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Committee on Science, Space and Technology
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on
"National Science Foundation: Advancing Research for the Future of U.S. Innovation"

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Introduction

Chairwoman Stevens, Ranking Member Waltz, and Members of the Subcommittee, it is a privilege to appear before you today as the 15th Director of the National Science Foundation to discuss how the agency can build upon decades of successful investments and breakthroughs to ensure that the United States remains the global leader in science, engineering and innovation into the future.

Established by the National Science Foundation Act of 1950 (P.L. 81-507), NSF is an independent federal agency charged with the mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF is unique in carrying out its mission by supporting research across all fields of science, technology, engineering, and mathematics, and all levels of STEM education. NSF investments contribute significantly to the economic and national security interests of the nation and development of a future-focused science and engineering workforce that draws on the talents of all Americans that creates new businesses, new jobs, and more exports.

Last year, NSF celebrated its 70th anniversary. Over the past seven decades, NSF has funded research, researchers, innovations and innovators, and world-class infrastructure that has garnered incredible benefits to the nation. The internet, 3D printing, the economic theory underpinning spectrum auctioning and kidney exchanges, and even the polymerase chain reaction testing technique that has been critical in the fight against COVID-19 are all examples of the outcomes and benefits of NSF investments. Many of the technologies and industries that are the focus of national conversations around competitiveness today -- artificial intelligence, quantum

information science, advanced manufacturing, advanced wireless and biotechnology, to name a few -- are rooted in sustained NSF support for research at the frontiers of science and engineering.

The Fight Against COVID-19

Over the past year, the research community has been integral to the ability to combat the SARS-CoV-2 virus by modeling its structure to reveal how the virus attacks the body, creating new products to mitigate the virus's spread and developing new treatments and vaccines to combat the virus. In the "Coronavirus Aid, Relief, and Economic Security Act," or "CARES Act," NSF was appropriated $75 million for urgent research to understand, predict the spread of, and enable approaches that mitigate the negative effects of COVID-19 on public health, society, and the economy. NSF's CARES Act funds were fully obligated by September 2020. NSF has continued to make awards for COVID-19 research and has made more than 1,000 awards totaling over $200 million to address important research questions.

This funding has already yielded results for the American people. For example, a team of researchers from the University of Florida received funding to understand the transmission modes of SARS-CoV-2. The resulting study provided the first-ever demonstration that the live virus can travel through the air in a hospital room. One of the most well-known projects on COVID-19 supported by an NSF award is the ongoing operation of the Johns Hopkins Coronavirus Resource Center. The data dashboard was first released publicly on Jan. 22, 2020, to visualize and track the COVID-19 outbreak in real time, and it has since served as a preeminent centralized source of COVID-19 epidemiological data. NSF funding was instrumental in automating the collection and curation of dashboard data, broadening its data sources, and supporting data analysis and modeling research to improve understanding of the pandemic and future outbreaks.

Even as the research community rose to this challenge, COVID-19 has had a profound impact on them. Labs were closed, research field campaigns were postponed, and access to equipment and personnel was limited or impossible. In responding to the challenges created by the pandemic, NSF's focus has been on all individuals and institutions most severely impacted by COVID-19, which includes women and early career researchers at vulnerable transition points in their careers. For example, in November of 2020, NSF announced an expansion of the Career Life Balance program, to help reduce the rate at which early-career researchers depart from the STEM workforce by offering to support the addition of technical staff to a grant while the PI, co-PI, other senior personnel, post-doc or graduate student is on family leave. Other opportunities were made available to ADVANCE PIs, especially focusing on intersectionality and equity by supporting systemic change in Minority Serving Institutions (MSI) and advancing women with disabilities in academic STEM careers.

The $600 million entrusted to NSF through the American Rescue Plan is critically important. NSF will utilize its existing mechanisms, either through award supplements or new awards, to distribute these funds to those most severely impacted and most vulnerable. NSF will also make investments in programs that support undergraduate researchers, such as the Research Experiences for Undergraduates Sites and Supplements program. Finally, through EPSCoR and existing mechanisms that support minority-serving institutions and two-year colleges, NSF will provide support for those institutions hardest hit by the pandemic as we support the nation's researchers and institutions so that they may continue to produce the amazing innovations that make the

nation's economy and national security stronger. I want to again thank the administration and Congress for this critical funding at this important time.

A Vision for the Future

As NSF looks to the future, the agency's capacity to produce breakthroughs, to innovate, to identify the industries we cannot even imagine today, and to cultivate the domestic talent needed to power our country forward will be strengthened at speed and scale.

