USTAR
Turning innovation into industry.

INNOVATION UTAH insights

monthly e-bulletin

Volume 9, Issue 52 April 7, 2015

In This Issue

In The News

Governor Gary Herbert to Award Science Medals. Gov. Gary Herbert, along with the Governor's Office of Economic Development and the Utah Science Technology and Research Initiative will present the Governor's Science Medals for 2014 to the awardees on April 15. The event, which honors Utah's top innovators at an annual dinner reception, will be held at the Masonic Temple in downtown Salt Lake City from 6-8:30 p.m.
Read more

Workshop Explores Solutions to Transporting Uinta Basin Waxy Crude. The sixth annual Waxy Crude Workshop, presented by the Utah Science Technology and Research Initiative's Eastern Utah Outreach team, the Utah Division of Oil, Gas and Mining and Integrated Energy Companies will be April 9th at the Uinta Basin Applied Technology College from 8:30 a.m. until noon. Held in conjunction with the DOGM quarterly meetings in Vernal, the workshop explores solutions to the challenges associated with transporting Utah's waxy oils.
Read more

Meet a USTAR Investigator: Danny Chou. Danny Chou,

Innovation Insights: The Neuroscience Edition

The primary mission of USTAR is to create a technology ecosystem that enables ideas to seed, grow and thrive. In order to do this effectively, the State requires capacity across the entire spectrum of technology development and commercialization activities.

In this issue of the USTAR Newsletter, we are highlighting specific examples in the field of Neuroscience that demonstrate that full spectrum of work; from the initial idea in the lab that is being tested and may lead to treatments for Alzheimer's diseas in the long term (See Jason Sheppard), to Utah companies that are developing equipment and devices based on research done in Utah, serving Global markets (Blackrock Microsystems).

The State of Utah is supporting work that will build the technology economy and allow ideas across a range of disciplines to seed, grow and thrive as companies make Utah a leader in technology research, development and commercialization.

We hope you enjoy this informative Neuroscience edition of the USTAR Newsletter.

Best,

Ivy Estabrooke, Ph.D.
USTAR Executive Director

Revolutionizing the Neuro-Prosthetic Field

BLACKROCK MICROSYSTEMS

Blackrock Microsystems is a small technology company that developed from a University of Utah laboratory in 2008. Blackrock has developed the world's largest portfolio of FDA and CE cleared technology in the neuroscience, neural engineering and neural prosthetics space.

The Company's technology has been at the forefront of worldwide innovations in Brain Machine Interfaces, implantable bionic technologies and epilepsy diagnostics.

assistant professor in the Department of Biochemistry at the University of Utah (U of U), and a Utah Science Technology and Research (USTAR) investigator, recently published a study in the Proceedings of the National Academy of Sciences of the United States of America that is gaining national and international attention. The study discusses the progress of his research to develop a "smart" insulin for people with Type 1 Diabetes (T1D).
Read more

The Company is headquartered in the University of Utah's Research Park and employs approximately 70 highly qualified individuals including a recently created clinical spin-off, Blackrock NeuroMed, and another 10 in Europe.

President Obama featured Blackrock Microsystem's Utah Array in the whitehouse.gov broadcasting of the 2015 State of the Union Address! President Obama commended the DARPA-funded project, which involves Johns Hopkins Applied Technology Laboratory, Blackrock Microsystems, and others for revolutionizing the neuro-prosthetic field.

The Utah Array is the neural interface component that allows for the successful use and control of the prosthetic arm by the brain. This technology provides a solution to veterans who selflessly gave a limb for their country in the line of duty and for individuals born without. Blackrock is proud to be part of this project and is continuing to develop technology that will benefit our wounded war veterans who have already given so much.

Read more here

Neurotechnology: Wiretapping the nerves

User makes the "rock and roll!" sign with his virtual prosthetic hand.

When people think about thinking, they often think about brains. That's natural enough. Our brains are the seat of cognition.

But, when it comes to using neuroengineering technologies to help fix nervous system damage and disorders, we shouldn't overlook the power of tapping into nerves.

Nerves are like hotlines between the brain and body. They can provide an ideal location to capture key signals of what the brain and spinal cord are trying to make the body do, or to send messages back to them.

Imagine, for example, that you have lost a hand. Hand loss is a traumatic experience that affects much of how you interact with the world, and even your sense of self. But your brain still works, just as it did before. Surprisingly, perhaps, your severed arm nerves still work, too. And the brain still sends motor commands down the nerves. But those commands never reach the muscles, which are no longer there.

With today's neurotechnologies, we can wiretap into the nerves, capture the command signals, translate them, and then relay them to the artificial "muscles" (motors) of an advanced prosthetic hand.

If we do our job right, we can begin to restore hand movements that are both highly dexterous and intuitive. People don't need to learn to do something new, or to think about making an unnatural, different movement. Instead, they just think about moving their artificial hand as if it were their real hand, and it moves.

That's half the story. The other half is feeling.

Read more here

Understanding Synaptic Plasticity

Our brains have the amazing ability to encode and store vast amounts of information, and,

Jason Shepherd

in the case of memories, this information storage can last a lifetime. Scientists have been pursuing the question of how the brain is able to perform this incredible feat for centuries, but many questions remain unanswered.

Neurons in the brain are thought to store information by altering the strength of their connections to one another. These connections, or synapses, can be strengthened or weakened in response to activity, a process known as synaptic plasticity.

The Shepherd Lab in the Department of Neurobiology and Anatomy at the University of Utah is interested in studying the proteins that control synaptic plasticity. Our lab studies the mechanisms behind memory formation at multiple levels: from the molecular interactions of neuronal proteins, to their dysregulation in disease, and finally to their role during learning in the intact brain.

At the smallest scale, we are determining the protein players in synaptic plasticity and studying the dynamics of these proteins as they interact with one another at the synapse. We are using state-of-the-art microscopy to obtain high-resolution images of these proteins at synapses to define where these proteins are located and what other proteins they are interacting with in living neurons.

Read more here

USTAR Diagnostic Imaging

Deborah Yurgelun-Todd

The USTAR Diagnostic Imaging cluster at the University of Utah makes use of high field, magnetic resonance methods to improve our understanding of the neurobiological changes associated with psychiatric disorders including mental illness and drug abuse. Findings from these imaging studies may then be used to identify and evaluate novel treatments including nutraceuticals and pharmacological interventions.

Perry Renshaw

Magnetic resonance methods are free from the hazards of ionizing radiation, allowing many of our studies to include children and adolescents who are generally understudied and for whom existing treatments are often inadequate. Investigators in this cluster are closely affiliated with the Department of Psychiatry at the University of Utah School of Medicine and the VISN 19 Mental Illness Research, Education, and Clinical Center (MIRECC) at the VA Salt Lake City Health Care System. Ongoing projects focus on suicide risk, mood symptoms, and psychiatric disorders in adolescents, adults, and veterans.

One active area of investigation has been focused on identifying neurobiologic risk factors associated with suicide and depression. For example, neuroimaging methods have been used to study changes in brain chemistry related to increased depression and suicide at increasing altitude. The identified changes in brain chemistry have led to ongoing clinical trials of novel agents including creatine and uridine which have been shown to improve brain chemistry and mood symptoms in some forms of depression. Notably, in women, adding creatine to an antidepressant can dramatically speed up the response to treatment.

Read more here