

Lifetime Achievement Award

For discoveries with impacts that have developed over more than 15 years, that have revealed profound new understandings of foundational science and/or theories within a given field and the resulting impact on society.

Celebrating a Lifetime of Excellence: Dr. Alan Rudolph's Contributions to Science and Research

NOMINATION ABSTRACT:

Dr. Alan Rudolph - recently retired VP of Research at Colorado State University; Former CO-LABS Board Chair; former leader of the U.S. Biodefense, Biosecurity, and Biotechnology programs at the DARPA; and serial entrepreneur and founder of Cellphire, a biotechnology company in phase II human clinical trials for freeze-dried platelets - has had an illustrious career marked by a profound commitment to scientific innovation and collaboration. He has published over 100 papers and 15 patents.

While serving as the Vice President for Research at Colorado State University (CSU), he orchestrated a transformative journey that elevated CSU into the prominent research institution it is today. Under his visionary leadership, CSU's research enterprise flourished, achieving total sponsored expenditures of \$456.9 million, solidifying CSU's position among the nation's foremost research universities. Dr. Rudolph's enduring commitment to interdisciplinary research led to the inception of influential research hubs such as the Center for Healthy Aging, One Health Institute, and Data Science Research Institute.

Additionally, Dr. Rudolph played a pivotal role in the realm of robotics, collaborating with Boston Dynamics on groundbreaking projects. Dr. Rudolph's German short-haired pointer, Laney, was the inspiration behind BigDog, the remarkably lifelike four-legged robot used by the Pentagon. In collaboration with the renowned robot maker Marc Raibert, Dr. Rudolph initiated the creation of "BigDog." This remarkable four-legged robot captured the imagination of millions through its ability to navigate challenging terrains and carry substantial loads. Beyond its captivating locomotion, BigDog showcased the potential of robotics in addressing critical military logistics challenges. His involvement with Boston Dynamics showcased his powerful imagination and dedication to pushing the boundaries of technology, enabling robots to achieve feats previously thought impossible. Its exceptional feats of balance and mobility underscored the convergence of technology and biology and exemplified the potential of robotics and automation in diverse applications.

Dr. Rudolph's dedication to leveraging "bioimagination" extended to improving the lives of individuals grappling with physical disabilities. He was instrumental in pioneering brain-machine interface technology, as demonstrated during the 2014 World Cup when a paralyzed individual



Dr. Alan Rudolph



Started in 2009, the annual Governor's Awards for High-Impact Research celebrates the brilliant ground-breaking discoveries and innovative research from Colorado's ecosystem of federally-funded laboratories and institutions.

Organized by CO-LABS, each year's event spotlights the men and women creating our future through brilliant technological and engineering discoveries in aerospace, energy, agriculture, public health, weather prediction, wildlife ecology, communication, earth science and dozens of other fields of research right here in our communities.



NOMINATION ABSTRACT (CONTINUED)

operated a robotic exoskeleton using their brain. This groundbreaking initiative showcased the potential of technology to bestow newfound independence on those with paralysis.

Dr. Rudolph's expertise in fostering collaborative partnerships transcended academia. His understanding of the power of collaboration led to partnerships with diverse institutions and individuals, resulting in a global network of scientific inquiry. He recognized the potency of collective problem-solving by uniting institutions, individuals, and sectors, addressing challenges such as infectious diseases and national security. His advocacy for investments in research institutions has resulted in crucial public assets such as the Colorado State University Regional Biocontainment Laboratory which provides a safe, secure, state of art facility for university investigators, government scientists and industry representatives to collaboratively research bacteria and viruses that cause human and animal disease. Likewise the Infectious Disease Research Center at CSU provides a research environment for developing new scientific discoveries, vaccines, methods of diagnosis, and therapeutic agents for infectious agents and is among the world's leaders in researching West Nile Virus, drug-resistant Tuberculosis, Yellow Fever, Dengue, Hantavirus, Plague, Tularemia and other diseases.

Dr. Rudolph's efforts to raise awareness within funding agencies and congressional supporters have paved the way for sustaining these and other critical institutions. His visionary leadership also extended to CO-LABS, where he served as a Board Director and Chair for several years, expanding the organization's engagement with federal elected officials and across scientific agency leadership.

