Mission Statement

To maximize the impact of UVA’s innovation assets via commercialization, while providing high levels of customer service, value-added business development, new venture creation, and a focus on driving quality transactions.

“Strengthen the University’s capacity to advance knowledge and serve the Commonwealth of Virginia, the nation, and the world through research, scholarship, creative arts and innovation.”

THE UNIVERSITY OF VIRGINIA CORNERSTONE PLAN
A Strategy for the Academic Division, 2014-2019
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Message from the Executive Director

The name of our report this year, IMPACT, is a reflection of the progress that the UVA Licensing & Ventures Group has made as a result of the direction and institutional support that began five years ago. As we welcome University President Jim Ryan, we are eager to charge ahead with the 2030 Plan: Great and Good, put forth by his administration. We hope to only amplify his inspirational vision for the future of the University of Virginia by driving discoveries that enrich and improve lives.

The fiscal year 2019 marks the end of the University of Virginia’s Cornerstone Plan (2014-2019).

During those five years, the core work of our organization strengthened as we recorded year over year increases of our performance metrics, launched the $10 million LVG Seed Fund, and relocated to the historic Coca-Cola building on Preston Ave. LVG supported the creation of nearly 40 new ventures, enhanced our relationships with UVA’s philanthropically funded translational research programs, and celebrated the ground-breaking research and impact of a half dozen Innovators of the Year.

As we close the chapter on the Cornerstone Plan, it seems fitting that we use this annual report to share a look back at LVG’s progress since 2014. In the pages that follow, you’ll see where we started, and how our efforts over the last five years led to our successes in the fiscal year 2019.

We are exceptionally proud to share the story of DexCom Inc.’s acquisition of TypoZero Technologies, which started our year. While UVA has chronicled the research development of the artificial pancreas for years, our perspective sheds light on the forces and efforts behind the commercialization process. It took years of dedication to bring the extraordinary artificial pancreatic islets to market; now, the life-changing commercial application. Now, the life-changing solution for diabetes management will become commercially available from DexCom, the industry leader in continuous glucose monitoring.

LVG launched a record nine new ventures this year to advance ideas in machine learning, sustainable solutions in agricultural technology, techniques for studying the spread of drug-resistant bacteria, novel microRNA therapeutics, and software tools for sorting biological samples. Our licensing team continued their efforts to improve the quality of our transactions and established relationships with 20 new industry partners.

This spring, we were honored to celebrate Lee Ritterband, Ph.D. as our 2019 Innovator of the Year, for his work pioneering the integration of digital therapeutics for patients living with a variety of behavioral health issues. Dr. Ritterband delivered a moving presentation at the Rotunda, describing how his early career and education in computer technology and clinical psychology intertwined perfectly alongside the rise of the Internet. Hard work, creativity, and some fate placed him firmly at the helm of the emerging digital therapeutics industry. In the months following our celebration, industry leader Pear Therapeutics acquired BeHealth Solutions, Inc., the digital health company co-founded by Dr. Ritterband, for its platform, SHUTi, designed to treat millions who suffer from insomnia.

Our ever-growing network of UVA faculty and student innovators, community leaders, entrepreneurs, investors, and notable alumni that champion our efforts is rooted in the generosity and spirit of our Board of Directors. This esteemed group of individuals impacts our direction and the allocation of our time and resources. Here is where we say, “thank you,” for your continued involvement and counsel.

LVG exists to serve and support the university research community. We look forward to engaging and collaborating with UVA faculty, staff, and students in the year to come as we work to advance the extraordinary ideas produced in every lab, clinic, and classroom across Grounds toward making a lasting impact on the world around us.

Michael P. Straightiff
Executive Director
2019 at a Glance

Invention Disclosures: 238
Patents Filed: 125
Patents Issued: 128
Licensing Deals: 78
New Ventures: 9

2014-2019 at a Glance

Unique UVA inventors worked with LVG across all tech transfer activity:
- 2014: 393
- 2015: 488
- 2016: 503
- 2017: 524
- 2018: 543
- 2019: 612

UVA inventors contributed to patent filings:
- 2014: 268
- 2015: 304
- 2016: 298
- 2017: 344
- 2018: 339
- 2019: 381

UVA inventors contributed to invention disclosures:
- 2014: 268
- 2015: 286
- 2016: 264
- 2017: 306
- 2018: 316
- 2019: 352

UVA inventors engaged in licensing activity:
- 2014: 91
- 2015: 150
- 2016: 169
- 2017: 106
- 2018: 107
- 2019: 157
Invention Disclosures

School of Medicine 58%

Curry School of Education & Human Development

Other

School of Engineering & Applied Science 25%

College of Arts & Sciences

Anesthesiology
Biochemistry & Molecular Genetics
Biomedical Engineering
Cell Biology
Emergency Medicine
Family Medicine
Medicine
Microbiology, Immunology, and Cancer Biology (MIC)
Molecular Physiology & Biological Physics
Neurology
Neuroscience
Obstetrics & Gynecology
Ophthalmology
Orthopedic Surgery
Otolaryngology
Pathology
Pediatrics
Pharmacology
Physical Medicine & Rehabilitation
Plastic & Maxillofacial Surgery
Psychiatry & Neurobehavioral Sciences
Public Health Sciences
Radiation Oncology
Radiology & Medical Imaging
Surgery
Urology

Communications
Data Science Institute
Information Technology
Medical Center
Nursing

Biology
Chemistry
Environmental Sciences
Psychology
Physics

Biomedical Engineering
Chemical Engineering
Civil & Environmental Engineering
Electrical & Computer Engineering
Materials Science & Engineering
Mechanical & Aerospace Engineering
Systems Information

58% 25% 6% 6% 5%
Invention Disclosures

61 Invention disclosures came from collaborative research groups.

30 Disclosures included co-inventors from one or more departments within UVA.

34 Disclosures included co-inventors from collaborative research partners from outside institutions and industry partners.

