

ANNUAL REPORT

Bringing Ideas to Life

12



Bringing *Ideas to Life*

12

Annual Report

COVER PHOTO: 3D Color Model

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for Research and the
Executive Director

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Mission

VCU Tech Transfer's mission is to foster a culture of innovation at the university and to protect and commercialize inventions created by the VCU research enterprise for the benefit of society.

Vision

VCU Tech Transfer's vision is to bring world-class recognition and value to VCU and its members through commercialization of intellectual property developed at the university.

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Dear Colleagues and Friends,

We are happy to report that 2012 was a prolific year for VCU Tech Transfer. Among this year's achievements were record-breaking numbers of invention disclosures, patent filings and licensing revenues, which increased by 50 percent.

While impressive, these numbers only scratch the surface of our activities here in VCU Tech Transfer. During the past year, with the support and leadership of VCU President Michael Rao, we have broadened our mission to support innovation, entrepreneurship and economic development. We are pleased to say our efforts are paying off.

To further enhance the commercialization of our technologies, we have established a new pre-license value creation program. As a result of this new program, two of our technologies were selected among the four most promising opportunities at this year's Southeast BIO (SEBIO) Investor Forum. Another aspect of this program is our newly formed commercialization advisory panel (see story on page 8). Through this panel, we have engaged a number of seasoned entrepreneurs, investors and industry executives to advise us and the inventors on potential commercialization pathways for our technologies.

Focusing beyond specific technologies, we have also developed programs to help enhance the culture of innovation and entrepreneurship throughout the university. In May 2012, VCU Tech Transfer hosted VCU's first ever innovation summit, which opened

a university-wide dialogue among university leaders. These efforts resulted in development of a new program, Venture Creation University or VCU², focused on strengthening our entrepreneurial infrastructure. This program will be rolled out in 2013.

In tandem with all these new initiatives, we have continued to build our industry relations program. Over the past year, we have built a number of collaborations with local companies aimed to foster research and commercialization activities and to support economic development in the region.

We hope you enjoy reading some of the highlights of 2012 within the following pages, and we look forward to working with you to create many more successes in the years to come.

With sincere gratitude,

Francis L. Macrina, Ph.D.
Edward Myers Professor of Dentistry and
Vice President for Research

Ivelina Metcheva, Ph.D., MBA
Executive Director, VCU Tech Transfer

FISCAL YEAR AT A GLANCE

Licensing Revenues	\$1,827,650
Invention Disclosures	111
Licenses/Options	10
Other Research Support Agreements	12
Start-ups	1
Patents Filed	132
Patents Issued	15
Copyrights	2
Material Transfer Agreements	308
Non-Disclosure Agreements	72

DEPARTMENTS WITH TEN OR MORE INVENTION DISCLOSURES

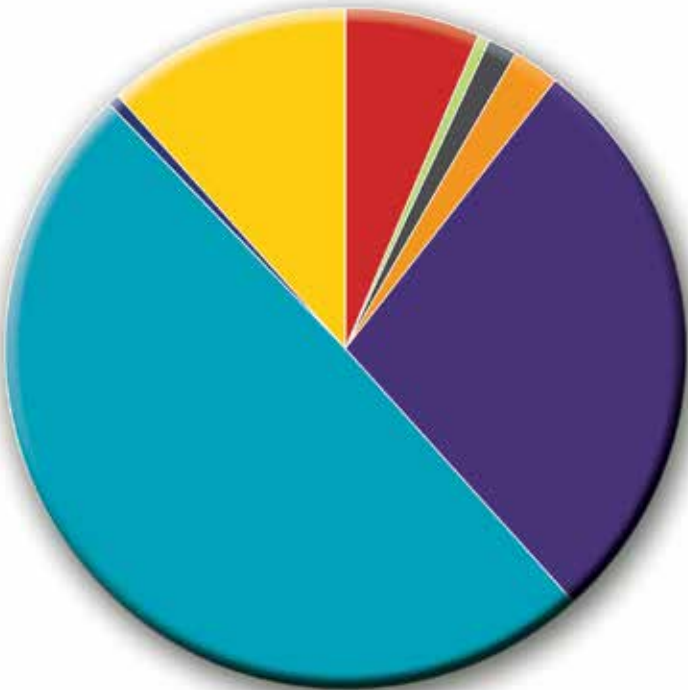
Mechanical and Nuclear Engineering	13
Human Genetics	13
Biomedical Engineering	12
Internal Medicine	10
Medicinal Chemistry	10

