

Driving *INNOVATION* Forward

The Center for Technology Transfer & Commercialization provides professional commercialization services to the Vanderbilt community, thus optimizing the flow of innovation to the market and generating revenue that supports future research activities and positively impacts the global society.

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Message from the Director



Support for Collaboration

As times change, so must the ways in which CTTC delivers value to the Vanderbilt community. Every department and center within Vanderbilt is seeking new sources of funding and support, and CTTC has positioned itself to contribute to the search.

Our core business remains strong; we are closing fiscal year 2014 with unprecedented levels of licensing transactions and inventor engagement, as well as steady growth in the number of inventions disclosed. During FY14, CTTC recorded a record level of inventor engagement and licensing transactions, with 185 invention disclosures, 101 licensing transactions completed, 973 material transfer agreements administered, and an overall increase in interaction with inventors through departmental presentations, educational events, and daily correspondence.

However, such measures are no longer adequate to gauge the effectiveness of a technology commercialization operation. An

increasingly significant factor is the generation of resources that benefit Vanderbilt and its faculty, staff and students, whether through licensing revenue, equity liquidation, industry research funding, federal grants or even philanthropy.

Notably, CTTC has expanded its role in supporting business development opportunities with worldwide leaders in healthcare, communications, biotechnology, pharmaceuticals, and diagnostics. CTTC has worked closely with Vanderbilt Corporate Relations, the Office of Contracts Management, the Office of Contract and Research Administration, Development and Alumni Relations, Office of General Counsel, and others to create opportunities to collaborate with industry leaders to further develop Vanderbilt technologies and capitalize on expertise within Vanderbilt and at the collaborating corporations. Such efforts have resulted in a plurality of substantive collaborations generating valuable research support for the institution (see examples below).

CTTC will continue to build on the successes and efforts of the 2014 fiscal year and remains focused on finding creative and innovative solutions to the ever-present financial strains felt throughout academic research.

Industry Collaboration

Throughout FY14, CTTC assisted in numerous collaborative agreements that will utilize Vanderbilt expertise and further develop promising technologies. (Industry partner identities are not disclosed to preserve confidentiality).

Diagnostics:

Leverage Vanderbilt expertise to bring next generation genomics to the public for more effective cancer management

Healthcare IT:

Harness Vanderbilt expertise in informatics to address clinical communication needs in healthcare systems

Pharmaceuticals:

Utilize Vanderbilt drug discovery infrastructure to identify and characterize novel small molecules

Oncology:

Leverage Vanderbilt expertise to increase efficiency in diagnosis of diseased cells, namely cancers

Biotechnology:

Employ Vanderbilt's EMR-linked DNA biorepository to maximize therapeutic efficacy

Commercialization Dashboard






Vanderbilt is focused on contributing to products that meaningfully advance healthcare through higher quality of care, improved patient outcomes and decreased healthcare expenses. Over the past decade, Vanderbilt researchers and their innovations have helped to position the university as a world leader in numerous medical research sectors such as biomedical informatics, medical imaging, personalized medicine, and drug discovery and development.

10 years of commercialization impact
Over the last decade, Vanderbilt University has effectively leveraged its innovative ecosystem to create commercial opportunities with industry.

Technology Licenses:	474
New Innovations:	1,476
Licensing Revenue:	\$92.1M
Research Expenditures:	\$4.53B

Data from last 10 fiscal years (FY04 - FY13)

While the FY14 numbers have yet to be audited, preliminary totals are in and show growth in number of invention disclosures, license transactions, new venture development, and MTAs administered. Due to the natural tendency of fluctuation in technology transfer, three-year averages are often used to show a more accurate representation of actual growth trends. Any given year can see significant spikes in given areas of data collection.

