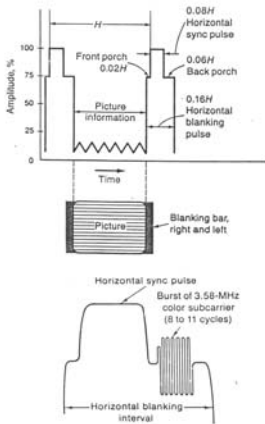


Stereoscopic Television Systems

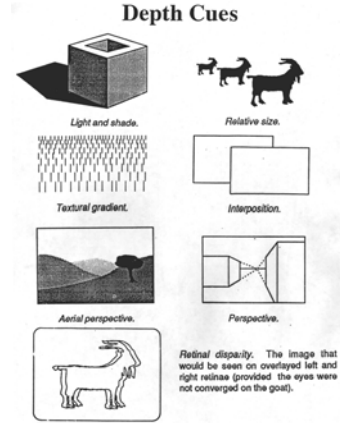
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3D/TV has yet to emerge as a commercially viable product. The creation of a stereoscopic television system is a surprisingly hard problem. Not only must each eye see a slightly different image, but the arrangement of scene objects and their relative motion must be consistent with our everyday experience. If not, users complain about visual tiredness, sometimes bordering on motion sickness. I'll describe and demonstrate two simple implementation of stereoscopic television.



Both stereoscopic television systems (analog and digital) use consumer grade video components, conforms to broadcast TV standards (NTSC waveforms), can be stored on videotape and are easily built. The camera system, recording equipment and methods for synchronization are more complex, but from the consumer's perspective, the addition of stereo to their viewing experience can be virtually free.

This talk explores three related topics: two VERY different approaches for implementing stereoscopic television and the development of a unique stereoscopic teaching facility specifically developed for teaching Anatomy and Surgery at Stanford University. Functioning prototypes will be demonstrated at the talk.



Understanding the spatial relationship within the human body is one of the most important challenges a physician faces in his or her medical education. There are innumerable medical procedures, such as inserting a central line into the chest, that require a detailed understanding of the spatial positions of the many structures within the thorax. Since a central line is inserted through the skin of the chest, the catheter needle must be carefully maneuvered through these structures until it is position into the subclavian vein. It is essential that the physician avoid injury to the important nerves to the upper limb, the adjacent subclavian artery, the pleural cavity cupola and the lungs. A small error can be life threatening.

Medical educational curricula attempt to convey this understanding via courses like Human Anatomy but students often end up merely memorizing the names of a plethora of bony structures, vascular segments, neural pathways and muscular structures. Anatomy is an enormously complex field of study and is one of the most challenging courses in the medical curriculum. The gross anatomy course at Stanford is allocated more lecture and lab time than ANY other preclinical course in the curriculum. Even with an intense focus on Anatomy, medical students need to reinforce learning of the detailed spatial relationships that will be required for the practice of medicine.



Traditionally, anatomists and surgeons who teach demonstrate human structures and relationships by displaying dissections to a group of students. The space close to the specimen is very limited and when more than 4 or 5 students crowd around the specimen, those in the second and third tier or

row try ineffectively to see the details being explained by the instructor and then questioned by the students.

The spatial relationships among various organs, nerves, blood vessels and lymphatic drainage within the body must be seen to be comprehended. These relationships represent a challenge in the teaching of Anatomy and Surgery. Some traditional methods for teaching anatomy: anatomical drawings, anatomy textbooks and various computer assisted learning aids are incapable of providing students with an adequate visual representation of these spatial relationships. Typically we rely



on dissection of cadavers as the only method for illustrating these spatial relationships in real humans. Facilities for cadaver dissection are limited and are commonly only available to medical students. Medical education for nursing, dentistry, physical therapy and other disciplines rarely provides these students with the unique opportunity to perform cadaver dissection. As such, it is significantly harder to provide these students with an adequate understanding of anatomical spatial relationships.