energy systems, such as aircraft propulsion engines and land-based gas turbines for power generation. As my research programs grew and I developed a reputation for doing first-class research, I began to attract funding from industry. Currently, most of my funding comes directly from industry, including Fortune 500 companies. Often, results from my laboratory at Virginia Tech and my spin-off company, Techsburg, are used immediately in a product. I am proud of the fact that, as an Engineering Professor, I am in a position to help improve global energy products manufactured by some of the Fortune 500 companies.

My research, however, does more than just help industry. I believe that a university professor who runs a successful research program should integrate that knowledge and activity seamlessly with teaching. In the undergraduate classes that I teach, I frequently use examples from my research to illustrate how the course materials will prepare students for a career in that field. This tremendously helps motivate students to learn the subject matter. They can see how, by doing well in the course, they will be better prepared for their career. I also devote one lecture each semester in undergraduate classes to (1) present my research programs and how the materials they learn in the course will help prepare them for the future, and (2) discuss their career options and what is expected of them in industry and graduate school. The students absolutely love this and many think this is one of the most important lectures they have at Virginia Tech. Each semester, I also hire about one dozen undergraduates to work in my lab. I meet with them on a weekly basis and introduce them to the latest cutting-edge research.

In addition to teaching and research, I have found that giving back to my institution and my field is of great value. I have been very active in serving on various committees at Virginia Tech, as well as on technical committees in my research areas, both at the national and international levels. At Tech, I have served on promotion and tenure committees for my department, my college, and the university, and on numerous search committees. Externally, I have taken on leadership roles for many committees. The highlight of my service to the country was my role in testifying before the U.S. House of Representatives on the future of the National Aerospace Plane. Above all, I am most proud of my service to the Commonwealth of Virginia as a faculty entrepreneur promoting economic development and competitiveness. By engaging in research as a university professor and applying that knowledge as an entrepreneur through my company, Techsburg, I can have an immediate and positive impact on energy system products in the global market. This has given me the greatest sense of accomplishment in my career.

Looking back at my career – when I arrived in the U.S. with practically nothing, worked my way through college, accomplished my dream of attending MIT, and achieved a career in which I am influencing the global energy products manufactured by Fortune 500 companies – I feel I have come a long way. Without my experiences as a teacher and researcher at Virginia Tech, I doubt I would have come this far.
ABBREVIATED CURRICULUM VITAE OF WING NG

EDUCATION
Massachusetts Institute of Technology, Cambridge, MA
   PhD Degree 1984 and MS Degree 1980 in Mechanical Engineering
Northeastern University, Boston, MA
   BSc Degree 1979 in Mechanical Engineering

PROFESSIONAL EXPERIENCE
Virginia Polytechnic Institute and State University, Blacksburg, VA
   Alumni Distinguished Professor 2019-present
   Christopher C. Kraft Endowed Professor in Engineering 1996-present
   Dept. of Mechanical Engineering: Prof. (91-96), Assoc. Prof. (87-91), Asst. Prof. (84-87)
Techsburg, Inc., Christiansburg, VA, Chairman and Founder 1998-present
Xi’an Jiao Tong University, Xi’an, China, Adjunct Professor 2015-2018
GE Corporate Research and Development, Schenectady, NY (Sabbatical) Smr/Fall 1992
Massachusetts Institute of Technology, Cambridge, MA, Grad. Research Asst. 1979-1983
GE Co, Aircraft Engine Group, Lynn, MA (Co-op) Spr/Smr 79, Smr/Fall 77, Fall 76

HONORS AND AWARDS (SELECTED)
   • Elected Fellow of the American Institute of Aeronautics & Astronautics (AIAA), 2019
   • Virginia Tech Faculty Entrepreneur Hall of Fame, which recognizes Virginia Tech faculty
     members who have made substantial contributions both in their role as university faculty
     and in the private sector through engagement in successful start-up ventures (only
     seven current and retired faculty members are members of the Hall of Fame), 2017
   • William E. Wine Award, presented annually to three Virginia Tech faculty members (out
     of ~1400) to recognize “a history of university teaching excellence,” 2014
   • Member of the Academy of Teaching Excellence, Virginia Tech, 2014
   • Techsburg received Northrop-Grumman’s World Class Team Supplier Award, 2014
   • Four-time recipient of a Certificate of Teaching Excellence from the College of
   • Dean’s Award for Excellence in Research, Virginia Tech, 2013
   • Techsburg received “Best Team” recognition by Honeywell, 2001
   • Dean’s Award for Excellence in Teaching, Virginia Tech, 1999
   • Fellow (elected) of the American Society of Mechanical Engineers (ASME), 1996
   • Japanese Government Research Award for Foreign Specialists to lecture in Japan, 1996
   • Certificate of Recognition from NASA for technical contributions, 1995
   • Certificate of Appreciation from ASME for serving as Chairman (elected) of the
     Aerospace Division, with members over 15,000, 1993-1994
   • Flag Award from ASME in testimony of the high regard of coworkers and the deep
     appreciation for advancing the engineering profession, 1993
   • Sporn Award from Virginia Tech for excellence in teaching of engineering subjects, 1987
   • Teetor Award from the Society of Automotive Engineers in recognition of significant
     contributions to teaching, research and student development, 1986

