# TELLURIDE DAILY PLANET

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**Don't quote me but...**

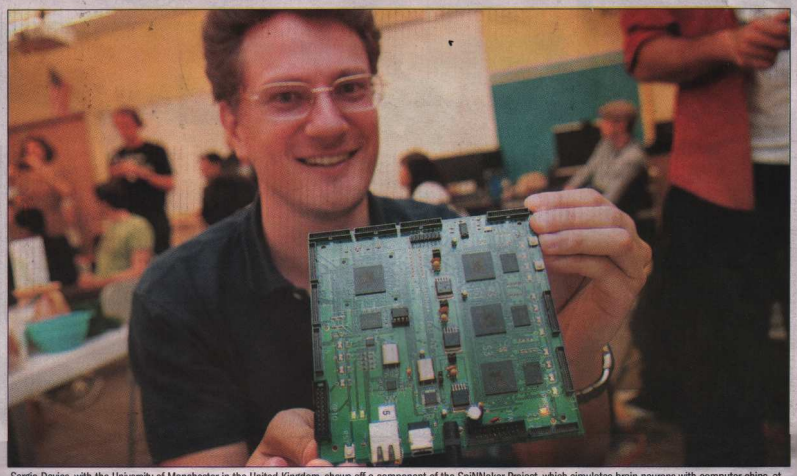
"We are human in expression, but divine in creation and limitless in potentiality."

— *Frank Rose*

## Calendar

**Sunday**

- Telluride Playwrights Festival Breakfast and Play with Gary Leon Hill's "Float": 10 a.m., Telluride Gallery
- Martin and Geoff on the Patio: 1-3 p.m., La Marmotte
- "American in Hiding" Staged Reading: 8 p.m., Opera House
- Movie: "Cars 2" (G) 6 p.m., "Bad



Sergio Davies, with the University of Manchester in the United Kingdom, shows off a component of the SpiNNaker Project, which simulates brain neurons with computer chips, at the Telluride Neuromorphic Cognition Engineering Workshop. [Photo by Melissa Plantz]

SCIENCE

# Replicating the brain

## *Neuromorphic workshop takes over Telluride Elementary School*

By KATHRINE WARREN
*Staff Reporter*

On Thursday night, a robot in the hall of the Telluride Elementary School proclaimed "I see a stapler," and those watching it couldn't help but burst into applause and cheers.

In another room, a graduate student sliced a tomato while a computer attempted to recognize what was happening. In the same room, scientists were testing a series of computer chips programmed to mimic the human brain.

Roughly 80 scientists, representing 22 different nationalities, spent the last three weeks at the school researching the brain for the 17th annual Telluride Neuromorphic Cognition Engineering Workshop.

"We come here with a general goal of trying to understand the brain and build robots and machines that work the way the brain works," said Ralph Etienne-Cummings, a workshop director who works for Johns Hopkins University.

Many may remember the group who marched in this year's Fourth of July parade demonstrating how the eye captures information and relays that to the brain through neurons. That's them.

"Nobody knows what we do," said Tobi Delbruck, another workshop director who works with the Institute for Neuroinformatics in Zurich, Switzerland. "People think we're just the mad robot guys from the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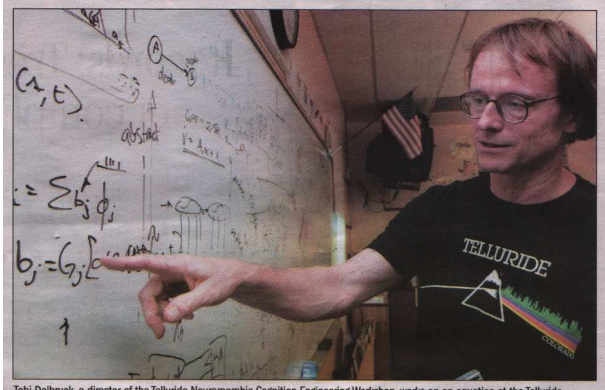


Tobi Delbruck, a director of the Telluride Neuromorphic Cognition Engineering Workshop, works on an equation at the Telluride Elementary School on Thursday. [Photo by Melissa Plantz]

# Brain

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parade."

Neuromorphic engineering is the concept of using the functional principles of the biological nervous system to inspire the design of artificial nervous systems in computers and robots.

Etienne-Cummings said the main goal of the workshop is three-fold: to understand more about how humans and animals interact in their environments, if that information can be translated into robotics and other technologies to help improve human lives and how to translate that into the business side of neuromorphic engineering.

This year, the workshop's directors decided to let topic leaders from research institutions direct the research and they came up with four categories:

- How the brain learns and how to make machines learn in the same way.
- The basic science of how the brain encodes information and how neurons communicate with one another.
- How the brain focuses its auditory attention.
- Creating a cognitive robot that is able to recognize what humans are doing.

More than a dozen separate projects fell under those categories and on Thursday night as the workshop neared its end, the researchers demonstrated their findings.

Ashley Liddiard with the University of Cape Town in South Africa was researching a parasite and how its brain sends signals to its muscles. Turns out, some animals have a group of neurons that aren't located in the brain, but rather the spinal cord that controls repetitive movements, such as swimming.

If you cut the head off of such a parasite, and send its spinal cord the same signals, it would still swim.

Brian Mingus of the University of Colorado at Boulder used a robot to see if it could recognize objects visually. David C. Noelle spent the workshop teaching a computer and testing its working memory.

A group from the University of Manchester in England was building computer chips that simulated brain neurons. It's been dubbed the SpiNNaker Project.

"Our brains are very efficient the way we process and do things," said Garrick Orchard, a student at Johns Hopkins University who was nice enough to show this puzzled reporter around. "We want to take advantage of the efficient way we compute things and mimic it in computer hardware."

The workshop was open to second year graduate students at esteemed neuromorphic engineering institutes, as well as faculty members, top researchers and those in the industry.

"We want to lower the barriers between the researchers, students and experts so everyone is talking at the same level," Etienne-Cummings said.

The workshop is funded by the National Science Foundation, the Air Force Office of Scientific Research, the IEEE Circuits and Systems society and Iguana Robotics, Inc. Other sponsors include, but are not limited to, Georgia Tech, the Institute of Neuroinformatics, Salk Institute and the University of Maryland.

Etienne-Cummings said they will definitely return next summer because funding is guaranteed through 2012, though he's hopeful the workshop will continue beyond that.

"Telluride is the ideal place for sequestering scientists," he said.