Since my confirmation last June, my leadership team and I have developed a vision for the future of the agency comprising of three core pillars:

- Advancing the frontiers of research into the future.
- Ensuring accessibility and inclusivity.
- Securing global leadership in science and technology.

The first pillar is advancing the frontiers of science and engineering research into the future. This has been the heart of NSF's mission for over seven decades and will be further strengthened in the years to come. By seeding strategic investments, NSF steers the frontiers of discovery and innovation toward breakthroughs that put the United States at the forefront of global leadership in science and technology.

Curiosity-driven research has proven to be an engine of economic growth. Since its inception, NSF has been a foundation for industries of the future. NSF funds the high-risk, high-reward research that has the potential to bring the world new discoveries. Each year, thousands of researchers expand the base of human knowledge and, in doing so, unlock new possibilities. They have built autonomous vehicles; revolutionized our wireless networks; developed life-saving medical technologies; transformed manufacturing; and brought digital tools to agriculture. Curiosity-driven, exploratory research is a critical component to the nation's current and future success.

Equally important to our nation's competitiveness and success is use-inspired research, which has been a critical part of NSF's mission throughout its history. NSF fosters an environment ripe for innovation and focused on economic and societal progress. Many of today's foremost national and societal challenges -- health care, education, climate -- demand deeply multidisciplinary, multi-sector, solution-oriented research leading to science and technology innovations. We must enable collaborations spanning diverse institutions, sectors, and geographies to co-create and scale new technologies and solutions to these challenges that accelerate prosperity.

The second pillar is ensuring accessibility and inclusivity in STEM fields. This is increasingly important. There is tremendous untapped STEM potential throughout the nation. To meet the needs of the future workforce, every person needs access to a quality STEM education. Every demographic and socioeconomic group in every geographic region of the country is full of talent that must be inspired and motivated to participate in STEM and contribute to the research and innovation enterprise. We must scale up existing pathways into STEM fields and create new tracks into science and engineering.

The third pillar is securing global leadership in science and technology. America must lead by our actions and our values. Key tenets of this leadership are transparency, reciprocity and research integrity. In coordination with our interagency colleagues, NSF will work with like-minded

partners who share these values and commitment to advancing scientific progress and prosperity. We will take the necessary steps to safeguard taxpayer investments and to ensure everyone is playing by the same set of rules. And we will help to give our workers and companies the tools and training they need to compete on the global stage.

The foundation for these pillars is the partnerships that NSF cultivates. NSF has a rich history of not only pursuing direct partnerships with other agencies, private industry and like-minded countries, but also fostering environments where partnerships thrive, because they are powerful ways to leverage resources and deliver results. We need partnerships for accessing a broader network of ideas, innovations and experiences to address and solve real-world problems.

This vision relies on a mindset of innovation. It permeates the culture at NSF and thereby unleashes the innovative spirit throughout the research enterprise across the entire nation.

Investing in Innovation

On March 31, the administration released the American Jobs Plan, which will create millions of good jobs, rebuild our country's infrastructure, and position the United States for the future. As part of that proposal, the administration proposes investing $50 billion in NSF, and creating a new directorate for technology that will collaborate with and build on existing programs across the government. It will focus on fields like semiconductors and advanced computing, advanced communications technology, and biotechnology. The American Jobs Plan also seeks $30 billion in additional funding for research and development that spurs innovation and job creation, including in rural areas; invests $40 billion in upgrading research infrastructure in laboratories across the country; and invests in Historically Black Colleges and Universities (HBCUs) and other MSIs.

In furtherance of those goals, on April 9th, the administration released the President's FY 2022 Discretionary Request, which firmly supports NSF's mission to advance the frontiers of science and engineering and aligns with NSF's vision for the future. The request includes $10.17 billion for NSF, an increase of 20% from the current budget. With this increase, the administration is positioning NSF to do the following:

Enhance Fundamental Research and Development

The administration's discretionary request provides $9.43 billion, an increase of $1.55 billion above the FY 2021 enacted level, to support research across the spectrum of science, engineering and technology, including biological sciences; computer and information sciences; engineering; geosciences; math and physical sciences; social, behavioral, and economic sciences; and education. With this additional funding, NSF will continue to be the champion of curiosity-driven, exploratory research and will strengthen it at speed and scale.