TEACHING
   • New courses developed: Aircraft Engines & Gas Turbines (undergraduate), Advanced
     Gas Turbines & Propulsion (graduate)
• Course leader: Fluid Mechanics, Aircraft Engines & Gas Turbines, Advanced Gas Turbines & Propulsion
• Courses taught: Thermodynamics I, Thermodynamics II, Fluid Mechanics, Intro to Thermo-fluid, Fluid Machinery Design, Engineering Analysis & Design
• Chair of Mechanical Engineering graduate seminars: invited outside speakers to give seminars for ~200 graduate students as a one-credit hour required course, 2003-2013
• Graduate students mentored as their major professor: 28 PhD, 91 MS completed; 5 PhD students and 1 MS student won university and national awards.
• In progress: 3 PhD/4 MS/3 undergraduate research theses

PUBLICATIONS
• 4 best paper awards (2 from ASME and 2 from AIAA)
• 3 book editorships, 2 book chapters, 86 peer-reviewed journal articles, 220 conference publications

FUNDING
• At Virginia Tech: 94 research grants as the principal investigator (PI) or co-PI, >$17 million, Ng’s personal share >$13 million. At Techsburg: total revenue $43 million over 20 years
• Funding from government: NASA, Department of Defense, Department of Energy, Japan Aerospace Exploration Agency
• Funding from industry: Rolls-Royce, Siemens, General Electric, United Technologies, Honeywell, Northrop-Grumman, Lockheed Martin, Honda, Caterpillar, etc.
• Research and scholarship have impacted the energy sectors and aerospace industries by helping companies to produce better products, both in the U.S. and abroad.

PATENTS

SERVICE
• Served as technical editor for 4 international journals
• Served in leadership positions for 11 national/international committees and organizations
• Served as an advisor to NASA and the Department of Defense
• Served on numerous federal grant review panels (e.g., NSF, Army Res Office, Department of Energy)
• Taught several short courses in the U.S. and abroad. Courses were given in such countries as Singapore and Belgium and attended by engineers from all over the world.
• Presented many invited keynote addresses and seminars at a variety of institutes and conferences, both nationally and internationally
• Served as chair of the Executive Committee of the Engineering Faculty Organization, Virginia Tech, representing about 300 engineering faculty members
• Served as a member or chair of numerous Virginia Tech committees at the department, college and university levels (e.g., promotion and tenure committees, honorific committees, search committees for deans and department heads) and as a faculty advisor for several Virginia Tech student organizations
LETTERS OF SUPPORT (EXCERPTED)

From Administrators and Colleagues

Dr. Timothy D. Sands, President, Virginia Tech. I am pleased to enthusiastically support the nomination of Dr. Wing Ng to receive a 2020 Outstanding Faculty Award from the State Council of Higher Education. A world-renown researcher, Dr. Ng is the Alumni Distinguished Professor at Virginia Tech, one of only ten faculty to hold this title. With more than 35 years of experience in fluid mechanics, heat transfer, and aero-acoustics, Dr. Ng and his research team have pioneered improved performance in aircraft and gas turbine engines. I especially appreciate the way Dr. Ng's work and accomplishments exemplify the role of a modern land grant university. He strongly supports our mission to teach, conduct research, and advance the economic competitiveness of Virginia. He is a valued member of the Virginia Tech community and a great asset for the commonwealth. He truly deserves recognition as one of Virginia's finest, and I am honored to endorse his nomination.

