



annual report

2008/2009



UNIVERSITY OF TENNESSEE  
**RESEARCH FOUNDATION**

IDEAS TO ENTERPRISE

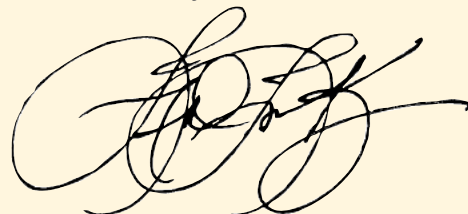
# message from the president

**Innovation.** It is a word that is used often these days because of its potential to improve the current economic environment and better the lives of our citizens. But where does innovation start? Most often, it starts with creative people in the research areas of companies, laboratories, and universities—people who have ideas they think could have a positive impact on our society.

I am pleased to say that researchers at the University of Tennessee are making a positive impact on society every single day. The breadth of innovation emerging from the university is astounding—from enzymes to engineering, from switchgrass to software, from pharmaceuticals to physics, from nutrition to nuclear power—and it all stems from the creativity, knowledge, and drive of some of the best researchers in the world.

The University of Tennessee Research Foundation (UTRF) is proud to partner with UT to bring these innovations to market. As you read the success stories highlighted in this report, you will see how we have helped researchers and partners navigate the path to commercially viable products. You will see how our partnerships with various groups and organizations have advanced both entrepreneurship and economic development throughout the state. And lastly you will see the tangible results of these efforts. We look forward to continued work with our researchers at the university as, together, we build on UT's growing reputation as one of the nation's premier research universities.

Sincerely,



Fred Tompkins, President  
University of Tennessee Research Foundation

## our mission

The University of Tennessee Research Foundation (UTRF) is a not-for-profit corporation whose mission is to take the ideas and discoveries made at the University of Tennessee and turn them into products and services that benefit society. The four key elements are

- Supporting the university research enterprise
- Identifying, managing, and marketing UT's intellectual property
- Fostering an entrepreneurial culture
- Driving technology-based economic development

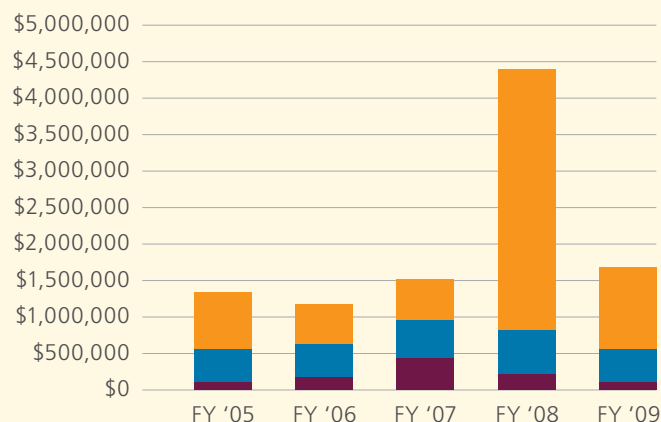


## changing to improve our service

At the end of fiscal year 2009, UTRF restructured to provide for greater local input and a deeper level of engagement with the individual campuses that comprise the university. Although policy-making, accounting, reporting, and compliance functions remain centralized, decision-making responsibilities for intellectual property management, licensing transactions, and revenue distribution have been moved closer to the campuses. By creating closer connections with both internal and external stakeholders, we can accelerate the pace and improve the results of our commercialization efforts.

Another major change implemented in 2009 was a revision to our policy for sharing the proceeds of licensing income. The new policy provides upfront payments to inventors and clarifies how licensing income is shared with the department, college, and campus/institute that generate the revenue-producing technology. Our goal is to encourage continued innovations by providing funds to the UT entities that are successful at creating technologies that reach the marketplace. More details can be found on our website, <http://utrff.tennessee.edu>, under Faculty Resources/Policies.

### Licensing Revenues by UT Campus/Institute



	FY '05	FY '06	FY '07	FY '08	FY '09
Institute of Agriculture	\$113,505	\$204,805	\$478,966	\$254,510	\$119,220
Knoxville	\$453,958	\$426,094	\$524,218	\$573,283	\$506,277
Health Science Center	\$720,095	\$532,557	\$488,004	\$3,479,594	\$1,106,834
<b>TOTAL</b>	<b>\$1,287,558</b>	<b>\$1,125,529</b>	<b>\$1,476,188</b>	<b>\$4,307,387*</b>	<b>\$1,732,331</b>

\* FY '08 includes a one-time payment of \$1.9 million for a UT Health Science Center technology



## supporting research

At UTRF, we believe that one of our primary jobs is to attract additional research funding to spur innovation. We approach companies (and sometimes companies approach us) that are experiencing business problems that we think our technologies have the potential to solve. We facilitate connections between these companies and the researchers, and often a relationship is formed that leads to new research opportunities, further technology development, and the licensing of the resulting inventions.