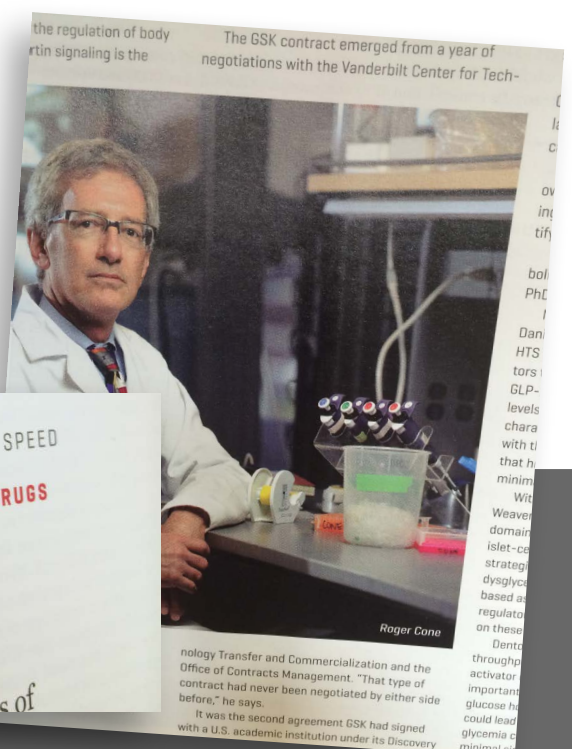
	FY14*	AVG, FY12 - FY14
 License Agreements	101	81.6
 New Innovations	185	184.3
 MTAs Processed	973	908
 Licensing Revenue	\$7.5M	\$13.6M
 Startups Launched	6	5

* unaudited data



The Winter 2014 issue of Vanderbilt magazine featured collaborative efforts between Vanderbilt researchers and the pharmaceutical industry, illustrating Vanderbilt's prominent role in drug discovery.

ACADEMIA AND INDUSTRY POOL THEIR EFFORTS TO SPEED
DISCOVERY OF **POTENT AND PERSONALIZED NEW DRUGS**
BY BILL SNYDER



Featured Inventor

“A lot of our motivation is just the nerdy desire to solve problems.”

- Will Grissom, Ph.D.

William Grissom, Ph.D.
Assistant Professor
Biomedical Engineering
Radiology
Electrical Engineering

“I live for the problems we get to solve,” said Will Grissom, Ph.D., assistant professor of biomedical engineering, radiology and electrical engineering at Vanderbilt. The “problems” Grissom refers to revolve around magnetic resonance imaging – helping clinicians see inside the human body, discovering new ways to target diseases and creating more effective and efficient healthcare solutions.