DEPARTMENTS WITH FIVE TO NINE INVENTION DISCLOSURES

Emergency Medicine	8
Microbiology/immunology	7
Electrical and Computer Engineering	6
Chemistry	6
Chemical and Life Sciennces Engineering	5
Pharmaceutics	5

College of Humanities and Sciences	9
School of Allied Health Professions	1
School of The Arts	2
School of Dentistry	3
School of Engineering	39
School of Medicine	69
School of Nursing	1
2 School of Pharmacy	16

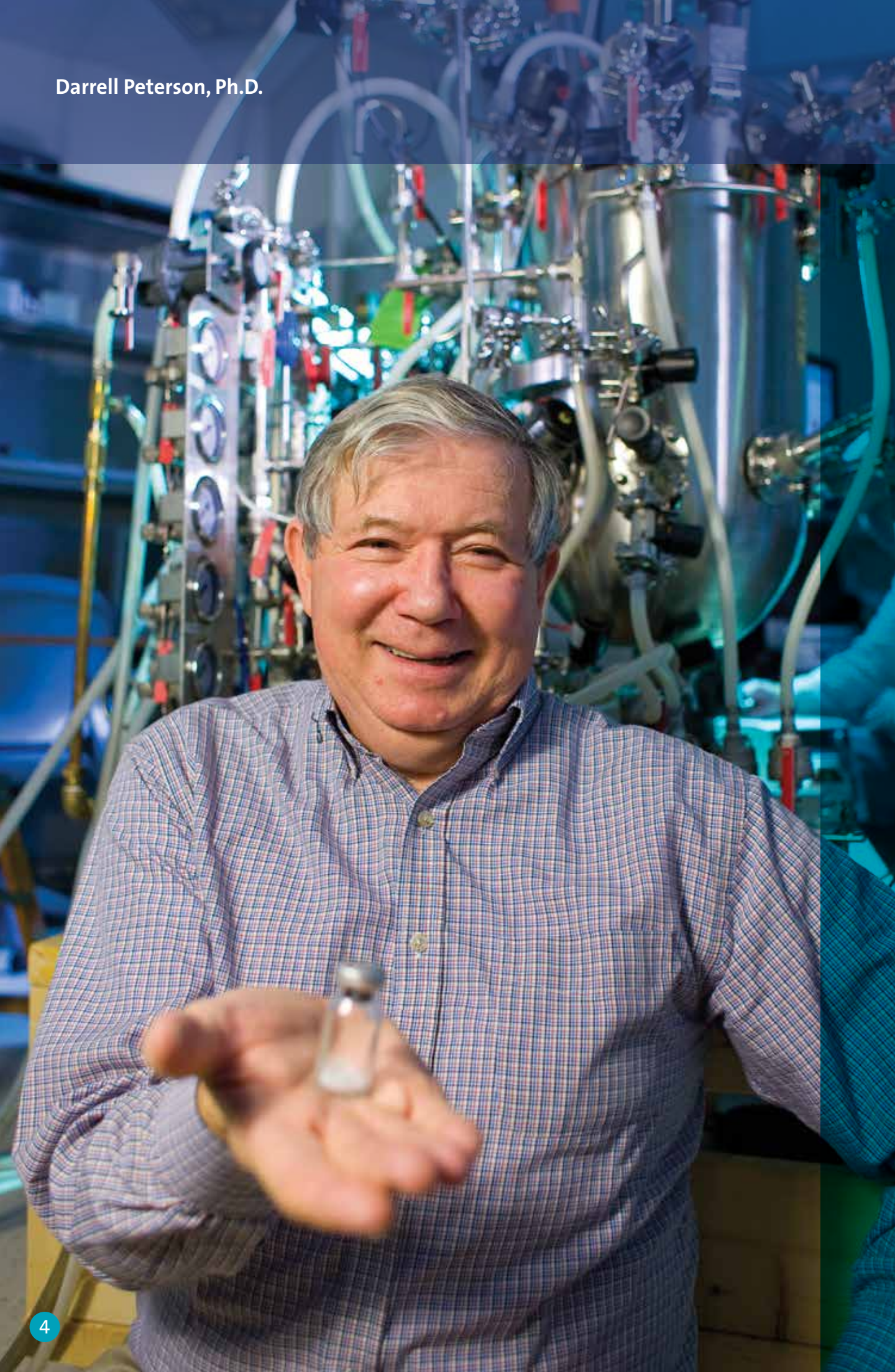
DISTRIBUTION OF INVENTION DISCLOSURES



VCU PATENTS ISSUED

ISSUE DATE	PATENT No.	VCU INVENTORS	TITLE
8/23/2011	US 8,003,385	JOHN G. TEW, PH.D. MOHEY ELDIN EL SHIKH, PH.D.	IN VITRO GERMINAL CENTERS
8/23/2011	US 8,003,387	JOHN G. TEW, PH.D. MOHEY ELDIN EL SHIKH, PH.D.	IN VITRO GERMINAL CENTERS
12/06/2011	US 8,071,373	JOHN G. TEW, PH.D.	CO-CULTURE LYMPHOID TISSUE EQUIVAENT (LTE) FOR AN ARTIFICIAL IMMUNE SYSTEM
02/07/2012	US 8,111,860	SHELDON RETCHIN, MD, MSPH MARTIN L. LENHARDT, AUD., PH.D.	RECREATIONAL BONE CONDUCTION AUDIO DEVICE, SYSTEM
5/29/2012	US 8,189,839	MARTIN L. LENHARDT, AUD., PH.D.	ACOUSTIC COUPLER FOR SKIN CONTACT HEARING ENHANCEMENT DEVICES
11/29/11	US 8,067,150	MARTIN J. MANGINO, PH.D.	IN-SITU PRESERVATION (ISP) BRIDGE SOLUTION FOR NON-HEART BEATING DONORS