To accelerate this process, we established the **UTRF Technology Maturation Funding Program** in 2008 to help UT researchers further develop technologies that have the potential for commercial success. Eleven research projects were awarded an average of \$15,000 each. As a result, all of those projects have been advanced commercially in some way during 2009. Here are a few examples of the impact of this program:

- **Dr. Steve Oliver** of the UT Institute of Agriculture has been working on a vaccine to prevent mastitis in dairy cows. The data he was able to obtain as a result of this funding attracted the interest of a very large pharmaceutical company, which provided an additional \$1 million for research and now has the option to license the technology.
- **Dr. David Baker** of the UT Knoxville Department of Chemistry received funding to continue development of a potent anti-tumor compound. The resulting successful drug trials allowed him to apply for a National Institutes of Health (NIH) grant that is currently pending. Negotiations are proceeding with a drug company to license the compound.
- In addition to the funding from UTRF, **Dr. Betty Lew** of the UT Health Science Center obtained matching funds from Cumberland Emerging Technologies (CET) to develop a new treatment for asthma. CET has the license for this technology and has attracted additional government funding to further develop the product.
- **Drs. Arnold Postlethwaite** and **Andrew Kang** of the UT Health Science Center received funds to continue development of a new treatment for rheumatoid arthritis. The resulting data allowed them to apply for and receive a \$1.5 million grant from the NIH.

“University-based research plays an important role in the innovation process. Basic research that leads to fundamental discoveries provides the underpinning of more applied technologies.”

The Kauffman Foundation

## Investments in Intellectual Property by UT Campus/Institute

	FY '05	FY '06	FY '07	FY '08	FY '09
Institute of Agriculture	\$142,962	\$98,694	\$139,403	\$206,633	\$135,314
Knoxville	\$227,820	\$229,942	\$339,496	\$262,696	\$198,795
Health Science Center	\$476,948	\$412,986	\$564,202	\$679,251	\$343,277
Chattanooga				\$556	\$2,041
Space Institute	\$17,949	\$59,173	\$49,923	\$15,198	\$12,870
<b>TOTAL</b>	<b>\$865,679</b>	<b>\$800,795</b>	<b>\$1,093,024</b>	<b>\$1,164,334</b>	<b>\$692,297</b>

In 2009, UTRF also funded nine new projects from across the UT system. We extend our congratulations to the following recipients:

Recipient(s)	Campus/Institute	Type of Work
Dr. Julian Hurdle Dr. Richard Lee Dr. Yunzhi Yang	Health Science Center	Preventing biofilms from forming on medical devices
Dr. Daniel Kestler Dr. Alan Solomon	Health Science Center	Breast and lung cancer biomarkers
Dr. Wei Li Dr. Shao Wang Dr. Yan Lu Dr. Jianjun Chen Dr. Duane Miller	Health Science Center	Anti-melanoma agents
Dr. Len Lothstein Dr. Trevor Sweatman	Health Science Center	Therapy for prostate cancer
Dr. Judith Soberman Dr. Polly Hofmann Dr. Guy Reed	Health Science Center	Reducing tissue damage associated with heart attacks
Dr. Feng Chen Dr. Greg Armel	Institute of Agriculture	Protecting plants from herbicide damage
Dr. Zong-Ming Cheng	Institute of Agriculture	Increasing environmental stress tolerance in plants
Dr. Frederico Harte	Institute of Agriculture	Improving processing costs and product quality in the food industry
Dr. Ying-Ling Chen	Space Institute	Product to improve vision screening in children



Maturation funding is rapidly being recognized as a critical element for innovation that spurs economic development. UTRF, along with several other institutions from across the state, worked closely with the Tennessee Technology Development Corporation (TTDC) to form the new statewide **TTDC Pilot Commercialization Grant Program** to help researchers further mature

early stage technologies that have significant commercial potential. The proposals were developed and submitted by UTRF. Two researchers from the Knoxville campus were awarded nearly \$150,000 as part of the program: **Dr. Dayakar Penumadu** in the Department of Civil and Environmental Engineering for his work on a new processing method for polymeric foam, and **Dr. Jimmy Mays** in the Department of Chemistry for his work on membranes used in chemical processing applications. The University of Tennessee was the only institution that received more than one award from this pilot program. A third researcher, **Dr. Ed Chaum**, from the UT Health Science Center, was part of a team at the University of Memphis that was awarded \$100,000 for development of a monitoring device for anesthesia.