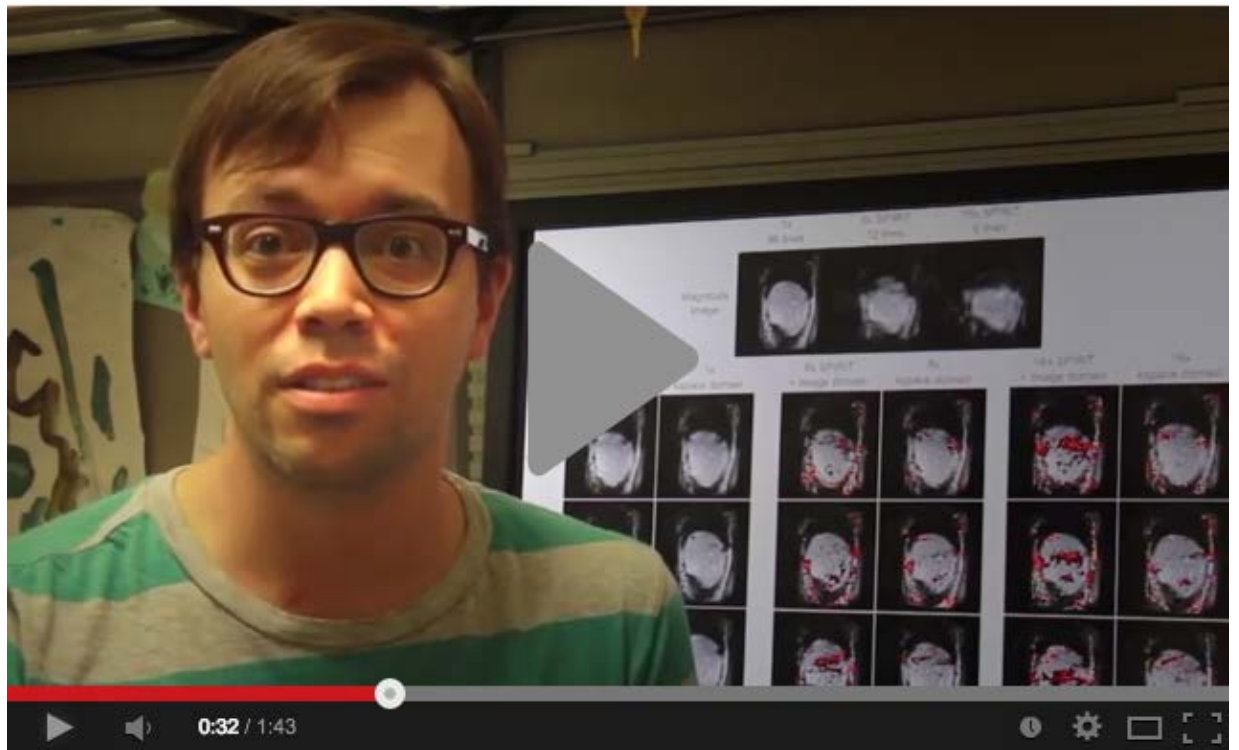
Self-described as “okay” in math and science, Grissom gravitated toward liberal arts early in his undergraduate studies. In fact, he originally planned to study law. However, a lingering interest in programming led him to take a few classes in electrical engineering. Those classes led to an internship that gave Grissom hands-on experience and inspired him to commit to engineering.

“The first couple of years were really hard,” Grissom said. “It was hard to see where the applications were. Once I got an internship in the area, I started to get really excited about it and decided to stick it out in a technical discipline.”

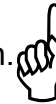
That internship and others played a critical role in shaping Grissom’s career. After committing to engineering, another internship introduced him to the field of imaging. In his senior year of undergraduate studies, Grissom began working on a project in functional brain imaging under a professor at the University of Michigan. After graduation, he took a position working in that professor’s lab as a graduate student.

After earning a Ph.D. from Michigan, Grissom spent time as a researcher at General Electric (GE) Global Research in Munich, Germany, where he collaborated with researchers at Stanford University and a GE spin-off. There, he was part of a team that developed a new way to estimate the temperature images from MRI data that was significantly more robust than previous methods.

Earlier this year, Grissom was awarded a Focused Ultrasound Foundation External Research Award for research that builds off his early work as a post-doc at Stanford and a research engineer at GE.



Click to watch.



“The Foundation is directly engaged in engineering and clinical trials to get focused ultrasound off the ground in the clinic,” said Grissom. “I’ve mostly been working with them on brain applications, trying to find safer and more effective methods for ultrasound surgery in the brain. This grant will allow us to perform experiments in collaboration with the University of Virginia -- utilizing their brain MR-guided focused ultrasound system but implementing our software tools.”

Aside from his core research, Grissom has spent the past year or so branching out into new territory. He is now exploring actual MR hardware and working with a team of researchers to create a new technique to encode the MR signal. If successful, the new technique could dramatically reduce the cost of MR scans.

“A lot of our motivation is just the nerdy desire to solve the problem,” said Grissom. “That’s what makes me work on this every single day, but ultimately our goal is to improve overall healthcare delivery, healthcare effectiveness, and healthcare value.”

During the 2013-14 school year, Grissom also launched a course that guides students through the construction of a tabletop magnet – from the RF coils to the transmit/receive switches. The students successfully connected the components and transmitted a signal to a computer screen.