4/04/2012	US 8,147,760	KEVIN R. WARD, MD	A PORTABLE CHEMICAL OXYGEN GENERATOR
02/14/2012	US 8,114,976	GREGORY A. BUCK, PH.D. LUIS SHOZO OZAKI, PH.D. YINGPING WANG, PH.D. PING XU, PH.D.	CRYPTOSPORIDIUM HOMINIS GENES AND GENE FOR CHEMOTHERAPEUTIC, IMMUNOTHERAPEUTIC, IMMUNOPROPHYLACTIC AND DIAGNOSTIC APPLICATIONS
06/12/2012	US 8,197,427	KEVIN R. WARD, MD MARTIN L. LENHARDT, AUD., PH.D.	ACOUSTICAL BASED TISSUE RESUSCITATION
05/08/2012	US 8,172,769	KEVIN R. WARD, MD MARTIN L. LENHARDT, AUD., PH.D.	METHOD AND APPARATUS FOR MONITORING INTRAOCULAR AND INTRACRANIAL PRESSURE
10/25/2011	US 8,042,544	KEVIN R. WARD, MD CURTIS N. SESSLER, MD LAURENCE J. DINARDO, MD BRUCE D. SPIESS, MD DR. RAO IVATURY, MD MARY J. GRAP, PH.D., R.N., ACNP, FAAN	PREVENTION OF VENTILATOR ASSOCIATED PNEUMONIA (VAP)
05/16/2012	EP 2041271	JOHN G. TEW, PH.D. MOHEY ELDIN EL SHIKH, PH.D.	CO-CULTURE LTE FOR AN ARTIFICIAL IMMUNE SYSTEM
12/05/2011	EP 1567490	MARTIN SAFO, PH.D. RICHMOND DANSO-DANQUAH, PH.D. DONALD ABRAHAM, PH.D.	ANTI-SICKLING AGENTS
09/21/2011	EP 2043695	JOHN G. TEW, PH.D. MOHEY ELDIN EL SHIKH, PH.D.	MODELS FOR VACCINE ASSESSMENT

Darrell Peterson, Ph.D.