In the words of Dr. Ray Goodrich, the Director of the IDRC who has worked closely with Dr. Rudolph, "Dr. Alan Rudolph is an incredible leader, a great friend, a wonderful collaborator, and a fantastic resource for the state of Colorado and the United States." Dr. Rudolph's journey is a testament to the transformative power of science and research in shaping a brighter future for all. CO-LABS is grateful and proud to recognize him with the 2023 Lifetime Achievement Award while also looking forward to the next chapters of his visionary story to unfold!

BACKGROUND CONTEXT

Dr. Alan Rudolph's illustrious career is marked by a profound commitment to scientific innovation and collaboration. As the Vice President for Research at Colorado State University (CSU), he transformed the institution into a research powerhouse. Under his leadership, CSU's research enterprise witnessed unprecedented growth, with total sponsored expenditures reaching \$456.9 million, positioning CSU among the top-tier research institutions in the United States. Dr. Rudolph's strategic vision and commitment to interdisciplinary research led to the establishment of influential centers and institutes, including the Center for Healthy Aging, One Health Institute, and Data Science Research Institute.

Dr. Rudolph's pioneering work ventured into the realm of "brain-machine interfaces," a revolutionary concept allowing robotic limbs to be seamlessly controlled by human thoughts. His vision sought to explore the potential of machines augmenting human abilities and providing a new dimension to assistive technology. Dr. Alan Rudolph played a significant role in the ambitious project led by Brazilian neuroscientist Miguel Nicolelis, which aimed to showcase a groundbreaking brain-machine interface during the opening ceremony of the 2014 World Cup in São Paulo. This endeavor sought to enable a paralyzed individual to walk onto the field and kick a soccer ball, controlled by a robotic exoskeleton operated by their brain.

Dr. Rudolph and the team adapted their approach to use non-invasive EEG electrodes on the scalp for brain signals, the project underscored the importance of scientific innovation and the complex challenges of brain-machine interfaces, bridging the gap between neuroscience and robotics. His innovative contributions aspired to offer newfound independence and hope to those facing physical disabilities.

Additionally, Dr. Rudolph's military technology advancements during his tenure at the Defense Advanced Research Projects Agency (DARPA) helped build a foundation of business and management principles that he would carry with him into future roles. His work with companies like Boston Dynamics was inspired by his German short-haired pointer named Laney during a woodland stroll, his objective was to devise innovative solutions

BACKGROUND CONTEXT (CONTINUED)

for transporting infantry and their equipment across rugged terrains where traditional vehicles faltered. Dr. Rudolph has often brought his zoology background into areas of biotechnology and life sciences. Bioinspiration is a theme in Dr. Rudolph's career, where he borrows principles and practices from living systems and puts them into engineered or applied opportunities.

Dr. Alan Rudolph's career is characterized by a profound commitment to innovation and interdisciplinary collaboration, leaving an enduring legacy in the realms of research, medical technology, military advancement, and adaption through design.

DESCRIBE THE COMPELLING FACETS OF THIS PERSON/TEAM'S, RESEARCH AND WHAT WAS THE ULTIMATE KNOWLEDGE AND INSIGHT DISCOVERED.

Dr. Rudolph's contributions to scientific knowledge are multifaceted and impactful. His early role in addressing pandemics like COVID-19 is particularly notable. Under his leadership, played a critical role in the pandemic response, developing innovative testing methods, including the detection of SARS-CoV-2 in sewer samples, and providing COVID-19 tests to thousands of students. These efforts propelled CSU to the forefront of national recognition for its contributions to combating the coronavirus crisis. Moreover, Dr. Rudolph's dedication to interdisciplinary collaboration is evident in the establishment of numerous initiatives and research centers, fostering a culture of collaborative research that accelerates scientific breakthroughs.

In collaboration with the renowned robot maker Marc Raibert, Dr. Rudolph initiated the creation of "BigDog." This remarkable four-legged robot captured the imagination of millions through its ability to navigate challenging terrains and carry substantial loads. Beyond its captivating locomotion, BigDog showcased the potential of robotics in addressing critical military logistics challenges. Its exceptional feats of balance and mobility underscored the convergence of technology and biology.