Introducing MDRAP

Vanderbilt launches Medical Device and Regulatory Affairs Program

In the spring of 2014, CTTC welcomed a new division to its team, the Medical Device Regulatory Affairs Program. Also known as MDRAP (referred to as “M-D-Rap”), its mission is to support investigators who are involved with Food and Drug Administration (FDA) regulated device research at Vanderbilt University. MDRAP provides a broad spectrum of services to researchers including:

- Individualized consultation
- Early product development regulatory guidance
- Determination of need for Investigational Device Exemption (IDE)
- Food and Drug Administration (FDA) pre-submission meeting guidance and support
- Liaise with the FDA
- Assistance with IDE submission assembly and review
- Assistance with Investigational Review Board (IRB) device documentation

"Thanks again for everything. You provided valuable support through every step in this process. We couldn't have been successful so quickly without your help, and I am very grateful for the time you've taken to assist us with this submission." – Mallory H.

- Education and training in Sponsor-Investigator responsibilities for FDA regulated device research
- Assistance with maintenance and ongoing reporting post-IDE approval
- Provision and maintenance of Sponsor-Investigator IDE Handbook
- Provision of IDE templates and tools
- Review of grant, contract and CTTC device submissions for potential regulatory needs
- Assistance with identification of appropriate resources relative to device research
- Facilitation of collaborative activities across the institution to facilitate quality device research and regulatory compliance



MDRAP is led by Dr. Ken Holroyd, CTTC medical director, assistant vice chancellor for research and associate professor of anesthesiology (pictured right). Additional services - ranging from development of regulatory strategy to GLP training, design control support to first and second party audits - will be offered in the future. To learn more about MDRAP, [click here](#).

Medical Device Pipeline unveiled

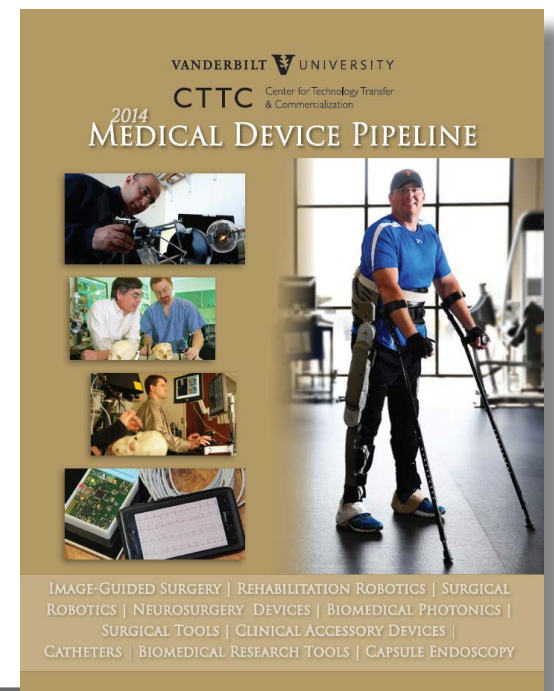
To better serve Vanderbilt's research community, and assist in the marketing and commercialization of technologies, CTTC has developed a number of industry-specific technology catalogs that show the university's current pipeline of technologies. The newest is a Medical Device Pipeline that debuted at the Southeastern Medical Device Association (SEMDA) meeting in May. The pipeline highlights more than 50 technologies in 10 different categories that are currently in the research and development pipeline at Vanderbilt. Industry feedback has been overwhelmingly positive. More technologies and categories are being added .



Spearheading the development of this pipeline was Masood Machingal, Ph.D., licensing analyst for CTTC (pictured left). Masood has been with CTTC since February 2012 and is responsible for identifying, protecting and marketing technologies in both physical and life sciences, as well as managing the licensing activities for **VU e-Innovations**. Dr. Machingal is a winner of the prestigious Howard Bremer Scholarship awarded by Association of University Technology Managers (AUTM). The scholarship honors Bremer, a pioneer in the technology transfer profession and former AUTM president, and is awarded to new professionals who bring creativity and innovation to the industry.