Dr. Cyril Clarke, Provost and Executive Vice President, Virginia Tech. I am very pleased to support Dr. Wing Ng, the Christopher C. Kraft Endowed Professor of Engineering at Virginia Tech, for a SCHEV Outstanding Faculty Award. During his thirty-plus-year career at Virginia Tech, he has won numerous teaching awards at the national, university, and college levels. His research in fluid mechanics and acoustics of energy systems has also been recognized with many best paper and research awards. Most importantly, by working with numerous Fortune 500 companies including Rolls-Royce, General Electric, Siemens, Honeywell, United Technologies, Northrop-Grumman, Caterpillar and more, the impact of his research has immediately and directly resulted in better products used in energy systems throughout the global market. As an example, his classified/proprietary research in reducing noise of unmanned vehicles has led to better weapon systems for the United States military. One such vehicle has become an indispensable tool for the Explosive Ordnance Disposal team of the Department of Defense (DoD) for fighting terrorists worldwide, and is credited with saving soldiers' lives weekly. Another example of the impact of his research is his proprietary work for companies such as Pratt & Whitney (a division of United Technologies) and GE Aircraft Engines, in which his research has resulted in better performance for the low-pressure turbines for military and commercial aircraft engines. Dr. Ng’s work exemplifies our land grant mission of teaching and learning, research and discovery, and outreach and engagement. He serves as a superb example of faculty excellence in the Commonwealth of Virginia, and I am privileged to support his nomination for this special recognition program.

Dr. Julie M. Ross, Paul and Dorothea Torgersen Dean of Engineering, Virginia Tech. Dr. Ng’s achievements are truly exceptional. He has been a member of the mechanical engineering faculty for his entire career (post-PhD). During this period, he has helped advance the stature of his department and the college through his teaching, research and service. His many teaching and research awards are a testimony to his commitment to balance both. Dr. Ng also stands out in our college due to his strong base for industry-sponsored research. Due to the proprietary (and sometimes classified) nature of his work, results are often not allowed to be published in open literature. In 2019, Dr. Ng was elected to become a Fellow of AIAA, one of the highest honors given to an aerospace engineer. Dr. Ng's service contributions in fostering economic competitiveness for the Commonwealth of Virginia and the nation, through his spin-off company, are exemplary. For all the above reasons, I strongly support Dr. Ng for a SCHEV Outstanding Faculty Award.
Dr. Azim Eskandarian, Department Head, Department of Mechanical Engineering, Virginia Tech. The contributions made by Dr. Ng to the Department of Mechanical Engineering are far more than all the awards that are listed in his vita. One of the intangible assets that Dr. Ng possesses is that he is absolutely a team player. On many occasions, he has put the interest of the team/department well ahead of his own. Despite his heavy load, he is always willing to serve on many important committees in the department. He is a person not driven by his ego, and he is not motivated by recognitions. He is a quiet team player and makes his contributions in a subtle yet influential way. His humble and low-key nature has not gone unnoticed by his department colleagues. His good citizenship helps create an environment in our department that makes it a very pleasant place to work. As a department head, I feel we are fortunate to continue to have him as our faculty. Mechanical engineering programs in other universities would be lucky to have a faculty member like Dr. Ng. I strongly and enthusiastically support his nomination for the SCHEV Outstanding Faculty Awards.

Dr. Alan Epstein, Member of the National Academy of Engineering; R.C. Maclaurin Professor Emeritus, Department of Aeronautics & Astronautics, MIT; and Retired VP of Technology & Environment, Pratt & Whitney. I have followed his work at conferences and in literature, as well as many details of the research he has done under the sponsorship of Pratt & Whitney (where I was Vice President of Technology and Environment). Professor Ng represents the Renaissance man that is the ideal of a modern research university. He is a world-class scholar, a dedicated and accomplished teacher, and a successful entrepreneur. He produces results. It is also a flourishing example how investment in university research can create wealth for local communities...His work is noteworthy not just for the quality of the scholarly contributions, but because it has proven quite useful in a practical sense to industry.

Dr. David Schein, Director, Applied Research, Northrop-Grumman Aerospace Systems. Our working relationship with Dr. Ng and Techsburg, Inc. has resulted in a design, analysis, and test capability that is unmatched in the aerospace industry. The benefit to our combined team has been to solve problems which are critical to improving mission effectiveness and survivability for our nation’s military. While the details are in many cases classified, the impact of the leading-edge technology which Techsburg has contributed to cannot be overstated.