28 INSTITUTIONS:

- Arizona State University
- Beth Israel Deaconess Medical Center, Inc.
- Children’s National Health System
- Cleveland Clinic Foundation
- Colorado School of Mines
- International Center for Diarrheal Disease Research, Dhaka, Bangladesh
- Max Planck Institute for Terrestrial Microbiology, Marburg, Germany
- Naval Research Laboratory
- Northwestern Polytechnical University, Xi’an, China
- Ohio State University
- Penn State University
- Purdue University
- Stanford University
- University of California, Irvine
- University of California, Los Angeles
- University of California, Santa Barbara
- University of Maryland School of Medicine
- University of Miami
- University of Padua, Padua, Italy
- University of Pittsburgh
- University of Rochester Medical Center
- University of Texas
- University of Utah
- Virginia Commonwealth University
- Virginia Tech
- Wayne State University
- Yale University

8 INDUSTRY ORGANIZATIONS:

- Antigen Discovery, Inc.
- Decibel Therapeutics
- Harkins Consulting, LLC
- Lockheed Martin
- New England Eye Center
- Rolls-Royce Corporation
- Siemens Healthcare
- Siemens Medical Solutions USA, Inc.
LVG executed 78 commercial transactions with 46 industry partners from around the world.


- **Regional Partners**:
  - Virginia: 17 (USA: 35, World: 46)
  - Arizona, California, Indiana, Massachusetts, Maryland, North Carolina, New Jersey, New York, Pennsylvania, Texas, Virginia, USA, Canada, China, France, Israel, Japan, Netherlands, United Kingdom.
Finger sticks gave way to continuous blood glucose monitors, and standard injections gave way to insulin pumps. But the dosing decisions remained an art, not systemized or controlled other than by the patient. Creating the closed-loop system was considered impossible, an unsolvable control algorithm that would connect glucose monitoring systems with insulin pumps to automate the delicate balance of blood sugar levels with eating, exercise, and administering insulin. The impossible became a reality when a collaborative team of mathematicians, engineers, physiologists, clinicians, alumni, and a software startup from the University of Virginia (UVA) made it happen.

In August 2018, DexCom, Inc., the leader in continuous glucose monitoring for people with diabetes, acquired TypeZero Technologies, Inc., uniting the groundbreaking artificial pancreas technology with an industry giant capable of bringing TypeZero’s innovative solutions to the commercial market. The success of this deal illustrates how UVA’s collaborative research faculty, engaged alumni network, and the business expertise of the Licensing & Ventures Group (LVG) working in lockstep can advance knowledge toward life-changing impact.

While the concept traces back to more than 50 years, the quest for the artificial pancreas accelerated in 2006 when the Juvenile Diabetes Research Foundation (JDRF) initiated the Artificial Pancreas Project and funded a consortium of centers to carry out closed-loop control research. Among the funding recipients was a group of interdisciplinary researchers from the UVA Schools of Medicine and Engineering and the University of Padova in Italy, including Boris Kovatchev, Ph.D., Stephen Patek, Ph.D., Patrick Keith-Hynes, Ph.D., Marc Breton, Ph.D., Stacey Anderson, M.D., and Sue Brown, M.D.

Researchers who had been working for years to understand the physiology of the disease and exploring mathematical theories were now well funded and connected with engineers capable of translating the ideas into a practical application. During the pursuit of an algorithm-based software platform that would connect Continuous Glucose Monitoring (CGM) systems with insulin pumps, the team created a simulator that digitally replicated the human metabolic system. The UVA-Padova team submitted the use of this software to the FDA for preclinical trials. The FDA accepted it as a substitute for animal trials, which advanced the work of the UVA team and the entire JDRF Artificial Pancreas Project.

The team went on to secure funding from the NIH along with many other sources, while LVG leveraged its relationship with the UVA translational research fund, LaunchPad, for further support. Additional funding allowed the team to continue technology development of the closed-loop system, execute subsequent clinical trials, and establish the UVA Center for Diabetes Technology.

By 2011, the team had converted their once bulky computer system, which connected sensors and pumps, into a wireless smartphone device that patients could take home and integrate into their care routines as participants of clinical trials. The staggering success of the trials brought a wave of new hope to patients living with diabetes.

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In the same year, UVA transformed its Patent Foundation into the UVA Licensing & Ventures Group, which adopted a new business model to align with a singular new objective: impact. For the artificial pancreas to impact the lives of diabetes patients the way that the researchers, philanthropic supporters, and clinical trial patients knew that it could, the technology would need to move from the lab to a commercial entity.

Recognizing this need, LVG established connections within the UVA community, building one of LVG’s most significant assets to date – its network. As the organization that sits at the physical intersection of Grounds and the city of Charlottesville, LVG stewards research ideas from concepts into marketable solutions for its industry partners. The artificial pancreas stood out from others in the portfolio due to its advanced stage of development and was primed to advance toward commercialization. Accordingly, LVG worked to find a licensing partner for the technology among the industry organizations sponsoring research conducted by the UVA-Padova team, including DexCom. However, the portfolio was substantial enough to warrant the creation of a new venture.

LVG tapped UVA alumnus Chad Rogers (McIntire ’97), a local entrepreneur who had returned to Charlottesville after 15 years in the startup technology and investment industries in San Francisco and Boston. LVG first engaged with Rogers when he took a management role as interim CEO of another UVA startup, HemoSonic. A local alumnus and entrepreneur with experience in technology development was the perfect match for the diabetes research portfolio.