## commercializing technology

UTRF is always searching for matches between companies with business issues and UT technologies that have the potential to solve them. In addition to direct marketing campaigns and website information, we also look for events where we can highlight the research capabilities of the university.

One successful forum in fiscal year 2009 was the **TTDC Tennessee Innovation Conference**. The planning committee for the event chose nine of 17 UT technologies submitted by UTRF for presentations to venture capital and industry representatives from across the country. Researchers presented their projects, received feedback, and were able to learn about technology commercialization and other research efforts happening within the state.

"The licensing of innovations by universities . . . adds billions of dollars to the U.S. economy and supports hundreds of thousands of jobs."

Association of University Technology Managers

## Licenses Executed by UT Campus/Institute

	FY '05	FY '06	FY '07	FY '08	FY '09
Institute of Agriculture	10	6	3	2	4
Knoxville	1	2	2	4	3
Health Science Center	4	2	5	11	10
Space Institute			2		
<b>TOTAL</b>	<b>15</b>	<b>10</b>	<b>12</b>	<b>17</b>	<b>17</b>

## TTDC TENNESSEE INNOVATION CONFERENCE PARTICIPANTS

Researcher	Campus/Institute	Technology
Denis DiAngelo Brian Kelly	Health Science Center	Multi-Axis Spine Testing System
Monica Jablonski	Health Science Center	Treatment for Dry Age Related Macular Degeneration
James Johnson Wei Li	Health Science Center	Sustained Release Injectable Analgesics
Duane Miller	Health Science Center	Thiazolidine Treatment for Prostate & Skin Cancer
George Wood	Health Science Center	Glioma Targeted Liposomes for Paclitaxel Delivery
Suxiang Deng Jimmy Mays	Knoxville	Sulfonated Fuel Cell Membrane
William Hamel	Knoxville	Mobile Tracking Device for Medical Applications
Dayakar Penumadu	Knoxville	Energy/Cost Saving Method to Produce Polymeric Foam
Ying-Ling Chen James Lewis	Space Institute	Dynamic Ocular Evaluation System

### QUOTES FROM PARTICIPATING RESEARCHERS

*"This is an excellent opportunity for us to know what others think about our project and make sure we are going in the right direction."*

*"Information regarding the mechanics of venture capital investment and insights into intellectual property issues was enlightening."*

*"Preparing for the meeting really forced us to try to envision all of the possible opportunities and angles, which was helpful in itself."*

We also use our vast network of industry contacts to reach companies directly. If there is a good match between their issue and our solution, a company will license the technology from UTRF and then further develop it on their own. Following are some examples of this year's licensees in action:

**Advanced Plasma Products** (APP) licensed plasma technology from UTRF that can quickly destroy living microorganisms, lending itself to a variety of disinfection and sterilization tasks. APP released its first product, the TriClean Pro, for air purification applications in the summer of 2009. Earlier in 2009, the company also secured a development contract with Memios, LLC to engineer a disinfection product used in waste handling systems.

**arGentis**, a pharmaceutical company that licensed a drug developed by **Drs. Arnold Postlethwaite** and **Andrew Kang** to treat scleroderma, received orphan status for the drug in Europe. Because Europe recognizes that the drug might help people who suffer from this rare disease, arGentis is eligible to market it exclusively for up to 10 years in many European countries.

**GTx**, a pharmaceutical company using technology developed by **Dr. Mitchell Steiner** of the **Health Science Center** and CEO of GTx, is evaluating a drug for the prevention of prostate cancer in high-risk men. They expect results from the Phase III clinical trial by the end of 2009.

**Neutraceutical Discovery Inc.**, a start-up company based on a technology developed by **Dr. Michael Zemel** in the **UT Knoxville Department of Nutrition**, entered into a partnership with Attitude Drinks to develop a milk-based drink that boosts metabolism.



Michael Zemel

## developing an entrepreneurial culture

UTRF strongly believes that innovative entrepreneurs are perfect candidates for launching new technologies. Start-up companies are the primary drivers of the U.S. economic engine, so having them launched within the state is a winning proposition for everyone involved. We have facilities and programs in place to help nurture these companies as they start and grow, and we work hand-in-hand with the Center for Entrepreneurship and Innovation in the UT Knoxville College of Business Administration to help and support budding entrepreneurs.