Mr. Dan Fouts, Senior Program Manager, Honeywell, Defense & Space. The close-knit engineering and manufacturing teams established at Techsburg by Dr. Ng were an ideal solution to the many technical aerodynamic and propulsion testing challenges encountered while developing a practical ducted Unmanned Air Vehicle. The final vehicle is useful in many military and civilian roles. Dr. Ng’s vision and entrepreneurship in establishing Techsburg as a provider of high-quality, cost-effective aerospace engineering services was very beneficial to our team.

From Virginia Tech Mechanical Engineering Alumni

Dr. Michael Watts, Chairman Elect, Department of Emergency Medicine, Winchester Medical Center; BS 1985, Virginia Tech; MD 1998, University of Virginia. ...He routinely held extra office hours to help students cement their understanding of the material. The night before tests and the final exam, he made himself available by holding study sessions. His dedication to teaching was extraordinary, to say the least. Fortunately for us, his teaching went well beyond the classroom. Dr. Ng was easily approachable. He was always available to discuss engineering topics and guide us in our career development. He focused on his students, whether in the classroom or the research lab. Dr. Ng’s broad approach to problem solving helped me transition from mechanical engineering to the practice of medicine. Among all
of my professors, both at Virginia Tech and UVA, he is by far the best; his unfailing, consistent dedication to his students and his profession is exceptional. Dr. Ng is the epitome of the teacher/student relationship.

**Provost Rob Clark, University of Rochester; BS 1988, MS 1989, PhD 1992, Virginia Tech.** I am writing to convey my strongest recommendation for Professor Wing Ng ... Having served in academics now for nearly twenty-seven years, nine in the capacity as dean and three as provost, I have a considerable database from which to compare. He is distinguished in every category that we seek to hold as true standards for our faculty... I learned much from him about academic research, integrity, and work ethic, which served to define my academic career. I consider myself very fortunate to have such an inspiring mentor. His influence on my career cannot be understated.

**Ms. Tamar Daniels, Master of Engineering 2017, Virginia Tech.** Dr. Ng is an invaluable person here at Virginia Tech. Coming into higher academia as a first-generation African American woman comes with unique struggles, and I had a rough time adjusting and learning what was expected out of me. During the beginning of my second year, Dr. Ng started to notice that something was wrong with my morale. He took me under his wing (no pun intended) in teaching me how to navigate this system. He not only provided this critical knowledge, he also followed it up with continuous weekly mentorship geared towards focusing on expanding my grasp of the etiquette and procedures of graduate school. Along with this personal development, he also provided direct aid as to my technical preparation for my qualifying exams. I passed with a 96 percent average under his direction. To be shown that you are of value and that you are genuinely cared for is such a blessing to have and I received a blessing in having Dr. Ng as an advisor during my time here. That acknowledgement of your experiences and sincere support and help is everything you need out of a mentor, and that’s exactly what Dr. Ng provides.

**Mr. Tyler Jones, BS 2018.** (As described below, this former student of Ng had to take a year off from college. The following is the student's description of his experience with Ng as a mentor during this time.) I first met Dr. Ng while working for him as a grader for his intro course in Thermal-Fluid engineering. This lent me an opportunity to learn to teach and connect with my peers through lectures and offices hours. While this rare opportunity was greatly appreciated, Dr. Ng’s mentorship soon expanded well beyond that. During a year of absence from VT, Dr. Ng provided personal guidance and consolation regarding the death of my father while also continuing to advise my professional development. He offered me rewarding and challenging opportunities in on-campus work as well as at his privately-owned company. I thank him for making this past year as engaging as it was. As I look forward to graduating, Dr. Ng certainly stands out as the most impactful person I’ve met throughout my college experience. His ability to pioneer excellence in teaching and research while maintaining rich personal relationships with his students and faculty is astounding. This multifaceted excellence demonstrated by Dr. Ng is why I believe he deserves this award.
ADDITIONAL DOCUMENTATION

Select media coverage highlighting Ng’s contributions

- Techsburg featured on WDBJ7 News in Roanoke, Virginia (https://www.youtube.com/watch?v=6A3bMgjgRsg&feature=youtu.be)
- “Discovery Engine-Wing Ng,” Virginia Tech Magazine, Fall 2014, pp. 14-15 (see excerpt below; for full article, visit http://www.vtmag.vt.edu/fall14/vtmag-fall14.pdf)
• “Wing Ng receives the Entrepreneur Hall of Fame Award,” VT News, April 23, 2017 (https://vtnews.vt.edu/articles/2017/04/fs-neg-entrepenuer-hall-of-fame.html)
• “Wing Ng appointed Alumni Distinguished Professor,” VT News, April 9, 2019 (see excerpt below; for full article written by Rosaire Bushey, visit https://vtnews.vt.edu/articles/2019/04/Me-NgnamedADP.html)

Wing Ng, the Christopher C. Kraft Endowed Professor of mechanical engineering in the College of Engineering, has been named an Alumni Distinguished Professor by the Virginia Tech Board of Visitors.