In September 2013, Rogers and his co-founder, Jeff Keller (Col ’97), the current Chief Innovation Officer of the UVA Health System, partnered with LVG to license the artificial pancreas technology and launch TypeZero Technologies, Inc. As has become its practice, and to encourage its commercial success, LVG allowed significant flexibility in the license agreement and worked closely with the company as it navigated relationships with academic inventors and raised capital to reach its development milestones. Several members of the research team joined the Company, including Patrick Keith-Hynes, Benton Mize, and Antoine Robert, who created the first software systems to instantiate the artificial pancreas. As the company got off the ground, the researchers continued the ongoing clinical trials at UVA supporting TypeZero, pursued complementary diabetes technology research, and steadily gained credibility in the field, putting the UVA Center for Diabetes Technology firmly on the map.

Concurrently, in 2015, with support from University leadership and the UVA Health System, LVG launched the $10 million LVG Seed Fund and closed its first investment with TypeZero as part of the Company’s larger funding round. Establishing the fund and supporting early-stage UVA startups at the seed stage is yet another example of how LVG worked to strengthen UVA’s ability to advance ideas to impact. A technology as promising as the artificial pancreas needed funding, credibility, and a route to industry-level production. Now it had all three.

Among its several product offerings, TypeZero’s “inControl Diabetes Management Platform” uses a series of mathematical algorithms and prediction tools, embedded in a mobile application to allow the CGM systems and insulin pumps to operate as a single closed-loop system intelligently. The system reduces the need for individual action by automatically monitoring blood glucose levels and regulating them through customized, calculated insulin dosages based on future predictions. The most extraordinary component of the platform is that it operates agnostic to any particular CGM or insulin pump allowing patients to continue to choose the devices and tools that work best for them.

When DexCom came to the table with an offer, TypeZero held the single largest patent portfolio ever licensed from UVA through LVG, which leveraged more than 30 clinical trials with more than 500 patients at 12 sites, including one at UVA. The acquisition marked the first exit for the LVG Seed Fund, and the artificial pancreas reached a coveted commercialization status rarely achieved by university technologies.

“This story is representative of what is possible when we harness the full capacity of this institution to support innovation,” said Michael Straightiff, LVG Executive Director. “Our interdisciplinary team of researchers leveraged federal funds, the financial generosity of our alumni, and our sophisticated translational research infrastructure to engineer technologies to relieve the heavy decision-making burden from patients living with diabetes. Then, in partnership with our research team, LVG once again leveraged the time and talent of our alumni to build, invest in, and sell a company that produced these early technologies. The story, though not yet over, has culminated in local economic development, return on investment, and, most importantly, lives enriched and improved by the University of Virginia.”

TypeZero will remain headquartered in Charlottesville and will work toward the introduction of the inControl platform to the commercial market by DexCom. In early 2020, the Company will relocate from its space in the IX Art Park to the new Dairy Building on Preston Ave down the road from LVG.

*Philanthropic supporters of the artificial pancreas research at the University of Virginia and the University of Padova include the Juvenile Diabetes Research Foundation, the National Institutes of Health, the Manning Family Foundation, the Helmsley Charitable Trust, the National Institute of Diabetes and Digestive Kidney Diseases, and the Wallace H. Coulter Translational Research Partnership."
New Ventures

CytoRecovery, Inc.
Working to advance and commercialize new technology that enables the rapid sorting and recovery of live cells from tumors and other forms of biological samples.
UVA School of Engineering & Applied Science | Electrical and Computer Engineering Collaboration with Virginia Tech Bio Electrical Mechanical Systems Laboratory

MADiDROP: a simple solution for safe water
SiliVhere Technologies, Inc.
Addressing the need for safe drinking water around the world with a porous ceramic tablet known as the MADiDROP+ that slowly releases silver ions into stored water over time, killing waterborne pathogens and ensuring safe water consumption.
UVA School of Engineering & Applied Science | Environmental Engineering
UVA FOUNDER: Jim Smith

Lytos Technologies
Developing a green biofungicide for pre- and post-harvest crop protection to empower growers with sustainable, organic solutions in crop protection that ensure consumer health and environmental safety.
UVA School of Engineering & Applied Science | Environmental Engineering
UVA FOUNDER: Bryan Berger

Hava, Inc.
Developing customer-centered air filtration products based on advanced metal-organic framework materials that make life in polluted cities healthier.
UVA School of Engineering & Applied Science | Chemical Engineering
UVA Founders: Gaurav Giri, Luke Huelsenbeck, and Bala Mulloth

NeuroView, LLC
Using machine learning to create a new stroke assessment tool.
UVA School of Medicine | Neurology, UVA School of Engineering & Applied Science | Electrical & Computer Engineering
UVA FOUNDERS: Andrew Southerland, Gustavo Rohde, Mark McDonald, Omar Uribe, Yan Zhuang

AMR Services, Inc.
Commercializing techniques for studying the spread of drug-resistant bacteria from wastewater systems in sterile environments.
UVA School of Medicine | Pathology, UVA School of Engineering & Applied Science | Biomedical Engineering
UVA FOUNDERS: Amy Mathers

Phase Health
Healthcare company seeking to promote health and wellness among individuals and communities by leveraging data, tools, and capabilities native to our lived environment.
UVA School of Medicine | Medicine
UVA FOUNDERS: Amy Salemo