These investments will allow the agency to fund more of the groundbreaking research and support the development of STEM talent critical to our future success. Each year, NSF investments reach approximately 300,000 people at almost 2,000 institutions in every state and territory. Through their work on NSF-supported grants, students, researchers, faculty, technicians, entrepreneurs and others develop the skills and knowledge they will bring with them into the future. Over its 70-year history, NSF has done a remarkable job of supporting the brightest minds with outstanding ideas. This includes 248 Nobel Prize winners; supported entrepreneurs responsible for incubating

companies; and ushered in technological revolutions. A great example is Small Business Innovation Research (SBIR) awardee SensorHound in Indiana, which is seeking to increase the reliability and robustness of cyber-physical systems (CPS). CPS technology is directly applicable to a broad range of sectors, including utility grids, smart buildings, manufacturing, healthcare, transportation, and other sectors.

The national innovation economy is powered in part by NSF programs that bring ideas from the lab into the marketplace. For example, the SBIR program was conceived of and piloted by NSF in the late 1970s. Today, SBIR programs across the federal government invest nearly $3 billion in small businesses annually. NSF also uses experiential education to help researchers gain valuable insight into starting a business and bringing an idea to market. The NSF Innovation Corps (I-Corps) program helps entrepreneurs and small businesses understand market needs and opportunities, thus increasing their chances of successfully translating new technologies. More than 1,300 teams have participated in the I-Corps program since 2011. With expanded funding to enhance fundamental research and development, NSF will unleash additional talent, create new knowledge, and plant the seeds of future industry.

Partnerships are critically important in accelerating scientific and engineering discoveries funded by NSF to the marketplace. In addition to small business, entrepreneurship and translation programs, NSF manages the Industry-University Cooperative Research Centers to better engage industry and academia. Existing NSF innovation research alliances such as Engineering Research Centers, Science and Technology Centers, Nanoscale Science and Engineering Centers and Materials Research Science and Engineering Centers complement NSF's significant investments in fundamental scientific and engineering research. They do so by offering multiple pathways to advance discoveries to innovations, to emerging technologies.

Strengthens U.S. Leadership in Emerging Technologies

As described in the American Jobs Plan, the administration's discretionary request includes the establishment of a new directorate for technology within NSF to help translate research into practical applications. The directorate will work with programs across NSF and with other federal and non-federal entities to expedite technology development in emerging areas that are crucial for the United States' technological leadership, including artificial intelligence, high performance computing, disaster response and resilience, quantum information systems, robotics, advanced communications technologies, biotechnology, and cybersecurity.

Intense global competition and a rapidly changing technological landscape requires the United States to take a different approach to research and development investment that brings science and technology innovations to market much more rapidly. Doing so requires unleashing the potential of economies of innovation across the nation and tightly integrating curiosity-driven research and use-inspired outcomes. The scientific pursuit of knowledge and understanding cannot be separated from the development of new technological capabilities. And, in turn, those new capabilities allow us to pursue new research questions that were either unseen or out of reach.

NSF has been investing in basic research and use-inspired outcomes for decades. A prime example is the internet. NSF had established supercomputer centers in the 1980s and launched NSFNET in 1985 to link researchers to these resources. The computing power harnessed was the result of decades of investments in basic research in computer science, electrical engineering and many other fields, all of which happened alongside use-inspired engineering to build new computing

capabilities and network capacity. NSFNET was the first large-scale implementation of the internet technology that is the backbone of major components of our economic vitality today. As it continued to grow, it presented new practical problems that needed to be investigated -- and new research questions that needed to be answered. And answering those questions allowed new solutions and technology to be designed that supported the growth of the internet and the many different science and engineering fields that underpin it today.

As we look to the future, artificial intelligence is an example of a technology that offers tremendous promising potential across a broad range of societal and national challenge areas. NSF is the largest non-defense funder of artificial intelligence research. In addition to foundational research advancing the frontiers of learning, reasoning, planning and so on, the key to harnessing the promise of artificial intelligence is the use-inspired, translational research that links artificial intelligence and economic sectors such as agriculture, manufacturing, transportation and personalized medicine. Equally important is the investment in education and learning, including growing the human capital and institutional capacity needed to nurture the next generation of artificial intelligence researchers and practitioners. Under the administration's discretionary budget request, NSF will supercharge investments and work collaboratively with our federal counterparts and other partners to rapidly catalyze results in areas of national importance.

Advances Racial Equity in Science and Engineering

The administration's discretionary request seeks $100 million -- or roughly a 50% increase -- in funding for programs that aim to increase participation in science and engineering of individuals from racial and ethnic groups underrepresented in these fields. Funding will support curriculum design, research on successful recruitment and retention methods, development of outreach or mentorship programs, fellowships, and building science and engineering research and education capacity at HBCUs and other minority-serving institutions.