The professorship is a pre-eminent appointment, recognizing remarkable scholarship and service, as well as extraordinary teaching that has influenced the lives of generations of students.

The Board of Visitors appoints Alumni Distinguished Professors on a 10-year appointment to fewer than 1 percent of university faculty to recognize outstanding contributions to the instructional program of the university.

“I congratulate Dr. Ng for his outstanding service to Virginia Tech as an exemplary educator and researcher,” said Cyril Clarke, Virginia Tech executive vice president and provost. “Both a pioneer in his field of research and an entrepreneur, Dr. Ng has enriched the students whom he has taught and advised.”

With more than 35 years of experience in fluid mechanics, heat transfer, and aero-acoustics of gas turbine engines and aero propulsion, Ng has published numerous articles across a variety of propulsion-related research areas, including transonic turbine blade aerodynamics, the development of advanced diagnostic techniques for flow measurement in turbine engines, the acoustics of jet noise, and the acoustics of drones and unmanned air vehicles.
Student Perceptions of Teaching scores for Ng’s courses (from a table prepared for Ng’s nomination for the Virginia Tech Wine Teaching Award in 2014)

<table>
<thead>
<tr>
<th>Course</th>
<th>Term</th>
<th>Number enrolled (respondents)</th>
<th>Well-prepared</th>
<th>Clearly presented</th>
<th>Mutual respect</th>
<th>Ng’s Overall</th>
<th>Overall Dept. Avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 3404 Fluids</td>
<td>F’ 14</td>
<td>57 (36)</td>
<td>5.92</td>
<td>5.78</td>
<td>5.89</td>
<td>5.81/6.00</td>
<td>4.75/6.00</td>
</tr>
<tr>
<td>ME 2124 Thermo</td>
<td>S’ 14</td>
<td>55 (21)</td>
<td>5.8</td>
<td>5.5</td>
<td>5.8</td>
<td>5.6/6.00</td>
<td>4.57/6.00</td>
</tr>
<tr>
<td>ME 2124 Thermo</td>
<td>S’ 14</td>
<td>53 (48)</td>
<td>5.85</td>
<td>5.57</td>
<td>5.85</td>
<td>5.76/6.00</td>
<td>4.57/6.00</td>
</tr>
<tr>
<td>ME 3404 Fluids</td>
<td>F’ 13</td>
<td>60 (48)</td>
<td>5.87</td>
<td>5.55</td>
<td>5.79</td>
<td>5.6/6.00</td>
<td>4.78/6.00</td>
</tr>
<tr>
<td>ME 2124 Thermo</td>
<td>S’ 13</td>
<td>61 (55)</td>
<td>5.85</td>
<td>5.65</td>
<td>5.69</td>
<td>5.62/6.00</td>
<td>4.58/6.00</td>
</tr>
<tr>
<td>ME 2124 Thermo</td>
<td>S’ 13</td>
<td>59 (47)</td>
<td>5.76</td>
<td>5.5</td>
<td>5.72</td>
<td>5.61/6.00</td>
<td>4.58/6.00</td>
</tr>
<tr>
<td>ME 3404 Fluids</td>
<td>F’ 12</td>
<td>67 (43)</td>
<td>5.93</td>
<td>5.79</td>
<td>5.84</td>
<td>5.84/6.00</td>
<td>4.78/6.00</td>
</tr>
<tr>
<td>ME 2124 Thermo</td>
<td>S’ 12</td>
<td>49 (34)</td>
<td>5.79</td>
<td>5.65</td>
<td>5.71</td>
<td>5.73/6.00</td>
<td>4.88/6.00</td>
</tr>
<tr>
<td>ME 2124 Thermo</td>
<td>S’ 12</td>
<td>55 (41)</td>
<td>5.95</td>
<td>5.71</td>
<td>5.78</td>
<td>5.78/6.00</td>
<td>4.88/6.00</td>
</tr>
</tbody>
</table>