Iconovast, LLC
Developing a novel nanoparticle technology for the detection and treatment of pancreatic cancer.
UVA School of Engineering & Applied Science | Materials Science, Chemical, and Mechanical Engineering
UVA FOUNDERS: David Green, Mark Kester

Merand Pharmaceuticals LLC
Developing a novel microRNA therapeutic for the treatment of Peripheral Arterial Disease (PAD) and Critical Limb Ischemia (CLI).
UVA School of Medicine | Cardiology
UVA FOUNDERS: Brian Annex, Charles Farber

Lytos Technologies
Developing a green biofungicide for pre- and post-harvest crop protection to empower growers with sustainable, organic solutions in crop protection that ensure consumer health and environmental safety.
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<tr>
<th>US Patent Number</th>
<th>Title</th>
<th>Inventors</th>
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<td>10,011,686</td>
<td>Viscoelastic Silicone Rubber Compositions</td>
<td>Bloomfield, Louis A.</td>
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<td>10,028,882</td>
<td>Oxidation Measurement System And Related Method</td>
<td>Thiels, Robert H.</td>
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<td>10,028,893</td>
<td>Ostomy Pump System And Related Methods Of Use And Manufacturing</td>
<td>Kane, Bartholomew J.; Cadel, Eileen S.; Powers, Natalie A.</td>
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<td>10,032,900</td>
<td>Abrikosov Avalanche Photodiode-Related Method</td>
<td>Campbell, Joe C.; Ren, Min; Woodson, Madison; Chen, Yajie; Bank (Texas); Seth; Maddox (Texas); Scott</td>
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<td>10,035,648</td>
<td>Antibody Targeting Cell Surface Deposited Complement Protein C3d And Use And Therapeutic Methods</td>
<td>Westner (NH), Adrian U.; Skvarilns (NH), Martin W.; Linderfors, Margaret A.; Taylor, Ronald P.; Rader (not UVA); Christoph, Ver (not UVA); Berangere</td>
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<td>Compositions And Methods For Preventing And Treating Infection</td>
<td>Petri, Jr., William A.; Buenorno, Erica</td>
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<td>10,067,869</td>
<td>Device And Method For Safety Expanding Minimally Invasive Surgical Incisions</td>
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<td>10,054,656</td>
<td>Method And Apparatus That Acquire Magnetic Resonance Data</td>
<td>Hongo (Siemens), Wilhelm; Nael (Siemens), Miatl; Muglar, III, John R. Paul (Siemens), Dorniek</td>
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<td>10,094,047</td>
<td>System And Method For Functional Gait Re-Tracker For Lower Extremity Pathology</td>
<td>Feger, Mark; Hertel, Jay N</td>
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<td>10,071,240</td>
<td>Floating Electrodes That Engage And Accommodate Movement Of The Spinal Cord</td>
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<td>Sphingosine Kinase Inhibitors</td>
<td>Lynch, Kevin R.; Santos (VTECH), Wielofor L.</td>
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<td>10,107,660</td>
<td>Multifunctional Thermal Management System And Related Method</td>
<td>Wadley, Rodney G.; Haq-Hamri, Hossein; Zeit (not UVA); Frank; Norrie, Pamela M.</td>
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<td>10,107,744</td>
<td>Frequency Hopping Spread Spectrum (FHSS) Fourier Transform Spectroscopy</td>
<td>Pate, Brooks Hart; Steber, Amanda; Harris, Brent</td>
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<td>10,126,438</td>
<td>Systems And Methods For Polarized Nuclear Imaging And Spectroscopy</td>
<td>Catau, J.; Gordon Od; Miller, Il; Grady Wilson; Zhang, Yuan; Tobias, William A.</td>
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<td>10,131,086</td>
<td>Micro-Structure And Nano-Structure Replication Methods And Article Of Manufacture</td>
<td>Gupta, Moh C.; Nayak, Baradha K.; Coffey, Paul M.</td>
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<td>10,143,384</td>
<td>Systems And Methods For Accelerated Imaging Using Variable Density Sampling And Compensated With Parallel Imaging</td>
<td>Chen, Xiao; Epstein, Frederick H.; Yang, Yang; Salerno, Michael; Meyer, Craig H.</td>
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<td>10,154,809</td>
<td>Test Trip Device And Related Methods Thereof</td>
<td>Verschatshin, Pavel (Paul); Mckevess-Malloys, Molly K</td>
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<td>10,155,063</td>
<td>Methods For X-ray Oclusive Contraction And Reversal Thereseim</td>
<td>Herr, John C.; Kilboman, Alexander L.; Eisenfeder, Kevin Simon</td>
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<td>8647,618</td>
<td>Method And Apparatus For Spin-Echo-Train MR Imaging Using The Prescribed Signal Evolutions</td>
<td>Maglar, Il; John R.; Brokameam, James R.</td>
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<td>10,159,019</td>
<td>Hip Continuous Passive Motion Device And Related Methods</td>
<td>Lee, Laura W.; Garrett, Kenneth A.; Khan, Muhaiminul</td>
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<td>10,159,404</td>
<td>Separable Beamforming For Ultrasonic Array</td>
<td>Owen, Kevin</td>
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<td>10,189,782</td>
<td>Method And System For Enhanced Imaging Visualization Of Deep Brain Anatomy Using Infusion</td>
<td>Elias, William J.; Bond, Aaron E.; Gillies, George T.</td>
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<td>10,196,006</td>
<td>Episcrational Catheter And Method Of Use</td>
<td>Mahapatra, Srijit; Gillies, George T.</td>
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<td>10,207,900</td>
<td>Methods And Apparatus For A Single Inductor/Multiple Output (SIMO) DC/DC Converter Circuit</td>
<td>Calhoun, Benton H.; Shivasakya, Atinmah</td>
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<td>10,169,544</td>
<td>Simulation Of Endogenous And Exogenous Glucose/Insulin/Glucagon Interplay In Type 1 Diabetic Patients</td>
<td>Breton, Marc D.; Kovatch, Boris P; Dallas Man (not UVA); Chiarini, Costel (not UVA); Chiarini, Michele (not UVA); Francesse</td>
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<td>LQG Artificial Pancreate Control System And Related Method</td>
<td>Pateka, Stephen D.; Breton, Marc D.</td>
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<td>10,176,324</td>
<td>System, Method And Computer Program Product For Protecting Software Via Continuous Anti-Tampering And Obfuscation Transforms</td>
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<td>10,172,639</td>
<td>Devices And Methods For Protecting An Internal Channel Of A Subject</td>
<td>Payne, Spencer C.</td>
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<td>10,184,759</td>
<td>Lightemitting Diode Antivirus-Intrusion Systems And Related Methods</td>
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<td>10,183,927</td>
<td>Method Of Instruction Localization Randomization (ILR) And Related System</td>
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<td>10,184,950</td>
<td>Accuracy Of Continuous Glucose Sensors</td>
<td>Kovaches, Boris R; King, Christopher Ryan</td>
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<td>Compositions And Methods For Treating Clostridium Difficile Infection</td>
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<td>10,196,810</td>
<td>Free-Flowing Parameter Mapping With High-Contrast Image Registration</td>
<td>Chou, Kelvin; Yang, Yang; Salerno, Michael</td>
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<td>10,146,329</td>
<td>Process Of Forming Electrodes And Products Thereof From Biomass</td>
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<td>10,201,947</td>
<td>Method Of Forming A Spectral Selective Coating</td>
<td>Gupta, Mool C.; Shah, Anik</td>
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<td>10,217,692</td>
<td>Heat Transfer Device For High Heat Flux Applications And Related Methods Thereof</td>
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<td>10,222,262</td>
<td>Segmented Chirped Pulse Fourier Transform Spectroscopy</td>
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<td>10,227,924</td>
<td>Particle Separator</td>
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<td>Smart Water Heater System, Method And Computer Readable Media</td>
<td>Whitetree, Cameron Dean; Poonian, Michael A.</td>
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<td>Compositions And Methods For Regulating Arterial Tone</td>
<td>Gaston, Benjamin M.; Straub, Adam C.; Isakson, Brant E.; Columbus, Linda</td>
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<td>10,256,906</td>
<td>Position Localization Using Visible Light Communication</td>
<td>Brandal-Preiade, Matere; Vatansevar, Zahi</td>
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<td>10,260,143</td>
<td>Method And Apparatus For Application Of Metallic Alloy Coatings</td>
<td>Hoss (OVT), Dek; Wadley, Haydn N. G.; Dharmasena, Kumar B.; Marsiano, Yosef</td>
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<td>Compositions And Related Methods For Modulating Ablation Production By Controlling PMT Promoter Activation Mediated By Transcriptional Factors LFM And YMC</td>
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<td>10,283,963</td>
<td>Quasi-Vertical Onde With Integrated Ohmic Contact Base And Related Method Thereseim</td>
<td>Aljabbari, Nasir; Weikle, Il; Robert M.; Baumers, Matthew F.</td>
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<td>General Anesthesics That Are Not Neurotic</td>
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<td>Compositions And Methods For Treating Eye Infections And Disease</td>
<td>Laurie, Gordon W.</td>
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<td>Inhibitors Of PFP4A3 For The Treatment Of Cancer</td>
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<td>Systems And Methods For Free-Breathing Cine DENSE MRI Using SelfNavigation</td>
<td>Cai, Xueyang; Epstein, Frederick M.; Zhong (Siemens), Xiaodong</td>
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<td>Image-Based Identification Of Muscle Abnormalities</td>
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<td>Method And System For Model-Based Tracking Of Changes In Average Glucose In Diabetes</td>
<td>Kovatches, Boris R; Breton, Marc D.</td>
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Seed Fund