Advancing equity requires that NSF look internally at our own policies and practices as well as externally at how the agency's policies and programs impact the research and innovation enterprise. As I mentioned earlier, my vision for the agency includes a central pillar of ensuring accessibility and inclusivity. That is why, shortly after becoming Director, I established an internal task force to ensure the agency works to identify and remove any barriers to opportunities both internally and externally for members of underserved and underrepresented communities. That task force recently submitted their preliminary recommendations to me, and I look forward to sharing the steps that NSF plans to take with the committee over the coming weeks and months. The work of the task force is an ongoing effort that NSF's recently established Equity Team has been able to leverage as a resource and promising practice for addressing broader equity initiatives. The team is focusing on methods to advance equity for all underserved and underrepresented communities and examining potential barriers for members of all such communities in accessing NSF's programs, benefits, services, and procurement opportunities. This group is working in tandem with the already established Racial Equity Task Force, capitalizing on the data obtained and the analysis accomplished thus far, and cross-purposing efforts as often as possible. NSF has established several teams that are either focused on equity (such as the Gender Policy Council, Agency Equity Team and the Racial Equity Team) or topics that are related to equity (such as broadening participation). The team has incorporated various assessment approaches and tools, such as logic models and stakeholder engagement internal and external to the agency. Embedding equity into NSF's operations is essential to delivering the mission.

To be successful in continued global leadership in science and technology, domestic talent needs to be inspired, nurtured and advanced across our nation. The future depends on investment in inclusion, in diversity, in training of STEM teachers, and in inspiring the next generations through formal and informal learning. Continued global leadership also requires investment in the next generation of scientists trained to pursue questions beyond the traditional scientific disciplines. NSF is investing in education research across all levels of learning -- from preK-12 through graduate education and beyond -- which then informs education and training programs to better develop skill sets in cutting-edge technologies, promote highly collaborative team science, and foster greater diversity in the workforce. NSF will continue to invest robustly across its suite of broadening participation programs. In so doing, NSF will work tirelessly to ensure that there are no barriers to equal opportunity at NSF or in the delivery of its programs. These investments will be central to our ability to achieve those goals.

Advances Climate Science and Sustainability Research

The administration's discretionary request provides $1.2 billion for NSF for climate and clean energy-related research. NSF will fund a broad portfolio of research related to climate science and clean energy, including research on atmospheric composition, water and carbon cycles, modeling climate systems, renewable energy technologies, materials sciences, and social, behavioral, and economic research on human responses to climate change.

NSF has been investing in the fundamental research at the heart of global climate issues for several decades. Long-term, continuous, and consistent observational records are a cornerstone of global climate science and resilience research. NSF supports a variety of research observing networks that complement, and are dependent on, the climate monitoring systems maintained by our federal partners. The results of NSF investments have helped us understand climatic phenomenon, and helped communities address challenges associated with mitigation, adaptation, and building resilient futures.

For example, NSF played a major role in the Tropical Ocean Global Atmosphere (TOGA) program along with NOAA and NASA to understand coupling between the atmosphere and the ocean. Foundational to our current understanding of complex climate systems, TOGA directly resulted in improved theoretical understanding and dynamic modeling of the El Niño Southern Oscillation (ENSO) cycle. This enabled routine seasonal forecasts by operational agencies, which save lives and protect property. NSF is well-poised to undertake use-inspired climate research on longer time scales. Information from such research can be used for long-range planning to enhance resilience for the benefit of society. Furthermore, NSF funds critical climate adaptation and mitigation research – from small businesses seeking to develop an integrated climate resiliency index, to support for graduate student training programs that integrate science with management and policy, to studying biodiversity and shifts in species ranges in response to climate change.

Continues Construction of Major Research Facilities

The administration's discretionary request invests in the continued construction of major NSF research facilities, including long-term upgrades of NSF's major Antarctic infrastructure. It also supports construction of the Vera C. Rubin Observatory to enable astronomy research, which we are pursuing in partnership with the Department of Energy's Office of Science. In addition, the

discretionary request seeks funding for the construction and procurement of smaller research facilities and equipment across the nation.

NSF invests in world-class research facilities, instrumentation, and capabilities to ensure that researchers have access to the most cutting-edge scientific equipment. Through the Major Research Equipment and Facilities Construction projects, NSF has built the world's most powerful solar telescope, transformative optical and radio telescopes, state-of-the-art research vessels, and complex facilities in the harshest environments, including at the South Pole.