Dr. Rudolph's pioneering work in the realm of brain-machine interfaces progressed from an exploration of surgically implanted electrodes to non-invasive EEG-based approaches. This evolution expanded our comprehension of how the human brain could seamlessly control external devices. His research laid a robust foundation for the development of assistive technologies, empowering individuals with paralysis to regain mobility and independence.

Team science and dedication to establishing and promoting programs that bring people together and show the benefits of being able to work on solving problems collectively - have been a consistent theme throughout Dr. Rudolph's career. He created a culture within the university where people realize that it's not the independent investigator or scientists working in the lab that are necessarily going to solve the big problems on their own, but that they have to partner with and work with their colleagues, whether they're down the hall, across the city, across the state or across the country, you have to partner with people by bringing those talents and those capabilities together. Collaborative science can be very successful at solving some of these challenging issues and Dr. Rudolph's understanding of being able to bring different institutions, different individuals, and researchers together to focus on a particular project or problem and solve it in ways that the public, our stakeholders, ultimately benefit.

"Dr. Alan Rudolph is an incredible leader, a great friend, a wonderful collaborator, and a fantastic resource for the state of Colorado and the United States." - Dr. Ray Goodrich

THE MANNER IN WHICH THIS WORK HAS INFLUENCED AND SHAPED THE PATH OF SCIENTIFIC RESEARCH, GUIDED POLICY DECISIONS AND/OR HAD IMPACTS ON PEOPLE'S LIVES OUTSIDE THE SCIENTIFIC COMMUNITY.

Dr. Rudolph's influence extends far beyond academia. His understanding of the power of collaboration led to partnerships with diverse institutions and individuals, resulting in a global network of scientific inquiry. His advocacy for investments in research institutions, such as the regional biocontainment lab and the Infectious Disease Research Center, has driven progress in addressing emerging threats. His ability to organize across sectors and industries and rally people around problems has been instrumental in advancing scientific research. Furthermore, Dr. Rudolph's efforts to raise awareness within funding agencies and congressional supporters have paved the way for sustaining these critical institutions. His visionary leadership also extended to CO-LABS, where he served as a Board Director and Chair, expanding the organization's engagement with federal elected officials and scientific agency leadership.

Dr. Alan Rudolph's contributions are not confined to the present; they have far-reaching consequences for the future. His advocacy for research institutions ensures the training of future generations of scientists capable of addressing unforeseen challenges. Moreover, these efforts provide the facilities and capabilities needed to tackle emerging threats and prevent them from becoming global crises. Dr. Rudolph's legacy is one of lasting positive impact, shaping the scientific landscape for decades to come.

In the words of Dr. Ray Goodrich, who has worked closely with Dr. Rudolph, "Dr. Alan Rudolph is an incredible leader, a great friend, a wonderful collaborator, and a fantastic resource for the state of Colorado and the United States." Dr. Rudolph's journey is a testament to the transformative power of science and research in shaping a brighter future for all.

Dr. Alan Rudolph's career represents a lifetime of exceptional contributions to science, research, and innovation. His visionary leadership and unwavering commitment to interdisciplinary collaboration have propelled scientific research to new heights and left an enduring legacy. His profound impact on addressing the COVID-19 pandemic, fostering collaborations, and bridging the gap between academia and industry have influenced scientific research, guided policy decisions, and enriched the lives of individuals beyond the scientific community. Dr. Rudolph's journey serves as an inspiring testament to the transformative power of science and research in shaping a brighter future for all.



About CO-LABS:

Started in 2007, CO-LABS is a non-profit consortium of federal laboratories, research institutions, businesses and economic development organizations that provide financial and in-kind support for programs that promote the retention and expansion of Colorado's federally-funded scientific resources. Through events, economic analyses, strategic communications and networking activities we work to:

- **PROMOTE** Colorado as a global leader in research and technology
- **EDUCATE** the public about federal research labs' and institutions' impact, and importance of sustained funding for research
- **CONNECT** the labs, universities, economic development organizations and businesses to facilitate partnerships and technology transfer

To learn more, visit www.CO-LABS.org.