Message from the Managing Director

AS WE FIND OURSELVES COMPLETING OUR THIRD YEAR OF OPERATION, I am excited to share news from across the Fund and portfolio. We continue to make significant strides in many areas including closing four investments, celebrating the Fund’s first exit, launching a speaker series with community partner, CvilleBioHub, completing the third full year of the Due Diligence in Seed Fund Investing class at UVA’s Darden School of Business, collaborating with the Batten Institute for summer internships and continuing to partner with the iLab and Engineering School in their summer incubator and iCorps Programs.

The year started well for us as DexCom, Inc. acquired TypeZero Technologies, Inc. in August 2018. DexCom is considered a leader in continuous glucose monitoring for people with diabetes, and recognized the value in TypeZero’s digital health platform that assists in managing the disease. TypeZero was founded by Scott Lim, a leading interventional cardiologist at UVA in the field of structural heart and catheter-based technologies, and Jaime Sarabia, whose 20 years of experience in medical device ventures include being one of the lead mechanical engineers with the Evolve Corporation which developed the MitraClip™ heart implant and was acquired by Abbott for $410 million in 2009. The Company has a license from LVG and is developing a novel, high-quality interventional device for performing advanced cardiac procedures. The Company is in the final stages of FDA 510(k) approval for the device and hopes to launch in early 2020.