The Billy R. Martin Innovation Award

FROM LEFT TO RIGHT:
IVELINA METCHEVA, PH.D., MBA, FRANCIS L.
MACRINA, PH.D., DARRELL PETERSON, PH.D.
AND MICHAEL RAO, PH.D. AT THE 7TH ANNUAL
“INVENTED AT VCU” RECEPTION



“The SA-ELISA II was created because VCU actively encourages collaboration between faculty and potential industry partners. It was my chairman that led to the initial contact. And although I knew immediately that I could do the science, if it weren’t for VCU Tech Transfer, it would never have resulted in a successful product.”

Darrell Peterson, Ph.D.
Professor
Department of Biochemistry
and Molecular Biology

Swamp fever. Sounds like something you would never want to get. Thankfully, it’s a virus that doesn’t affect humans. But it is a nasty virus for horses. Equine infectious anemia (EIA), often called swamp fever, is caused by a virus similar to HIV in humans and leads to chronic disease for which there is no treatment.

For many years, the only test available to diagnose EIA was the slow and cumbersome Coggins test. Darrell Peterson, Ph.D., professor in the Department of Biochemistry and Molecular Biology, invented a test kit for EIA that is significantly faster and produces easier to read results. This test, branded SA-ELISA II, was licensed and is now available on the market.

Dr. Peterson was awarded this year’s Billy R. Martin Innovation Award for his role in the development of this critical veterinary test. “Universities like Virginia Commonwealth University conduct more than half of the scientific research in America,” said the president of VCU Michael Rao, Ph.D., who presented the award. “At VCU, we are advancing knowledge that cures disease and benefits society.”



Richard Marconi, Ph.D.

Lyme Disease: On the Path to a Vaccine

“VCU Tech Transfer was instrumental in helping us develop a strong research partnership with Pfizer Animal Health. That relationship culminated in the development and licensing of a canine vaccine for Lyme disease that will soon be taken to market. The VCU tech transfer team continues to work aggressively to identify new industry collaborations and funding opportunities for other vaccine and diagnostic technologies being developed in my laboratory.”

Richard Marconi, Ph.D.
*Professor
Microbiology and Immunology*

In the early 1970s, a group of children in Lyme, Connecticut, fell ill and were diagnosed with rheumatoid arthritis. Researchers investigated this mysterious illness, which eventually led to the identification of the bacterial cause of the condition, which became known as “Lyme disease”. Since then, we know that Lyme disease is transmitted to humans and animals through tick bites. If left untreated, infection can spread to the joints, the heart and the nervous system.

Research in Dr. Richard Marconi’s laboratory is focused on the genetics of pathogenic spirochetes, including those associated with Lyme disease. Dr. Marconi and his post-doc, Christopher Earnhart, Ph.D., developed a Lyme disease vaccine and diagnostic tool by constructing a chimeric polypeptide, which encompasses the majority of strains seen in both the United States and Europe.

With the help of VCU Tech Transfer, Pfizer Animal Health was brought into the picture to fund Dr. Marconi’s research in this area. That research led to the further development of the vaccine. Pfizer has licensed the resulting chimeric vaccine and continues to develop the technology, with plans to apply for market approval from the United States Department of Agriculture (USDA) for use in dogs.

Along with Dr. Marconi, VCU Tech Transfer is working to commercialize the Lyme disease vaccine and diagnostic for use in humans and other animals.

Working with the Richmond Business Community



During the past year, VCU Tech Transfer established a commercialization advisory panel as a vehicle to showcase VCU technologies to the innovation leaders of the Richmond business community and to use their knowledge and insight to drive further technology commercialization.

The panel, currently at 18 members, consists of industry experts, investors, and entrepreneurs with breadth of experiences in product and business development, new venture formation, early-stage investments, or business incubation. The panel members are major players in the regional commercialization activities and provide a life link between VCU and the local innovation community. The panel meets quarterly to listen to inventors presentations and to discuss commercialization strategies. It provides VCU Tech Transfer with invaluable feedback and recommendations regarding critical patenting, commercialization and investment decisions.

The panel has been instrumental in educating faculty and giving them an industry perspective. Several panel members have engaged as business mentors to faculty and student inventors. With their extensive contact networks, the panel members also help VCU Tech Transfer to identify the right industry partners to move the VCU technologies forward.