UTRF Technology Business Center

“Because of their embrace of innovation, entrepreneurs help lift all parts of the American economy.”

National Commission on Entrepreneurship

Six start-up companies based on UT technologies were formed in 2009, the most ever in one year. Following are highlights from some of those companies:

- **ARISTE Medical, LLC** is a pre-clinical-stage company dedicated to improving the treatment of vascular disease and

infections associated with implanted devices. ARISTE is developing a drug delivery system that may be applicable to a wide variety of implantable devices. The technology was initially developed by **Drs. Lisa Jennings** and **Tim Fabian** at the UT Health Science Center. ARISTE competed against 50 other life science companies and was selected as one of the ten semifinalists in the 2009 Southeast Bio (SEBIO) business plan competition.

- **Embryo Armor Technologies, LLC** is commercializing Embryo Armor™, a discovery that improves reproductive efficiency in cows. Developed by **Dr. Neal Schrick** at the UT Institute of Agriculture, this technology has been shown to substantially increase pregnancy success rates when used with either fresh or frozen embryos.

- **Sequel Innovations, LLC** is a start-up created by three Knoxville MBA students to commercialize a novel polymeric foam expansion method developed by **Drs. Dayakar Penumadu** and **Neel Sen**. The Sequel team presented this technology at the Global Venture Challenge business competition in March, where they were named as finalists.



Neel Sen (left) and Dayakar Penumadu.

## economic development

Technology-based economic development is critical for economic growth, so UTRF works with economic development and industry groups across the state to pave the way for transitioning new technology into local economies. UTRF staff members are involved in several regional and statewide economic development initiatives, and they serve as board members for some of the economic development organizations and statewide industry groups.

The 2009 BIO Conference in Atlanta, the world’s largest networking and partnering event for the biotechnology industry, is an excellent example of our effort in this area. UTRF teamed with TTDC, the Tennessee Biotechnology Association, and several other research and economic development organizations across the state

to drive Tennessee’s presence at the event. A post-event survey showed that our participation was positive not only for the state but also for the university—UTRF held 12 meetings with industry, some of which may result in licensing of UT technologies.



2009 BIO Conference

“Regions that do not achieve some level of attainment in [high-tech] industries will likely experience substandard economic growth in the future.”

Milken Institute



And many thanks to the students, post-docs and staff members who also contributed to these technologies.

## 2009 HALL OF FAME

Congratulations to the following University of Tennessee researchers who received a patent from the U.S. Patent and Trademark Office:

Raul Almeida – Institute of Agriculture

John Birdwell – Knoxville

Ying-Ling Chen – Space Institute

Sheng Dai – Knoxville

Jim Dale – Health Science Center

Frank DiBianca – Health Science Center

Shige Eda – Institute of Agriculture

Jay Frankel – Knoxville

Georges Guiochon – Knoxville

Karen Hasty – Health Science Center

Polly Hofmann – Health Science Center

Roger Horn – Knoxville

David Icove – Knoxville

James Lewis – Space Institute

Leonard Lothstein – Health Science Center

Douglas Luther – Institute of Agriculture

Duane Miller – Health Science Center

Stephen Oliver – Institute of Agriculture

Arnold Postlethwaite – Health Science Center

Catherine Scott – Institute of Agriculture

Alan Solomon – Health Science Center

C. Speer – Institute of Agriculture

Mitch Steiner – Health Science Center

Trevor Sweatman – Health Science Center

Jon Wall – Health Science Center

Tse-Wei Wang – Knoxville

Jie (Jayne) Wu – Knoxville



Richard Magid and Jim Johnson at UTHSC patent ceremony

## U. S. Patent Applications by UT Campus/Institute

	FY '05	FY '06	FY '07	FY '08	FY '09
Institute of Agriculture	11	11	7	6	13
Knoxville	14	20	17	11	11
Health Science Center	46	45	35	44	37
Chattanooga					1
Space Institute	1	2			1
<b>TOTAL</b>	<b>72</b>	<b>78</b>	<b>59</b>	<b>61</b>	<b>63</b>

## U. S. Patents Issued by UT Campus/Institute

	FY '05	FY '06	FY '07	FY '08	FY '09
Institute of Agriculture				5	2
Knoxville	4	4	5	3	3
Health Science Center	3	11	10	7	9
Space Institute					1
<b>TOTAL</b>	<b>7</b>	<b>15</b>	<b>15</b>	<b>15</b>	<b>15</b>