In April, we added BrightSpec, Inc. to our portfolio with our third investment of the year. BrightSpec is a life science instrumentation company based on the research and patented technologies of UVA Chemistry Professor Brooks Pate, Ph.D., our 2017 Innovator of the Year. It is the first company to commercialize analytical instruments for the pharmaceutical industry using rotational spectroscopy. Critical innovations in instrument design produce a spectral pattern that is unique to the 3-dimensional structure of small molecules and enables rapid detection of isomers and low-level impurities.

Our final investment of the year was in Direct Spinal Technologies, Inc. (DSTI) in June. Headquartered in Charlottesville, DSTI is a medical device company developing a Spinal Cord Stimulation (SCS) product-platform to enhance treatment for chronic back pain and other spinal cord injuries. The Company’s IP2 technology is based on collaborative research and joint intellectual property from the University of Virginia and the University of Iowa.

While working on building the Fund, we are also developing our network. It was a pleasure to host the first two Entrepreneurs’ Edge programs in collaboration with CvilleBioHub. The first event focused on Building a Board of Directors and the second on Managing Intellectual Property, and I am looking forward to working with them on future events for the UVA and Charlottesville community.

Once again, for the third year, we had active participation in the Due Diligence in Seed Fund Investing class at UVA’s Darden School of Business. We continue to realize significant benefits from these students, and the students gain the real life experience of an investment fund associate.

Our Seed Fund Investment Committee continues to be one of the most contributory and enjoyable components of our operation. Their role in helping us evaluate opportunities and manage the portfolio is invaluable and has been a significant reason for the Fund’s success to date.

We closed the fiscal year 2019 with a portfolio of six companies and a full pipeline. We will face new challenges in the year to come, but still, I am excited and look forward to continuing my role as part of the LVG team, working with our Seed Fund Committee, Advisory Group, and Darden students on sustaining our progress and expanding our impact.

Our first investment was a follow on investment in Mission Secure (MSI), a Charlottesville company based on technology developed by UVA faculty member Dr. Barry Horowitz. The technology is a cybersecurity solution for Industrial Control Systems (ICS). MSI continues to make significant progress, increasing its customer base from four to 17 across the oil and gas, defense, and transportation sectors. MSI also doubled the size of its Houston office, was awarded a new patent, launched Version 4.0 of its product, and in May 2019, was named the Start-up of the Year by the Charlottesville Business Innovation Council.

Our second investment contributed to the balance of the original note in 530 Kardiac Devices. Founded by Dr. Scott Lim, a leading interventional cardiologist at UVA in the field of structural heart and catheter-based technologies, and Jaime Sarabia, whose 20 years of experience in medical device ventures include being one of the lead mechanical engineers with the Evolve Corporation which developed the MitraClip™ heart implant and was acquired by Abbott for $410 million in 2009. The Company has a license from LVG and is developing a novel, high-quality interventional device for performing advanced cardiac procedures. The Company is in the final stages of FDA 510(k) approval for the device and hopes to launch in early 2020.

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Acquired By: TypeZero in fiscal year 2019.

TypeZero Technologies, Inc. is a digital health company revolutionizing the management of type 1 and type 2 diabetes using their proprietary inControl Diabetes Management Platform. The company built the platform with the licensed foundational artificial pancreas technology which was developed by an interdisciplinary team of researchers at UVA over the course of several decades. TypeZero earned the first investment to further support the company’s efforts to develop the platform and to support regulatory and intellectual property work in advance of a pre-submission meeting with the FDA.

510 Kardiac Devices, Inc.

Mission Secure, Inc. (MSI)

Mission Secure (MSI) is a leading industrial control system (ICS) cybersecurity company providing the patented MSI Platform and cyber advisory services to help protect clients in energy, defense, transportation, maritime and critical infrastructure from cyber attacks. The MSI Platform prototype created at UVA and originally funded by the Department of Defense mitigates cyber risks from within operational software. The company licensed the foundational technology from LVG and the LVG Seed Fund first invested in 2017 to support the company’s first-in-human clinical trial which focused efforts on patients with Primary Sjogren’s Syndrome, an autoimmune disorder that causes dry eye and dry mouth. In fiscal year 2019, the LVG Seed Fund completed a follow-on investment to further support the company’s Phase II clinical trials.

Syndicate Partners: Virginia Tech Carilion, Pharmanstandard, Santen Pharma

Direct Spinal Therapeutics, Inc. (DSTI)

Direct Spinal Therapeutics, Inc. is a medical device company developing a Spinal Cord Stimulation (SCS) product-platform to enhance treatment for chronic back pain and other spinal cord injuries. The company’s IP2 technology is based on collaborative research and joint intellectual property developed by George Gillies, Ph.D., UVA research professor of mechanical and biomedical engineering, and Chairman of the University of Iowa’s Department of Neurosurgery. Dr. Matthew Howard III. The LVG Seed Fund invested in DSTI before the close of the 2019 fiscal year to advance the company’s IP2 product development and support regulatory and intellectual property work in advance of a pre-submission meeting with the FDA.

Ceres Nanosciences Inc. (Ceres)

Ceres Nanosciences Inc. is engaged in the research, development, and commercialization of innovative sample preparation products and diagnostic tests, based on its proprietary Nanotrap® particle platform. The Nanotrap® particles capture, enrich and preserve the most valuable biomarkers, enabling early and accurate detection of diseases such as cancer, cardiac, neurological, and infectious diseases, resulting in improved patient outcomes and reduced health care costs. Founded in 2009 by UVA alumnus Ross Dunlap (McIntire ’96), the company is headquartered in Manassas, VA and is the only UVA alumni company in the LVG Seed Fund portfolio. In June 2019, a collaborative team from Ceres, UVA, and George Mason University received a $600,000 Virginia Catalyst award for the development of a Nanotrap® liquid biopsy collection device to be matched by $1.2 million in product development funding by Ceres.