VCU INVENTOR PRESENTING
TO PANEL MEMBERS.
FROM LEFT TO RIGHT:

William H. Daughtrey, MS, MBA

Entrepreneur-in-Residence
Dominion Resources Innovation Center

Ivelina Metcheva, Ph.D., MBA

Executive Director
VCU Tech Transfer

Umesh Desai, Ph.D. (inventor)

Professor
VCU, Medicinal Chemistry

Geoffrey D. Beecher

Senior Sales Specialists
Cartcept Medical

Rebecca Caffrey, Ph.D., MBA

Senior Director of Business Development
Health Diagnostic Laboratory, Inc.

Paul France, MS, MBA

Vice President, Innovation Systems
MeadWestvaco



“VCU Tech Transfer has been extremely instrumental in connecting us with key business experts.”

Matthew Wallin

Assistant Professor

Department of Communication Arts

An exciting collaboration between faculty in the School of the Arts and the College of Humanities and Sciences has led to the development of a new interactive three-dimensional color model. The inventors, Robert Meganck, Professor and Chair, Department of Communication Arts, Matthew Wallin, Assistant Professor, Department of Communication Arts and Peter Martin, Ph.D., Adjunct Instructor, Department of Physics, received a VCU Presidential Research Incentive Program (PRIP) award and School of the Arts' funding to create the model that identifies and describes colors based on human perception.

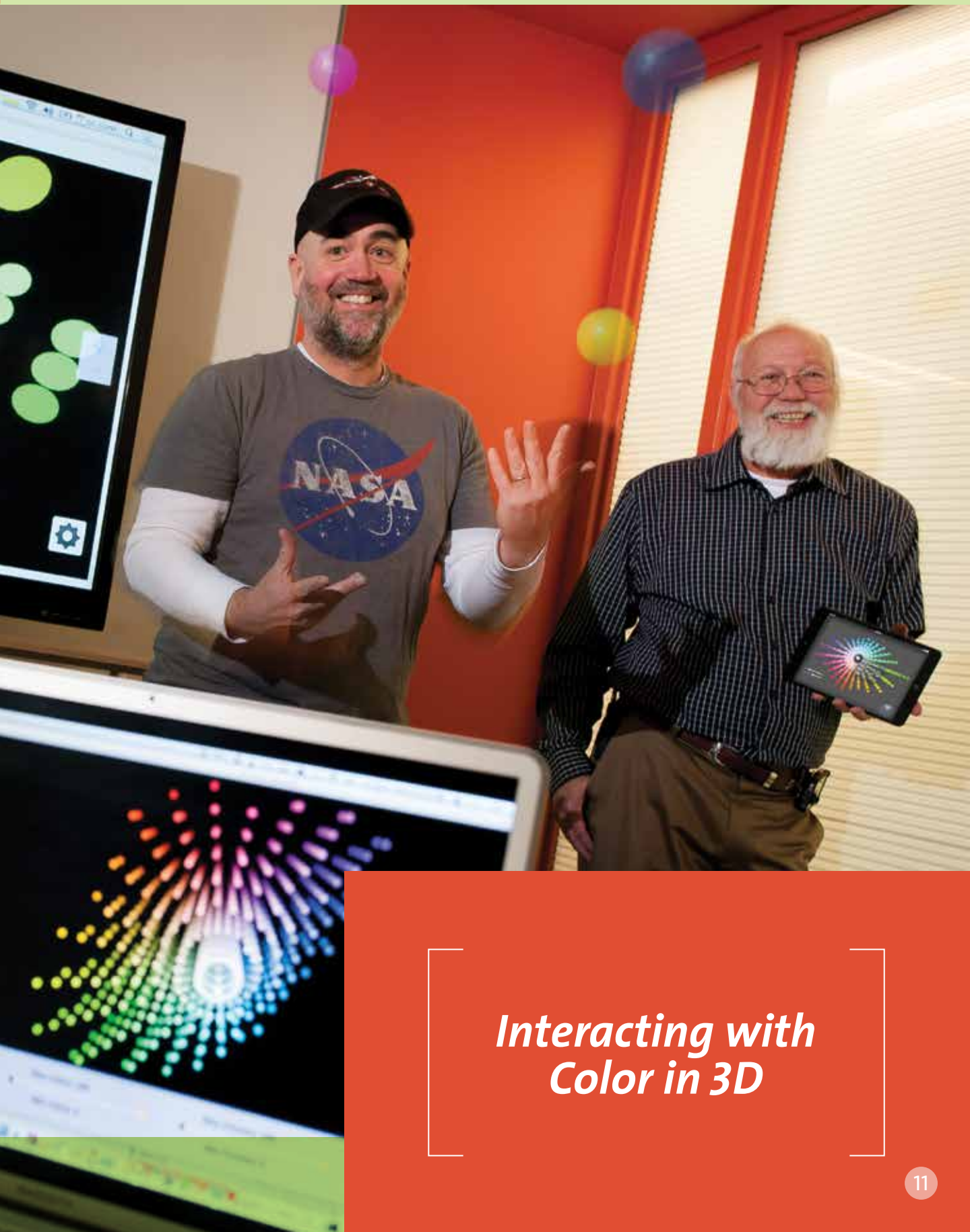
“Color is a universal concern of all design, art and science disciplines, and it is one of the most widely misunderstood visual principles,” said Meganck. “Most people believe color is just a physical property of an object rather than a human perception and interpretation of visible wavelengths,” adds Martin.