Institute of Agriculture patent recipients



In addition, UTRF extends sincere appreciation to UT faculty, staff and students who invented and disclosed new technologies in 2009:

- |                       |                     |                     |                          |
|-----------------------|---------------------|---------------------|--------------------------|
| Laura Abercrombie     | Charles Duke III    | Sang Min Lee        | Burt Sharp               |
| Jamie Adcock          | Ramez Elgammal      | Michael Levin       | Xiang Shu                |
| Gladys Alexandre      | Oluseyi Fajolu      | Chunyan Li          | Atul Shukla              |
| Kyle Anderson         | Mohammed Ferdjallah | Woodlyn Madden      | Alan Solomon             |
| Gregory Armel         | Shane Foister       | Ram Mahato          | Susan Speraw             |
| J. Ronald Bailey      | Paul Frymier        | Kafait Malik        | Christopher Stephens     |
| Jeffrey Barlow        | Jessica Gooding     | David Mann          | C. Neal Stewart          |
| Ashesh Belapure       | Ja'Wanda Grant      | Amanda May          | Yichun Sun               |
| Robert Belland        | Martin Grossbeck    | Chanchai McDonald   | Thomas Thundat           |
| Roberto Benson        | Mark Hairr          | Robert Mebane       | Gabor Tigyi              |
| Michael Berry         | Reza Hajimorad      | Bernd Meibohm       | Elina Tjioe              |
| James Bina            | Jeremiah Harden     | David Mercker       | Leon Tolbert             |
| Xiaowen (Renee) Bina  | William E. Hart     | Duane Miller        | Peter Tsai               |
| Doug Birdwell         | Federico Harte      | Bob Moore           | Pavan Vaddaddy           |
| Benjamin Blalock      | Wei He              | Anjaparavanda Naren | Srinivasan Velusamy      |
| Alison Buchan         | David Hedden        | Susan Newbill       | Teeradache               |
| Antonin Bukovsky      | William Hofmeister  | Susie Nicholson     | Viangteeravat            |
| John Buolamwini       | Omid Hosseinaei     | Brian O'Nuallain    | Rajagopal Vijayaraghavan |
| Jason Burriss         | Bin Hu              | Cristopher Oppert   | Jonathan Wall            |
| Gerald Byrne          | Baoshan Huang       | Shivaputra Patil    | Siqun Wang               |
| Shawn Campagna        | Mohammad Huque      | Yingxu Peng         | Tse-Wei Wang             |
| Anais Castagnola      | Julian Hurdle       | Gregory Peterson    | David White              |
| Michael Caudle        | David Icove         | Jianjun Qi          | Jacqueline Whittemore    |
| Feng Chen             | Syed Islam          | Wen Qu              | Jonathan Willis          |
| (Max) Zong-Ming Cheng | James Johnson       | Mark Radosevich     | Clifton Woods            |
| Samuel Chill          | Juan Jurat-Fuentes  | Rakesh              | Hao Wu                   |
| Andrew Colvin         | George Kabalka      | Anton Reiner        | Jack Wyrick              |
| Stephen Corda         | Steve Karman        | Aixia Ren           | Xia Ye                   |
| John V. Cox           | Stephen Kennel      | Timothy Rials       | Lan Yu                   |
| Tim Cross             | Ana Kitazono        | Joe Rudd            | Junming Yue              |
| Thomas Currey         | William Klingeman   | Arthur Ruggles      | Othman Zalloum           |
| Donald Dareing        | Katherine Kottkamp  | Mina Sartipi        | Nan Zhao                 |
| Joseph Donaldson      | Nicole Labbé        | David Schneider     | Lin Zhu                  |
| Doris D'Souza         | Richard E. Lee      | Horrick Sharma      |                          |



Duane Miller in his laboratory

### Invention Disclosures by UT Campus/Institute/Other Entities

	FY '05	FY '06	FY '07	FY '08	FY '09
Institute of Agriculture	6	32	11	43	18
Knoxville	21	27	26	19	23
Health Science Center	36	33	24	28	31
Chattanooga			1	5	6
Space Institute	2		1		2
Martin				2	1
Non-UT	1		3		3
<b>TOTAL</b>	<b>66</b>	<b>92</b>	<b>66</b>	<b>97</b>	<b>84</b>

Jacqueline Whittemore (left) and Katherine Kottkamp perform an endoscopy simulation





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**RESEARCH FOUNDATION**

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