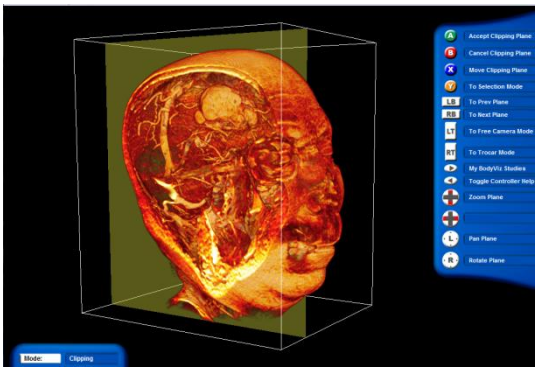
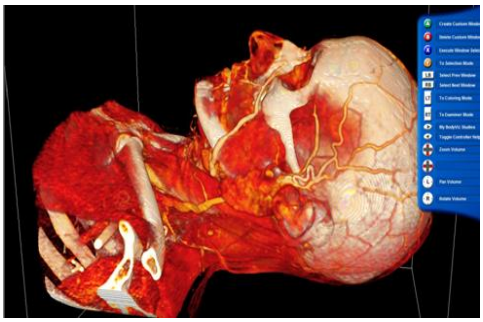
BODYVIZ FACT SHEET

BODYVIZ, the company, was established in 2007 at the Iowa State University Research Park in Ames, Iowa. It was created by ISU's Virtual Reality Applications Center Director James Oliver, VRAC Associate Director Eliot Winer, and world renowned surgeon Dr. Thom Lobe. In the fall of 2008 the founders hired serial-entrepreneur Curt Carlson as CEO. Together they've worked on developing and refining a very visual, simple to use, and affordable 3D visualization technology for imaging. VRAC research focuses on developing computer interfaces that integrate virtual environments, wireless networking, pervasive computing and emerging user interface devices to amplify the creativity and productivity of people. The image to the left is the VRAC's C6 CAVE. It is a 10ft x 10ft x 10ft fully immersive synthetic environment where all four walls, the floor, and the ceiling are projections screens capable of displaying back-projected stereoscopic images, providing total immersion for participants. The C6 CAVE is the highest resolution immersive environment of its kind in the world. Leveraging this research, the FDA-approved **BODYVIZ** software creates vivid 3D visualizations of medical scan data (MRI/CT), unlocking medical imaging for the practicing surgeon as well as educational institutions. **BODYVIZ** improves the efficiency and accuracy of surgical planning, and the study of anatomy and pathology displaying anatomical spatial relationships in 3D. Similar radiological tools have a tremendous feature set developed for the radiologist, but as a result are very expensive, overly complicated, have interfaces and controllers that are not intuitive, and do not appeal to surgeons. **BODYVIZ** has extensive visualization features that enable users to quickly and effectively view and interact with their patient's data using an Xbox controller changing the way medical, educational and legal professionals view their world. This virtual reality software is affordably priced, lightweight and simple to use on laptops, PCs or on large stereoscopic 3D projection systems where users don 3D glasses to view the large-scale images. This stereoscopic software and hardware scales to virtually any configuration. The Methodist Hospital System in Houston, one of the largest hospital systems in the nation, has **BODYVIZ** configured for a 20' by 30' "CAVE" and projects their MRIs stereoscopically on a 16' x 9' silver screen.

Easy to Use – BODYVIZ is operated by an Xbox controller, making it simple for anyone to use. The use of this highly intuitive game controller provides a user a "hands on" experience and much simpler control of the computer-human interface allowing a user the feeling of being immersed in the 3D space and the ability to grasp spatial relationships. **Useful for Surgical Planning – BODYVIZ** allows for the virtual placement of surgical equipment such as trocars anywhere within the 3D anatomy. **Available in 3D Stereoscopic – BODYVIZ** is the only 3D MRI/CT software available in a stereoscopic version where users wear 3D glasses for incredible large-scale visualizations, engaging students in human anatomy like never before.

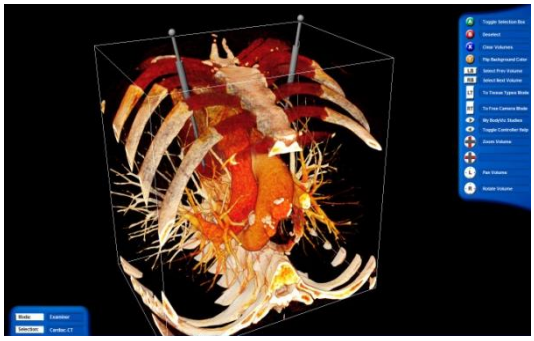
With a simple two-stalk Xbox controller, a user can rotate, pan, zoom, clip, measure, change colors or fly-thru a patient's virtual anatomy…The user can create "clipping" or "slicing" planes and move the planes to see the internal structure of the patient. In this picture to the right, the green shading indicates the use of a clipping plane where the user is clipping into the skull exposing the brain. The user can now identify a brain tumor in 3D. They can measure the tumor if they choose, or have an accurate picture of where they will be able to insert trocars for surgical planning.