The technology allows its users to identify and manipulate colors based on their value, hue and chromaticity. It may be easiest to think of the model as a “point cloud” or a mass of floating marbles (each marble identifies the location of a specific color) with which the viewers can navigate around and through, allowing them to identify how colors relate and correspond to one another. Identifying colors using their physical location in three-dimensional space as opposed to their common names (e.g. “red” or “blue”) will provide more accuracy and better identification of colors across disciplines.

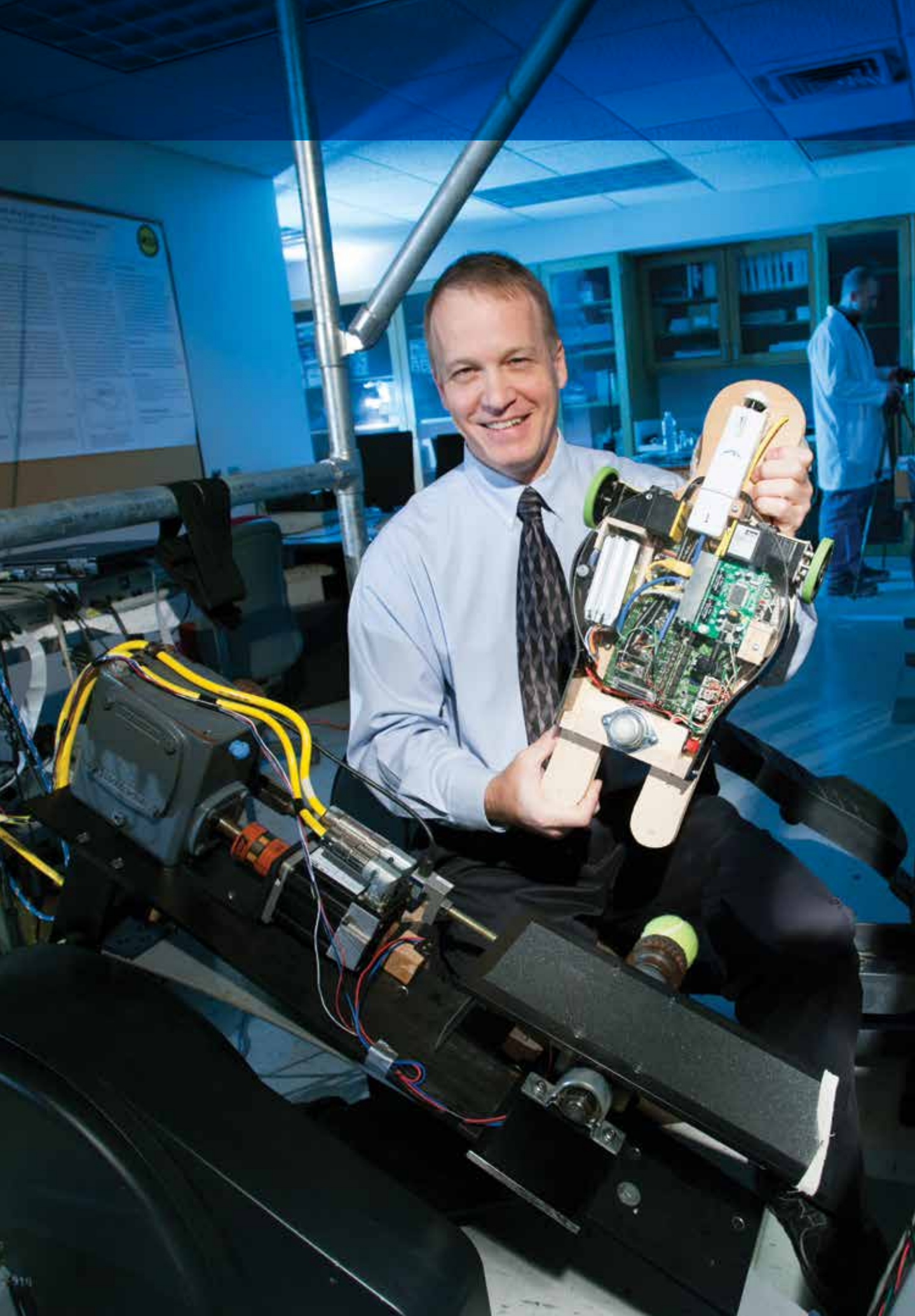
The final product is envisioned to be an interactive, web based software and mobile application toolset that can be used by artists, engineers, scientists, educators, students, medical personnel, and the military. This is particularly useful for applications such as color editing in the film industry, interior design, graphic design, etc.



