medical students learning about the complicated anatomy of the brain now have a new tool available to them—an electronic brain model that allows them to “see” inside the brain and view its various structures as they appear in space. This new computer program is the branch, so to speak, of a dedicated group of people at Albany Medical College. “One of the biggest benefits of this system is that it helps students understand the spatial relationships of structures inside the brain, which is essential for understanding how the nervous system functions,” explains Taree Lingdy, PhD, professor in the Center for Neurophysiology and Neuroscience. She points out that these spatial relationships can be hard to picture when you look at a brain anatomy in a textbook. “It’s hard to get a sense for where structures lie in relationship to one another when you’re looking at a flat surface of a page.” She adds that students can also study plastic brain models, but points out that those models do not allow students to visualize the internal relationships of structures.

Charles Kite, MD, a faculty member in the Medical Education Department, started work on the ideas for the Virtual Brain Model software two years ago while teaching first-year medical students with Dr. Lingdy. “When we first considered a 3-D computer program for teaching brain anatomy, we couldn’t believe it had never been done before. But, after an exhaustive search, we found there was nothing like it out there,” Lingdy says. They recruited Norman Strengler, PhD, professor in the Center for Neurophysiology and Neuroscience, neuroanatomist and author of a textbook on the nervous system. Strengler worked closely with medical student Joseph Rozell, who is credited with identifying software that could be used to build 3-D images from 2-D images taken in sequence, as medical MRIs, and with the technical details of the program.

Lingdy says the team was very fortunate to be at a medical center where the best high-tech MRI equipment is available.

Enlisting the help of Neurologist Earl Zimmerman, MD, at Albany Med’s Advanced Neuro Imaging Research Center, which houses a powerful GE Signa 3.0 Tesla MRI machine, the team gathered a group of medical students to test out the new program. “After taking a look at the images, we realized why this hadn’t been done before,” says Kite. “The detail provided in an MRI image isn’t sufficient to allow automatic coloring of most of the structures we wanted to show in the 3-D models. The only solution was to hard-paste, or piecemeal, put hard, cold, tens of thousands of points on the MRI images to indicate the location of each structure. This could only be done by someone with a detailed knowledge of neuroanatomy and lots of time—and those things rarely exist in one person.”

But between Rozell, who did the technical work and Strengler, who lent his vast expertise in neuroanatomy, the task was completed. By the fall of 2008, they had 3-D images of 79 brain structures.

That winter, the software was tested in classes at Albany Medical College, where students provided their feedback. Based on that feedback, the program was revised with the help of Brad Whitney, a graduate student in Aaron Arsh, a summer undergraduate student.

“An image from the software program shows the neurovascular system and its relationships to the brain,” says Kite. “This makes it much easier for students to understand various neurovascular structures.”

The research team discovered that one of the main outcomes of this work is the ability of students to look for previously unknown abnormalities. “The power of this imaging tool can be demonstrated by a 21-year-old patient who underwent brain surgery at New York University Medical Center, where he was diagnosed with a previously unknown abnormality of the vascular system. We were able to develop a software model that showed us the connection between these abnormalities and the patient’s symptoms.”

In this scenario, the software could be used to identify the location of previously unknown abnormalities and to develop a treatment plan. In the future, the software could also be used to identify previously unknown abnormalities of the vascular system and to develop a treatment plan. In the future, the software could also be used to identify previously unknown abnormalities of the vascular system and to develop a treatment plan.
This will include looking at spinal fluid, genetic tests and other stages. Right now, we don't have anything such as a blood test or abnormalities that show up on MRIs of the brain, in addition to tests that need to be administered over time in order to measure because we have to include so many people in order to truly (MCI), which may or may not be an early sign of Alzheimer's.

Researchers at Albany Medical College have validated an experimental technology that allows people to use brain waves recorded directly from the brain's surface to "choose" letters to spell on a computer screen at rates faster than any devices previously described. The technology, invented at Albany Medical College, directly links the brain-computer interface (BCI) at Albany Medical College, presented in December at the 63rd meeting of the American Epilepsy Society in Boston. The research team, led by Gerwin Schalk, PhD, associate professor of neurology at Albany Medical College and research scientist at the Wadsworth Center for the New York State Department of Health. Albany Medical College’s Anthony Ritaccio, MD, the first author was Dr. Peter Brunner, a doctoral candidate working on the project. Using a software platform called BCI2000, they recorded electrical activity directly from the brain's surface in patients with epilepsy for clinical evaluation prior to epilepsy surgery. The subject was able to make character selections at rates of up to 10 characters per second, faster than any device previously described. Because the subject uses brain signals rather than muscles for communication and control, they can be operated by people who are paralyzed, or have very limited mobility, even "locked in" by amyotrophic lateral sclerosis (ALS), brainstem stroke, severe cerebral palsy, or other neuromuscular disorders.

In the study, the subject looked at a monitor that displayed 64 matrixes of question marks and numbers, and space and backspace commands. The row and column of the matrix was illuminated randomly and rapidly, i.e., 16 times per second. The subject’s task was to pay attention to each of the characters she wanted to spell. The computer learned the desired character by interpreting and recording the brain’s responses to the illuminated row and column that commonly contained the desired character. The subject was able to make character selections at rates of up to 10 characters per second, faster than any device previously described. These results could further extend communication options, such as email or instant messaging, for people with severe motor disabilities to connect with the outside world,” said Ritaccio. The research team was led by Anthony Ritaccio, MD, National Institutes of Aging clinical trial intended to find techniques that identify people who may develop Alzheimer's disease looking at compounds found in people with early Alzheimer's. The subject was able to spell with her mind faster than any human being, according to Ritaccio. The research team was led by Anthony Ritaccio, PhD, National Institutes of Aging clinical trial intended to find techniques that identify people who may develop Alzheimer's disease looking at compounds found in people with early Alzheimer's.