Education:

Ph.D., Virginia Tech-Wake Forest University School of Biomedical Engineering
Master of Technology in Biotechnology
Master of Science Bioinformatics



Vanderbilt announces formal collaboration with JumpStart Foundry, new program to support NSF Innovation Corps

Groundbreaking collaboration with JumpStart Foundry

In the spring of 2014, CTTC and Jumpstart Foundry (JSF) announced plans to engage in a new program that identifies, evaluates and selects new project proposals from Vanderbilt faculty, staff and students. CTTC will nominate select proposals through a stringent due diligence process for placement in JSF's top 30 applicant pool. JSF will rank order this group and begin interviewing the top ranked teams. The final selection round will be comprised of the top dozen or so teams from the above pool and will be given an offer to participate in JSF's annual business accelerator program, which begins in May.

"This new engagement represents a dynamic extension of our growing relationship with Jumpstart Foundry that promises to create new and valuable opportunities for entrepreneurial-minded members of the Vanderbilt community," said Alan Bentley, assistant vice chancellor of technology transfer and intellectual property protection. "We're excited and fortunate to work with one of the most highly-regarded accelerator's in the country."

In May, Vanderbilt startup PinPtr was selected through the new program to participate in JSF's 2014 cohort. The company is commercializing a cloud-based precision positioning platform developed by engineers at the Institute for Software Integrated Systems at Vanderbilt.

"We have been incredibly impressed with the potential at Vanderbilt," said Vic Gatto, CEO of Jumpstart Foundry. "The combination of Vanderbilt intellectual property and human talent with the Jumpstart Foundry curriculum and mentor network will create successful startups driving disrupting large industries and improving people's lives."



PinPtr, a cloud-based precision positioning platform, is an extremely broad technology with wide-ranging implications for a variety of applications - from agriculture to robotics to safety-critical applications. Below, the system is being used to locate an active shooter and bullet trajectory.

New program supports NSF Innovation Corps

In June 2014, CTTC launched a program that will support entrepreneurs interested in pursuing a place in the National Science Foundation (NSF) Innovation Corps (I-Corps) program. The program fosters entrepreneurship in order to commercialize technology that has been supported previously by NSF-funded research. To support Vanderbilt entrepreneurs, CTTC has developed a formal process for assessing technologies, assisting in the application process, preparing entrepreneurs for interviews and NSF assessment, and monitoring the progress. CTTC will also serve as and assist with the placement of team mentors.



Assess

Due diligence on innovation, as well as its commercial viability (value proposition, marketability and scalability).



Assemble

Assist with application review, mentor selection and other relevant duties that will strengthen the proposal.



Prepare

Critical inputs on interview preparation, sample Q/As and overall preparedness for panel questions.



Monitor

EL Coaching on Lean LaunchPad curriculum, post selection. Continuous monitoring of team's progress during program.

CTTC's role in the newly established I-Corps Program.

To date, CTTC has had four NSF I-Corps winners:

Team EndoInSight, Fall 2013

Entrepreneurial Lead: Byron Smith

Principal Investigator: Pietro Valdastri

EndoInSight is a disposable CO2 insufflation system for the colonoscopy market that will help clinicians improve patient outcomes while reducing procedure and recovery times.

Team Filtergraph, Spring/Summer 2014

Entrepreneurial Lead: Dan Burger

Principal Investigator: Keivan Stassun

Filtergraph is a web application designed to flexibly and rapidly visualize large datasets. The user loads a dataset in a variety of supported file types into Filtergraph, which automatically generates an interactive data portal that can be easily shared with others.