Syndicate Partners: Greybird Ventures, Pactolus Ventures, Bay Area Lyme Foundation

BrightSpec, Inc.

BrightSpec, Inc. is a life science instrumentation company offering fast, precise analysis of trace level chemical components for applications in R&D, pharmaceuticals, fine chemicals, food, and advanced manufacturing sectors. The company is founded on the research portfolio and patented technologies of UVA Chemistry Professor Brooks Pate, Ph.D., which is licensed through LVG. The LVG Seed Fund invested in BrightSpec in fiscal year 2019 alongside MedVest Capital in a $2.3 million Series B financing to support corporate development and a new product launch. The company has since announced a letter of intent to acquire assets from BioTools, Inc. that will enhance their customer offerings in chemical structure analysis and impurity quantification problem solving.

Syndicate Partner: MedVest
The highest honor bestowed on University of Virginia innovators, the Edlich-Henderson Innovator of the Year award recognizes an individual or team each year whose research discovery is making a major impact.

Named for UVA Professor Emeritus Dr. Richard F. Edlich (1939-2013) and Christopher J. (“Goose”) Henderson, an 35-year financial industry veteran with experience in strategic planning, risk management, sales, marketing and business development, the award is a tribute to their enduring support of and commitment to the University and its innovators.

Previous Winners

2019

Jeffrey Elias, M.D.

2018

Brooks V. Patel, Ph.D.

2017

John A. Hossack, Ph.D.

2016

N. Scott Baner, Ph.D.

Arthur W. Lichtenberger, Ph.D.

Robert M. Weikel II, Ph.D.

2015

Benton H. Calhoun, Ph.D.

James A. Smith, Ph.D.

2014

J. Randall Moorman, M.D.

Douglas E. Lake, Ph.D.

2013

Marcia A. Invernizzi, Ph.D.

2012

Robin A. Felder, Ph.D.

2011

Boris P Kovatchev, Ph.D.

2010

Kevin R. Lynch, Ph.D.

Timothy L. Macdonald, Ph.D.

2009

John P Mugier, Ph.D.

James R. Brookeman, Ph.D.

2008

George T. Rockeaver, Ph.D.

2007

Wiadek Minor, Ph.D.

2006

George T. Gillies, Ph.D.

2005

Benjamin M. Gaston, M.D.

John E. Hunt, Ph.D.

2004

Haydn N.G. Wadley, Ph.D.

2003

William A. Petr, M.D., Ph.D.

Barbara J. Mann, Ph.D.

2002

Joel M. Linden, Ph.D.

2001

Doris Kuhlmann-Wilsdorf, M.D.

2000

Robert M. Berne, M.D.

Luz Belardelli, M.D.

2000

Rafael Rubio, Ph.D.

1999

John C. Herr, Ph.D.

1998

Richard L. Guerrant, M.D.

Timothy L. Macdonald, Ph.D.

1997

Jessica J. Brand

Patrice G. Guenent, Ph.D.

Richard D. Pearson, M.D.

Janine C. Jaggor, Ph.D.

1996

Donald F. Hunt, Ph.D.

Jeffrey Shainkova, Ph.D.

George C. Stafford Jr., Ph.D.

1995

Gerald L. Mandell, M.D.

Gail W. Sullivan

1994

Joseph Larmer, M.D., Ph.D.

1993

Robert M. Berne, M.D.

Luz Belardelli, M.D.

Rafael Rubio, Ph.D.
A Fifth-grade School Teacher is at Her Wits’ End.

Most nights it takes the woman—who is in her 40s—at least two hours to fall asleep. Almost every night, she wakes up at 3 a.m., then can’t get back to sleep for another two hours. She has tried everything she can think of—a warm bath, reading before bed, leaving the television on— to no avail. Her husband has been supportive, but now feels helpless and is starting to lose patience. This woman exemplifies the estimated 30 million people in the U.S. suffering from chronic insomnia.

It was with this in mind that University of Virginia School of Medicine professor Lee Ritterband created SHUTi (Sleep Healthy Using the Internet) – a digital therapeutic that uses cutting-edge technology to administer cognitive behavioral therapy for people suffering from insomnia.

In more than two dozen clinical trials—many involving the likes of the fifth-grade school teacher—SHUTi has reduced insomnia severity by an amount comparable to face-to-face therapy. Studies in the U.S., Australia, Norway and Denmark have also shown that SHUTi users experience less depression, anxiety, fatigue and other co-occurring conditions.

SHUTi is just one of many digital therapeutics Ritterband and his team have created and tested. In recognition of the impact of his innovative solutions, the University of Virginia Licensing & Ventures Group has named Ritterband the 2019 Innovator of the Year.

“We are thrilled to honor Lee Ritterband for his work pioneering the integration of digital solutions for patients living with a variety of issues, including insomnia, cancer, diabetes, and substance abuse, just to name a few,” says Michael Straughtiff, executive director of the UVA Licensing & Ventures Group.

“Ritterband sits firmly at the helm of this emerging field and his efforts to make these treatments available on a mass scale through commercialization stand to significantly reduce the overall cost of behavioral health care.”

Most of the interventions created by Ritterband and his team are fully automated programs that don’t require regular doctor’s appointments. This allows for greater ability to scale and disseminate the programs because the only necessity is an internet connection.

“We work hard to automate as much of the intervention as we possibly can,” Ritterband said. “The minute we add a person to the mix is the minute we dramatically reduce the ability to deploy these programs on a large scale.”