With the introduction of the Mid-Scale Research Infrastructure program, NSF is investing in smaller scale, but equally important research infrastructure and filling a vital need for the United States research and innovation enterprise. The Mid-scale Research Infrastructure program is aimed at transforming scientific and engineering research fields as well as inspiring STEM talent. The need for this program has been recognized by stakeholders in the scientific community and by Congress in the American Innovation and Competitiveness Act. Mid-Scale Research Infrastructure can also serve as a proving ground for new and innovative major research facilities.

National Science Foundation Reauthorization Act of 2021

The National Science Foundation appreciates the strong support for the agency's mission that is evident throughout the National Science Foundation for the Future Act. While the Administration does not have formal views on the legislation, NSF provides the following comments regarding the importance of the proposed policies and budget increases.

NSF's Education and Human Resources Directorate works tirelessly to achieve excellence in U.S. STEM education at all levels and in all settings (both formal and informal) to support the development of a diverse and well-prepared workforce of scientists, technicians, engineers, mathematicians and educators and a well-informed citizenry that have access to the ideas and tools of science and engineering. The bill's emphasis on further investing in STEM education research, from pre-K to advanced technical education, aligns with the agency's mission and vision to build a more engaged, diverse, and prepared STEM workforce. Increased and improved information to better align the needs of the STEM workforce and the education and technical training students receive is critical. There are multiple federal agencies engaged in the national STEM education framework, and it will be important for expertise, information, and resources to be shared across these partners.

In addition, the bill also makes updates to several of NSF's established programs that aim to broaden participation in STEM and adds a focus on growing diversity to other existing programs and facilities management. Both the Administration and NSF are committed to building a more inclusive research enterprise that represents the great diversity of the nation. NSF has taken steps to ensure we are building capacity at MSIs. For example, last year NSF's Social, Behavioral and Economics Directorate launched the Build and Broaden Initiative, which seeks to foster partnerships and build research collaborations among institutions while building capacity at MSIs. NSF's Directorate for Computer and Information Science and Engineering (CISE) launched a similar program this year, the CISE-MSI Research Expansion program. National forecasts of the impending science and engineering skills shortage underscore the importance of expanding the volume and increasing the diversity of the STEM workforce. HBCUs, Hispanic Serving Institutions, Tribal Colleges and Universities and other MSIs can and do make considerable

contributions to educating and training science leaders for U.S. economic growth and competitiveness. It is vital that we take steps to increase their participation and bring more of their students into the STEM research enterprise. NSF also appreciates the codification of the NSF Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (INCLUDES) program, which is building networks throughout the nation to move the needle on STEM inclusivity. To date, the program has engaged more than 37,000 individual participants and more than 1,200 partner institutions in 49 states. NSF looks forward to working with the Committee on these important initiatives to build a more diverse and inclusive STEM enterprise.

The legislation also includes several provisions aimed at improving the security, impact of, and trust and confidence in fundamental research supported by NSF. In particular, the bill codifies the Chief of Research Security position that Dr. Rebecca Keiser was appointed to in March 2020. Since her appointment, Dr. Keiser has been working closely with the NSF Office of Inspector General, federal intelligence and law enforcement agencies, other federal research funding agencies, and the research community. In addition, NSF has developed training modules for staff and principal investigators to be aware of and cognizant of the threat posed, and the agency has devoted analytical resources to better understand the scope of the threat. NSF is committed to ensuring that the needed resources and authorities are devoted to this pressing issue while balancing the openness and collaboration that makes basic research so successful and impactful. The agency looks forward to working with the Committee to do so.

The bill also requires that researchers prepare a statement on possible security or other risks to society from their research to encourage researchers to always consider their research in a societal context. As is recognized by the legislation, the very nature of exploratory-based fundamental research often leads to discoveries and innovations not even conceived of at the outset of the research. The public outreach and stakeholder input required in the legislation to determine what constitutes "a foreseeable or quantifiable risk" would be critical if such a requirement were to be implemented. As noted in the legislation, NSF has taken a number of steps to both understand and assist researchers in understanding the ethical considerations inherit in their research, including commissioning a study by the National Academies and creating specific programs and funding opportunities to explore these questions.