Selected comments from students who took Ng’s courses

- The instructor did an excellent job in stressing the basics. His concern for the students is unsurpassed by any other professor I have had…
- I wish to say the same thing I did last year. You are the best professor I have had at Tech, and the reason is your concern for us. You are a credit because you are able to balance your research, and be good at both. Thank you for 2 good semesters.
- He is very concerned with the students and that everyone understands the material. His homework solutions are great (an effective way to save time in class too). Dr. Ng is the best teacher I’ve had in college. He is very organized, thorough, and fair…
- Shows concern for the student and how he is doing in the course. Emphasizes learning, not the grade. Dr. Ng goes out of his way to make sure everyone is learning the material.
- Professor Ng does an excellent job in relating the class material to experiences in the “real world”, both his own past experiences and things to expect in the future.
- He has a very good relationship with students and is very approachable. He is very interested in how well a student is learning and provides a lot of help time. He is always looking for students’ input as to how course can be improved. Probably the best teacher I’ve had at Va. Tech.
- Prof. Ng is one of the best teachers I have had. The thing that he does best is get the class to participate instead of him just lecturing.
- I feel the instructor is genuinely concerned with the progress of the student. He is very helpful in urging one to do better. His number one concern is the student and how well the students understand the material.
- Prof. Ng was clearly concerned about our understanding of the material and it made the class so much better knowing that your teacher cares about how you do individually…


Additional statements of support from overseas

Prof. Yan, Dean of the School of Energy & Power Engineering, Xi’an JiangTao U (XJTU), Xi’an, China. (Prof. Yan provided the following comment regarding Ng’s international collaboration.) XJTU has a long-standing international collaboration with Prof Ng. Our faculties and graduate students have been working on joint projects that involve experiments and numerical simulations of gas turbine engine components. His experimental facilities, in which he simulates the harsh environment inside of a gas turbine engine in his short duration wind tunnel, is unique and creative, and has earned him world-wide recognition. We have joint publications with Prof Ng’s team in some of the most prestigious journals in our field. In addition to visiting our institute, he had also given lectures at several of the top universities in China (e.g. Tsinghua U, Hong Kong U of Science & Technologies, Beijing U of Aero & Astro, Northwest Polytechnic Institute …etc.), as well as some of the gas & steam turbine industries. Without questions, Prof Ng’s research program is world-class, and is highly respected internationally. We appreciate this collaboration, in which students and faculties from both countries can be benefited from Dr. Ng’s leadership. He has promoted the international visibility of Virginia Tech, and he truly deserves to be recognized.

Dr. Yoshida, Program Director of Aeronautical Technology, Aeronautical Technology Directorate, Japan Aerospace Exploration Agency (JAXA), Tokyo, Japan. We have been cooperating with Prof Ng since 1994. He is a world expert in aeroacoustics, especially in reducing noise from aircrafts and aircraft engines. Our researchers have visited Virginia Tech on many occasions, to study their unique anechoic wind tunnel. This facility is a world class facility, built by Prof Ng, in collaboration with Prof Devenport & Prof Burdisso, also of Virginia Tech. Since the inception of their novel wind tunnel, we have built a similar wind tunnel at JAXA for our own research; a testimony of the high regard we have on their research idea. This cooperation with Virginia Tech led to considerable advancement on our aircraft noise research and recently to a success of our aircraft noise project. Because of his international recognition, Prof Ng was also invited by a fund from the Japanese government to give lectures on his research for the aircraft industries throughout Japan. He is without question a world-renowned leader in his field and has increased the reputation of Virginia Tech globally.

Dr. Arima, Chief Engineer, Advance Research Division, Honda R&D Co, Ltd, Saitama, Japan. Dr. Ng is a world-renowned researcher in gas turbine engines. We had funded a research program at VT, in which we asked Prof Ng to experimentally investigate the aerodynamic performance of some stator blades. His innovative, short duration wind tunnel (the Virginia Tech Linear Cascade Blowdown wind tunnel) was used to provide experimental data at a fraction of the cost to do the experiment in a steady-state, continuous test facility. The test program provided important data to validate our design and allowed us to improve our knowledge of transonic blade design which is instructive in the design of our products. The timely delivery of the accurate test results from Dr. Ng’s team was very much appreciated, and to do that in a university with graduate students is very unusual. VT is fortunate to have faculty like Prof Ng, whose effort in working with industry made VT to be recognized as a global power house in engineering education.