FROM LEFT TO RIGHT:
Matthew Wallin & Robert Meganck



*Interacting with
Color in 3D*



Robotic “Skateboard” Helps Children with Disabilities



“It is essential for a research university to have the resources and support of a professional technology transfer office. VCU Tech Transfer has been extremely helpful in securing the necessary protections and agreements regarding our inventions, which is vital for me as an inventor and as an asset for VCU.”

Peter E. Pidcoe, PT, DPT, Ph.D.
Associate Professor
Physical Therapy

Infants with cerebral palsy, Down’s syndrome and other congenital diseases have delayed motor skill development and trouble learning how to crawl. A Self Initiated Prone Progressive Crawler (SIPPC) was developed to help these infants. The crawler was invented by Peter E. Pidcoe, PT, DPT, Ph.D., associate professor in physical therapy and adjunct professor in biomedical engineering at VCU, and Dr. Thubi Kolobe, rehabilitation sciences professor at the University of Oklahoma Health Sciences Center.

The device itself is a robotic mobile platform that encourages the movement of infants. The crawler helps train the child to move in a concerted manner, i.e. to crawl, to get to their desired location. The device was developed with safety features as well as the ability to update the therapists on the child’s progress.

Dr. Pidcoe and his students have also developed technologies to help patients with mobility issues, including an elliptically-based robotic gait trainer (as pictured) that helps stroke victims relearn to walk. Dr. Pidcoe teamed up with rehabilitation and biomedical engineering students to develop a specialized bike for Aaron Nalle, a 7-year-old boy with significant movement constraints. Aaron’s wish was to have a bike to ride with his brothers and Pidcoe’s team was thrilled to grant this wish.

Going to the Final Four





In the past year, VCU Tech Transfer has initiated a pre-licensing value creation program to enhance and mature some of the top university technologies towards commercialization. As part of this program, Tech Transfer developed business plans for two high potential medical technologies. As a result, both were selected among the final four to present at the annual Southeast BIO/Plan Investor Forum. The Southeast BIO (SEBIO) program brings forward the most promising opportunities from the region’s research universities.