Team PinPtr, Fall 2014

Entrepreneurial Lead: Will Hedgecock

Principal Investigator: Ákos Lédeczi

PinPtr is a cloud-based positioning system using patent-pending localization methodology and a network of stationary base stations.

Team VasculoStent, Fall 2014

Entrepreneurial Lead: Timothy Boire

Principal Investigator: Hak-Joon Sung

VasculoStent is designed to prevent intimal hyperplasia so that the initial coronary artery bypass grafting procedure is more successful and does not require re-do operations.

New Venture News (cont.)

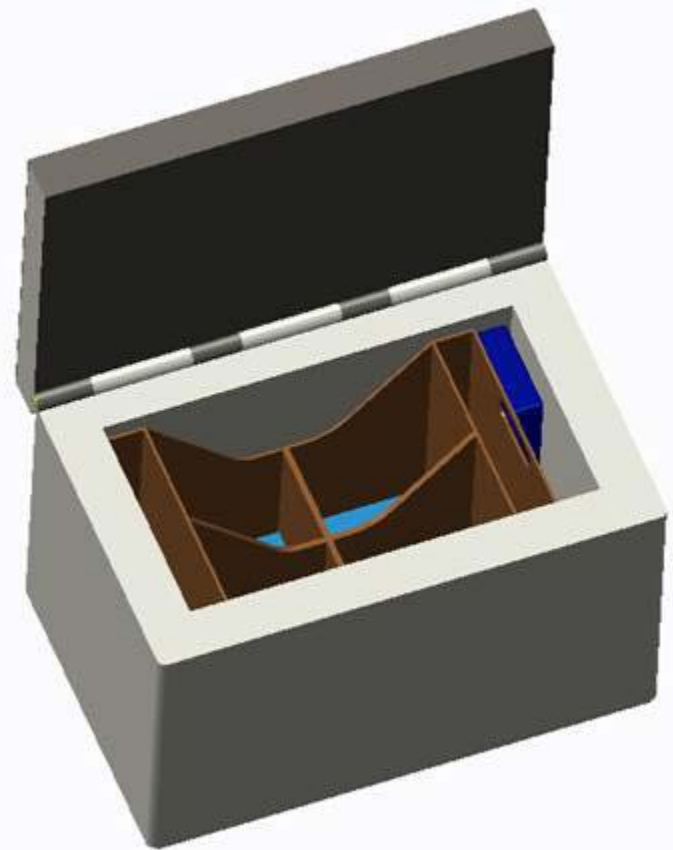
Two Vanderbilt startups look for guidance, exposure

This spring, a pair of technologies developed at Vanderbilt will benefit from the expertise of the region's top entrepreneurs and technology experts as well as gain national exposure. EndoInSight, a startup exploring commercialization possibilities for a CO2 insufflation device, and Blood Monitoring Solutions, a startup exploring commercialization of a blood waste reduction system, were selected to Memphis Bioworks ZeroTo510 Program. The two Vanderbilt startups comprise half of the current cohort and will benefit from the 12-week medical device accelerator program.

"ZeroTo510 will give us access to unbelievable mentors and a network of medical device industry experts," said EndoInSight founder and co-inventor Byron Smith. "The financial support is nice, but at this stage of the game getting feedback on our product concept and commercialization strategy is really the key."

Smith was inspired to apply for the program after hearing another former Vanderbilt student, Charleson Bell, sing the program's praises. Bell participated in the inaugural cohort with a company he founded, Bionanovations. Smith recently completed the National Science Foundation's Innovation Corps Program, along with Pietro Valdastri, Ph.D., Vanderbilt assistant professor of mechanical engineering and principal investigator on the insufflation device, and Rigved Joshi, CTTC New Ventures Manager and team mentor.

The ZeroTo510 program will be the first accelerator for Blood Monitoring Systems. Based on a Smart Blood Cooler System that was developed by the associate medical director of the Vanderbilt University Medical Center blood bank, Dr. Garrett Booth, and four Vanderbilt engineering students, the company's goal is to reduce red blood cell wastage through the utilization of feedback systems. Part of the allure for the program, said company founder Jim Mullen, is the actual product design feedback they will receive.