Of course, some disorders need an involved clinician, but Ritterband has shown that for many people, an automated program works incredibly well. SHUTi is no exception. Users log onto the web-based treatment platform through either their computer or mobile device. After creating a sleep diary and answering a number of questions pertaining to their sleep habits, SHUTi’s proprietary algorithms determine a patient’s ideal sleep window.

“I’m a clinical psychologist and one of the things I was trained to do was help people,” he said. “This allowed me to do it in a much broader way. Instead of the hundreds of people we might be able to help in a clinic, we can scale these platforms to help thousands, tens of thousands— or maybe millions at some point—by making these kinds of interventions available. They’re lower cost, they’re more accessible, they’re empirically validated.”

In addition to his recent work with SHUTi, Ritterband and the Center for Behavioral Health and Technology support the development of other internet interventions including:

- CARRIL, to reduce alcohol-exposed pregnancy risk
- UCancerPooP, to help families of children with encopresis
- mySmartSkin, to increase skin self-examination and sun protection behaviors among patients with melanoma
- BGATHome, to help diabetes patients recognize and anticipate extreme blood glucose fluctuations
- iSHIFUp, to prevent pressure ulcers in adults with spinal cord injury

“Can we provide treatments to people who might not otherwise be able to get them?” Ritterband said he wouldn’t have been able to accomplish what he has without collaboration from his many colleagues and multi-disciplinary team at UVA, support of the UVA faculty member Frances Thorndike, independent researchers are predicting the global digital therapeutics market will reach $9 billion by 2025, up from about $2 billion in 2017.

Jennings said the estimated 30 million people in the U.S. suffering from chronic insomnia carries an economic burden of more than $100 billion per year.

“SHUTi is a great innovation because it provides a highly effective solution for a huge problem,” Jennings said. “Very few people have access to traditional therapy because there are fewer than 100 providers of the therapy available in the U.S. to serve the 30 million insomnia sufferers, and those providers are typically concentrated in high population areas.”

He and Ritterband have collaborated with Thorndike on the development of SHUTi, said it’s been “incredibly gratifying” to see his idea help so many people.

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Noteworthy

Ceres Nanosciences (Ceres) received Breakthrough Device designation from the U.S. Food and Drug Administration (FDA) for its new point-of-care Nanotrap® Lyme Antigen Test System in July 2018.

Jonathan Kipnis, Ph.D., chair of UVA's Department of Neuroscience and director of its Center for Brain Immunology and Glia published research findings in Journal Nature in July 2018, and in Nature Neuroscience in September 2018.

Adial Pharmaceuticals, Inc., a clinical-stage biopharmaceutical company focused on the development of a therapeutic for the treatment of alcohol use disorder, raised more than $3.2 million in its IPO which closed on July 31, 2018.

DexCom, Inc., the leader in continuous glucose monitoring for people with diabetes acquired TypeZero Technologies, Inc. in August 2018.

In August 2018, the UVA Office of the Vice President for Research launched the 3 Cavaliers program to facilitate funding for collaborative research projects across UVA.

Jonathan Kipnis, Ph.D., chair of UVA's Department of Neuroscience and director of its Center for Brain Immunology and Glia was awarded the prestigious Director’s Pioneer Award from the National Institutes of Health including $5.6 million in research funding over five years as part of the award. The prize recognizes scientists with outstanding records of creativity as they pioneer new approaches to the biggest challenges in medical and behavioral research, with the goal of funding work that could have a transformative effect on human health.

In October 2018, Cavion, Inc. announced promising results of the T-CALM Phase 2 clinical trial of its first-in-class T-type calcium channel modulator CX-8998 in essential tremor.

Mission Secure (MSI) announced a Series A financing round in October 2018 including the LVG Seed Fund to accelerate growth and expansion of the Company throughout the energy, defense, and transportation sectors.

George Gillies, Ph.D., a UVA research professor of mechanical and biomedical engineering and a prolific inventor who holds more than 30 issued U.S. patents was inducted into the National Academy of Inventors in December 2018.

Adial Pharmaceuticals, Inc. priced 2.475 million shares in secondary offering on February 21, 2019.

The NIH awarded the Integrated Translational Health Research Institute of Virginia (ITHRV) a five-year grant of nearly $23 million to advance innovative ideas from the point of discovery to implementation in clinical practice and population health.

BrightSpec, Inc. announced a Series B Financing in March 2019 including the LVG Seed Fund to support corporate development and a new product launch. HemoSonics received de novo marketing authorization from the FDA for its Quanta Hemostasis platform.

HemoShear Therapeutics, LLC, and Takeda Pharmaceutical Company Ltd announced the extension of their exclusive drug discovery partnership aimed to develop additional novel therapeutics for liver diseases, including nonalcoholic steatohepatitis (NASH).

Governor Northam announced more than $6.7M in GoVirginia Grants including the Catalyst Accelerator Program. TearSolutions closed a $6.4 million funding round to complete a Phase II clinical trial for their novel solution for dry eye disease, LacripepTM.

Cavion, Inc. presented the results of their Phase 2 Essential Tremor Clinical Trial in a platform presentation at the American Academy of Neurology.

PsKick, the company pioneering wireless, batteryless Internet of Things (IoT) systems, changed its name to Everactive and closed a $30 million funding round.

The LVG Seed Fund to support corporate development and a new product launch. HemoSonics received de novo marketing authorization from the FDA for its Quanta Hemostasis platform.

Cores Nanosciences, Inc. received a $600,000 grant from Virginia Catalyst Technology Transfer (STTR) Award.

Jazz Pharmaceuticals acquired Cavion, Inc. through a merger with a Jazz subsidiary in August 2019.


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