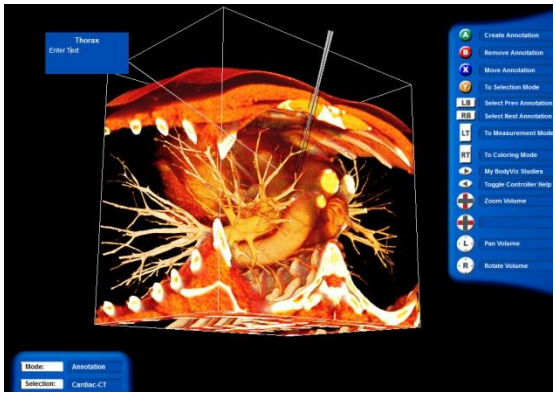




Users can choose from a variety of colors to enhance organs and features of the data. They can also navigate through a virtually unlimited number of tissue densities including harder tissues (bone, muscle) or softer tissue (fat, skin). In the screen shot at the left, the user has windowed down to view the muscular structures as well as bone and artery/vein structures.

Using actual patient data, virtual trocars (hollow tubes which allow access inside the body in minimally invasive surgeries) can be placed in the 3D MRI or CT scan visualization to enhance surgical planning. In screen shot to the right you see a patient's cardiac study with trocars inserted on each side of the heart.

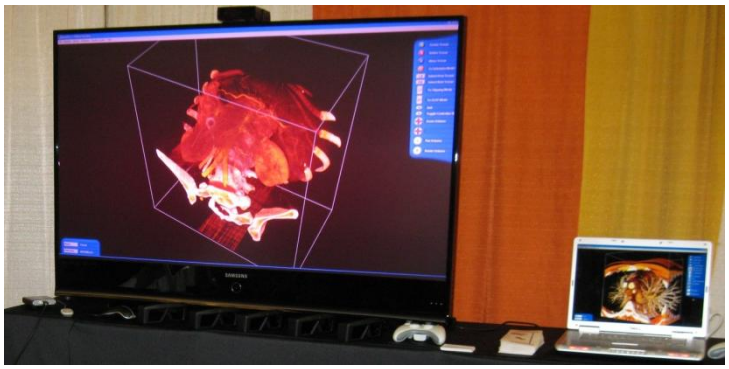




Using the annotations tool, users can label different parts of the anatomy, clearly identifying organs, tissue types, and other structures. In the thoracic study to the left the user has labeled the trachea using an annotation.

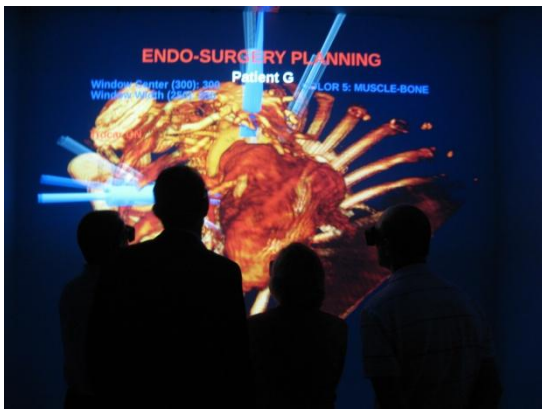
BODYVIZ SOLUTIONS

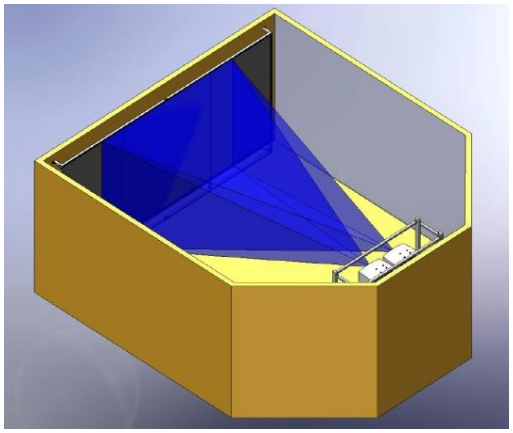
Laptops/PCs – This single-user version runs on laptops (as shown in the picture to the right) or on PCs. Users interact with their MRI studies directly using the Xbox controller. The user interface is simple to use and the visualizations are rendered in monoscopic 3D producing the effect of being immersed or flying-thru the anatomy on a laptop or PC! Users are amazed at seeing real-life anatomical spatial relationships in the virtual world.