The two VCU finalists represented opportunities that can have a significant impact on health care. The first is a rapid test for cardiac ischemia, which was developed by a multidisciplinary team from the schools of medicine and pharmacy that included Todd Gehr, M.D., professor and vice chair in the Department of Internal Medicine; Lynne Gehr, M.D., assistant professor in the Department of Anesthesiology; and Don Farthing, Ph.D., affiliate assistant professor in the Department of Pharmaceuticals. This rapid test could help clinicians to make more timely diagnostic and treatment decisions for patients with chest pain.

The other finalist was a novel surgical mesh for hernia repair that represents an inexpensive and scalable electrospinning technology overcoming the issues of adhesion, recurrence and infection. The interdisciplinary team that invented this technology included Gary Bowlin, Ph.D., professor in the Department of Biomedical Engineering, and David Simpson, Ph.D., associate professor in the Department of Anatomy and Neurobiology.

Richmond has been selected to host the 2013 SEBIO Investor Forum in the fall 2013. VCU Tech Transfer will be instrumental in promoting VCU to attendees during the forum.



“We’re very excited to help host the SEBIO Annual Investor Forum here in Richmond next fall. It will be an important and wonderful opportunity to share VCU’s research enterprise with venture capital and angel investors, serial entrepreneurs and industry representatives who will be visiting Richmond for the forum.”

Francis L. Macrina, Ph.D.
*Edwards Myers Professor of Dentistry
and VCU Vice President for Research*



VCU Tech Transfer Team

From Left to Right

T. ALLEN MORRIS, PH.D., MBA
Associate Director

WENDY M. REID, PH.D.
Licensing Associate

IVELINA METCHEVA, PH.D., MBA
Executive Director

NICOLE M. COLOMB, MBA
Economic Development

CLARA A. SINE
Office Manager

Board of Directors

Donna J. Edmonds
President and CEO
Virginia Biosciences Commercialization Center

Michael Grisham, MBA
Founder
GPB Scientific

Jacquelyn E. Stone, Esq.
Partner
McGuireWoods, LLP

Jerome F. Strauss, III, MD., Ph.D.
Dean, School of Medicine
Virginia Commonwealth University

EX-OFFICIO MEMBERS

Francis L. Macrina, Ph.D.
Vice President for Research
Virginia Commonwealth University

Ivelina S. Metcheva, Ph.D., MBA
Executive Director, VCU Tech Transfer
President, VCU Intellectual Property Foundation
Virginia Commonwealth University

About VCU

Virginia Commonwealth University is one of the state's largest universities with more than 31,000 students. Located on two campuses in historic downtown Richmond, Virginia, this vibrant, urban university offers 222 undergraduate, graduate and professional programs in 13 schools and one college. VCU also is home to one of the nation's leading academic medical centers and has received recognition from the Carnegie Foundation for its research activity and community engagement.

In 2012 VCU was ranked among the top 100 research universities in the country by the National Science Foundation and sponsored research awards exceeded \$260 Million for the fiscal year. Thirty-two of the university's graduate and professional programs are ranked among the best in the nation in *U.S. News & World Report's* "America's Best Graduate Schools."

Many of VCU's 2,000 full-time instructional faculty are recognized nationally and internationally for excellence in the humanities, arts, sciences, engineering, education, social work, business and the health care professions. The late Dr. John B. Fenn was one of three international scientists to be awarded the 2002 Nobel Prize in chemistry.

The VCU Medical Center is one of the nation's leading academic medical centers and has received recognition by *U.S. News & World Report's* as the No. 1 hospital in the state of Virginia, with four nationally ranked specialties: nephrology, orthopedics, pulmonology and urology. The medical center offers state-of-the-art care in more than 200 specialty areas, including organ transplantation, head and spinal cord trauma, burn healing and cancer treatment at the VCU Massey Cancer Center, Virginia's first NCI-designated cancer center.

Together, VCU and VCU Medical Center are the largest single employer in the Richmond area with 19,000 employees and combined budgets of more than \$2 billion. As an economic engine and urban leader, VCU has forged ties with industry in such innovative projects as the VCU School of Engineering, da Vinci Center for Innovation, and the Virginia BioTechnology Research Park, which encompasses more than 1.2 million square feet of space, housing 2,000 scientists, researchers, engineers and technicians in fields like drug development, medical diagnostics, biomedical engineering, forensics and environmental analysis.





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