Finally, the bill establishes a new Directorate for Science and Engineering Solutions to advance research-based solutions to societal and national challenges by (i) supporting use-inspired research that advances emerging technologies, (ii) accelerating the translation and commercialization of Foundation-supported fundamental research, and (iii) expanding the pipeline of United States students and researchers in areas of societal and national importance. As noted earlier, NSF and the Administration believe it is vitally important to take a different approach to research and development investment that brings science and technology innovations to market much more rapidly. The goals and purpose of the proposed directorate align well with the FY 2022 Budget proposal for a new directorate for translation, innovation, and partnerships at NSF, and we look forward to working with the Committee as this legislation moves through the legislative process and the Congress considers the FY 2022 budget request.

Conclusion

At a time of intense global competition, NSF is prepared to lead the nation in innovation, discovery, and STEM education to help build a diverse and inclusive workforce to unleash economic and societal progress. NSF is well positioned to identify emerging opportunities and innovate to create future opportunities to unlock their potential for American people. Every day, we benefit directly from NSF-funded advances, from the technology that powers our smartphones and the capabilities that connect them, to improved weather forecasts, to a better understanding of the world around us.

The United States is focused on leadership in science and technology and leaping ahead of the competition into the future. That leadership is built upon a uniquely American innovation system in which sustained investment in research innovations is intertwined with a strong partnership among government, academia, and industry. This public-private partnership has ensured the United States as the world leader in discovery and innovation for decades and will no doubt propel American leadership well into the future. Fields such as artificial intelligence and quantum information science hold the promise of incredible job growth, prosperity, and strengthened national security. A robust, sustained commitment and expansion of this American system of foundational and use-inspired research and innovation will be crucial to seek continued preeminence in science and engineering.

Thank you for the opportunity to testify before you today. With the continued support of this Committee and the Congress, NSF will unleash rapid innovations, creating ecosystems of prosperity across the nation and securing our future.

Dr. Sethuraman Panchanathan
Director
National Science Foundation

The Honorable Sethuraman Panchanathan is a computer scientist and engineer and the 15th director of the U.S. National Science Foundation (NSF). Panchanathan was nominated to this position by the President of the United States in 2019 and subsequently unanimously confirmed by the U.S. Senate on June 18, 2020. NSF is an $8.5B independent federal agency and the only government agency charged with advancing all fields of scientific discovery, technological innovation and STEM education.

Panchanathan is a leader in science, engineering and education with more than three decades of experience. He has a distinguished career in both higher education and government, where he has designed and built knowledge enterprises, which advance research innovation, strategic partnerships, entrepreneurship, global development and economic growth.

Panchanathan previously served as the executive vice president of the Arizona State University (ASU) Knowledge Enterprise, where he was also chief research and innovation officer. He was also the founder and director of the Center for Cognitive Ubiquitous Computing at ASU. Under his leadership, ASU increased research performance fivefold, earning recognition as the fastest growing and most innovative research university in the U.S.

Prior to joining NSF, Panchanathan served on the National Science Board as chair of the Committee on Strategy and as a member of the External Engagement and National Science and Engineering Policy committees. Additionally, he served on the National Advisory Council on Innovation and Entrepreneurship. He was chair of the Council on Research of the Association of Public and Land-grant Universities and co-chair of the Extreme Innovation Taskforce of the Global Federation of Competitiveness Councils. Arizona's Governor appointed Panchanathan as senior advisor for science and technology in 2018. He was the editor-in-chief of the IEEE Multimedia Magazine and editor/associate editor of several international journals.

Panchanathan's scientific contributions have advanced the areas of human-centered multimedia computing, haptic user interfaces, person-centered tools and ubiquitous computing technologies for enhancing the quality of life for individuals with different abilities; machine learning for multimedia applications; medical image processing; and media processor designs. He has published close to 500 articles in refereed journals and conference proceedings, and has mentored more than 150 graduate students, postdocs, research engineers and research scientists, many now occupy leading positions in academia and industry.

For his scientific contributions, Panchanathan has received numerous awards, such as Distinguished Alumnus Awards and the Governor's Innovator of the Year for Academia Award for his development of information technology centric assistive and rehabilitative environments to assist individuals with visual impairments.

Panchanathan is a fellow of the National Academy of Inventors, where he also served as vice president for strategic initiatives. He is also a fellow of the American Association for the Advancement of Science, the Canadian Academy of Engineering, the Association for Computing Machinery, the Institute of Electrical and Electronics Engineers and the Society of Optical Engineering.

Panchanathan is married to Sarada "Soumya" Panchanathan, an academic pediatrician and informatician, who has taught medical students, pediatric residents and informatics fellows. They have two adult children, Amritha and Roshan.