A rendering of the Smart Blood Cooler System

"The ZeroTo510 Program stresses the need for market validation before polishing a prototype," said Mullen. "We have begun interviewing potential users to understand the market that we will be selling to, as well as learning about different organizational structures and who within the hospital makes decisions."

Mullen expects a polished prototype to come after they complete the program. They will base prototype plans on what the company learns throughout the accelerator.

Both teams received \$50,000 in initial seed capital from co-investors Innova and MB Venture Partners. At the end of the 12-week accelerator, each will participate in Demo Day and pitch to a group of investors. Finalists could receive an additional \$100,000 in additional capital funding and the opportunity to participate in Phase II of the program.

Vanderbilt Innovation and Entrepreneurship Society (VINES) elects student president

As the entrepreneurship scene on campus continues to grow, the student-run Vanderbilt Innovation and Entrepreneurship Society (VINES) welcomes a new board of officers for the 2014-15 school year! Rochelle Glazman (pictured right), the new club president, welcomes you to reach out to VINES at vines@vanderbilt.edu.



Southland, Tech Connect, BIO, and AUTM Tools Course

Throughout the spring, CTTC showcased Vanderbilt technologies at a number of national conferences, including the Southeastern Medical Device Association Conference (SEMDA), Southland Conference, Tech Connect World Conference, and BIO International.



Vanderbilt's Team Filtergraph attended the Tech Connect World Conference. Pictured are (L to R) Dan Burger, inventor and researcher, Rachel-Chloe Gibbs, researcher, and Keivan Stassun, professor and lead inventor. Filtergraph is an interactive, web-based data visualization portal that plots millions of points seconds.

Filtergraph received a National Innovation Award at the conference.



CTTC employees at Southland (L to R): Peter Rousos, director of new ventures, Alan Bentley, assistant vice chancellor of technology transfer and intellectual property development, Heather McMillan, coordinator of new ventures, Rigved Joshi, manager of new ventures.

CTTC employees at SEMDA (left to right): Phil Swaney, CTTC technology transfer intern and Vanderbilt mechanical engineering graduate student, Taylor Jordan, licensing officer, Ashok Choudhury, senior licensing officer, Masood Machingal, licensing analyst.



AUTM Software Tools Course emphasizes best methods for protecting software IP

In May, the Association of University Technology Managers (AUTM) and CTTC hosted a Software Tools Course in Nashville. Technology licensing professionals from across the U.S. convened for two days to learn the ins and outs of licensing software - from protecting intellectual property to evaluating licenses. Ashok Choudhury, Ph.D., senior licensing officer in physical sciences for CTTC, served as local organizer, as well as led courses and served on panels during the conference.

Best practices for protecting IP was a key discussion point at the session. Rather than seek patent protection for software and the underlying algorithms (except in unusual circumstances), speakers suggested technology transfer offices should focus more readily on trade secret and copyright registration to protect these types of IP. The reason being (i) these types of patents are often quite narrow, provide little protection and can be easy to engineer around; (ii) it can be quite difficult to detect infringement; and (iii) the software market will typically have changed considerably by the time the patents issue.

Other topics of interest included: software valuation methods, cloud-based access and software as a service, commercialization models, and building companies around software platforms.



CTTC Services

CTTC supports Vanderbilt researchers who seek to commercialize intellectual property by providing a variety of services. Some of the services are more widely known, while others may be less obvious.