Entry-Level Stereoscopic – The Entry-Level Stereoscopic solution is bundled for low-cost 3D stereoscopic projection systems like 3DTV's or stereoscopic projectors. Users don 3D glasses when interacting with their studies. In stereo, the anatomy appears to pop out of the screen, providing the user with an unparalleled virtual experience enhancing the ability to analyze and absorb complex spatial relationships between anatomical structures. In the picture to the left, you see BODYVIZ installed on a 3DTV system. (For reference, you also see the monoscopic version running on a laptop next to the 3DTV.)

Large Displays and Caves – BODYVIZ scales up to run on large stereoscopic projections systems in a "cave" like environment, immersing the users in stereoscopic 3D. The system below on the left is installed in a 30' by 20' collaboration room called "Plato's Cave" at The Methodist Hospital System in Houston, and is projected on a 16' x 10' silver screen. These systems use two large projectors in the back of the cave to project onto the display screen to form the stereoscopic 3D image, shown above on the right. These large scale systems are bid on a custom basis depending on a needs analysis completed with the customer.





BODYVIZ MARKETS

Medical

In the medical community there is a well established correlation between procedure time and number of complications, so this 3D-enhanced anatomical understanding leads to less invasive procedures, shorter procedure times and hence better surgical results. For minimally invasive procedures, surgeons spend hours before procedures reviewing patient imagery and planning how they will gain access to various areas of the body. Medical imaging data from MRI and CT scans are usually viewed as two-dimensional slices. Radiologists are trained to think and interpret two-dimensional information on a computer screen or viewbox, while surgeons are trained and work in three dimensions on patients. The result is that planning for non-routine surgeries, such as a tumor removal, can easily consume hours and repeated conversations between the surgeon and radiologist. Dr. Thom Lobe, a minimally invasive and robotic surgeon and BODYVIZ founder says:

> *"When I have a complex case that I'm planning to do using minimally invasive techniques, and especially when I use robotics, I spend time with the radiologist in his office going over the images he has prepared and often have to ask him to create some different views. This interrupts his busy schedule and often, I don't get them in time. When the patient finally gets positioned on the operating table, I then have to plan, draw pictures, and imagine and finally guess at the best approach and trocar positions before I can begin. This takes time while the patient is asleep, under anesthesia. BodyViz allows a surgeon to take CT or MRI images and do all these tasks himself, simply and quickly, so that when the surgeon and patient arrive in the operating room, no time is lost in preparation. It's better for all concerned and gives the surgeon peace of mind, so that there are no surprises on the day of surgery. BodyViz, a time-saving "must have" for minimally invasive surgeons performing complex procedures."*

Software tools to manage and visualize 2D image data as three-dimensional models are currently marketed to radiologists, are very expensive and have complex user interfaces. Surgeons need a simple and intuitive software tool that will enable them to efficiently plan a surgery in their office and in the operating suite.

Education

In education, learning through textbooks is an ongoing struggle for students and two-dimensional images can't provide the 3D spatial relationships rendered by a technology like BODYVIZ. In turn this visualization technology allows students to retain more information while allowing instructors to use less time teaching complex anatomical structures. Jack Harris, Director of Advanced Manufacturing Technology at Rockwell Collins and advocate for virtual reality in education has this to say, "…studies show the human mind is only able to observe 100 bits per second for a written task, in comparison to a visual task where the mind observes over a million bits. This allows students to not only absorb the learning better, but also to retain the information as well." This was the conclusion at eleven high schools throughout Iowa, eight of which are a part of the Virtual Reality Education Pathfinder (VREP). VREP is committed to bringing a new kind of learning and teaching to schools across the country with virtual reality. The schools purchased the stereoscopic version of BODYVIZ, to be viewed on 65" 3DTV's in their anatomy classrooms. Further, Greg Kolbinger, Clinical Director of the Des Moines University Simulation Lab and a beta user stated: "BODYVIZ is a very unique technology that allows our students to see how using minimally invasive techniques, the surgeons of the future will be better prepared to do surgery with minimal risk and greatly improved patient safety. This is an exciting way to look at learning anatomy and doing it in virtual reality with state of the art colored clinical clarity. We are excited about the role this technology will play in the education of medical students at all levels."

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