To give you an idea of how we may be able to assist you, here is a snapshot of the services we regularly provide:

- **Evaluating** commercial opportunities and market potential for novel technologies
- **Filing and prosecuting** patent applications
- **Marketing** technologies to industry
- **Negotiating** license agreements and options
- **Executing** various agreements, including: license, material transfer, confidentiality, inter-institutional and research collaboration
- **Facilitating** sponsored research and clinical trial agreements

- **Monitoring** licensee compliance
- **Tracking** milestones and collecting royalties
- **Distributing** payments to inventors, labs, departments, centers, and schools
- **Assisting** in new venture assessment and development
- **Educating** through departmental talks and presentations about intellectual property protection and commercialization as well as educational seminars on commercialization-related topics

A key role CTTC has undertaken is to facilitate collaborative arrangements between researchers and industry. In recent years, CTTC has assisted with such arrangements in all industries - from communications to diagnostics.

New U.S. Patents

Examples of compelling technologies recently patented by Vanderbilt are:

- 8,673,294 Immunoisolation patch system for cellular transplantation
- 8,691,556 Methods and compositions for vein harvest and autografting
- 8,696,933 Polar nematic compounds
- 8,697,447 Cleavable surfactants and methods of use thereof
- 8,697,691 Alkyl 3-((2-amidoethyl)amino)-8-azabicyclo[3.2.1]octane-8-carboxylate analogs as selective M1 agonists and methods of making and using same
- 8,697,888 Substituted (1-(methylsulfonyl)azetidino-3-yl) (heterocycloalkyl)methanone analogs as antagonists of muscarinic acetylcholine M.sub.1 receptors
- 8,703,665 Materials comprising deaggregated diamond nanoparticles
- 8,703,946 Substituted pyrazolo[1,5-A]pyrazine compounds as allosteric modulators of mGluR5 receptors
- 8,709,280 Polar nematic compounds
- 8,710,074 Dihydronaphthyridinyl(organo)methanone analogs as positive allosteric mGluR5 modulators
- 8,735,397 Method for treating schizophrenia and related diseases
- 8,740,762 Specific inhibition of cPLA.sub.2 enhances the efficacy of radiotherapy
- 8,747,345 Percutaneous collateral bypass
- 8,747,801 Broad-emission nanocrystals and methods of making and using same
- 8,748,381 Compositions and methods for the treatment of disorders involving epithelial cell apoptosis
- 8,759,377 Substituted dioxopiperidines and dioxopyrrolidines as MGLUR4 allosteric potentiators, compositions, and methods of treating neurological dysfunction

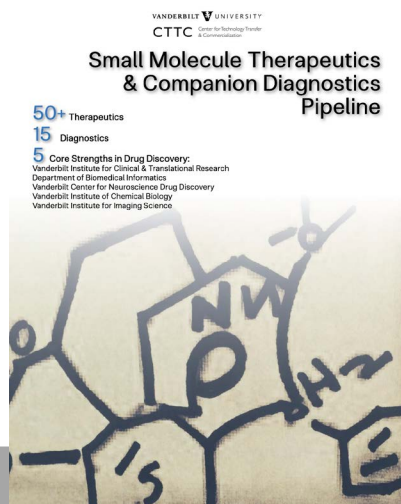
What's on Deck

Technology Catalogs

CTTC is currently developing a number of themed technology catalogs to assist in the marketing, and ultimately licensing, of new technologies. Catalogs currently in production include (i) medical imaging technologies, and (ii) biologics. These catalogs not only identify the technologies within each field, but also show where each falls on the research and development pipeline.

Expansion of MTAShare

Vanderbilt is now using MTAShare to manage and process outbound Material Transfer Agreements to other academic or not-for-profit institutions. Currently, the system is being tested by external academic and not-for-profit research institutions. Upon completion of external testing, MTAShare will be made available for use nationwide. This is critical as the **benefits and level of automation scales with the number of system users.**



Stay Connected to CTTC

To stay informed of the latest innovation news, events and technology commercialization activities, visit our blog, CTTC Muse. There you will find everything from agreement signings to tips for inventors - such as how to publish and patent, entrepreneurship challenges to videos about Vanderbilt technologies and core research capabilities.

You can also:



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