
Technology: The Road to Improved Health Care

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The military services have played an influential role in the development of the allied health care field. It is a very little known fact that many of the current allied health care fields came to being as a result of needs identified by one of the Services (Air Force, Army, and Navy). For instance, the field of Audiology developed in response to the many World War II veterans that return from the battlefields with significant damage to their hearing. The need was so great that it called for the development of a new breed of professional that could address the needs of these veterans. Likewise many other professions developed as a result of the special needs of airmen, soldiers and sailors. Along with the development of these new professions, new technologies developed to support their special requirements.

As a result of this synergistic relation, advances were achieved in the fields of prosthetics, amplification, and optics to mention a few. Although most technologies developed by the military usually are developed for strategic purpose many times these technologies find their way to the civilian markets. The focus of this presentation is to highlight the dual application of some technologies developed by the United States Air Force and how the allied health care provider can play a critical role in the development and use of such advances. Not only are these technologies used for military applications, but also are used to assist individuals with different types of impairments. I see the allied health care professional not only as a provider of services, but also as the proverbial renaissance person. I see him/her as diagnostician, healer, counselor, engineer, and inventor.

I will begin my presentation by discussing six critical technologies currently being researched and developed by Armstrong Laboratory, Headquartered at Brooks Air Force Base, Texas. All of these technologies are exciting and offer tremendous promise to the allied health care fields.

The technologies are briefly summarized and discussed below:

Mind Control Device. The mind control device relies on certain brain waves in order to work and it shows potential for patients with different levels of mobility impairment. For example, this device would be ideal for quadriplegic patients as a mind control switch for many applications requiring an on-off paradigm. For instance telephone communications, opening doors, turning on-off appliances, and control of a wheel chair among others.

The Smart Stick. This technology has potential in the development of better wheelchairs for individuals with spasticity. This device dampens unwanted random moves therefore allowing the patient to attain better control of the wheelchair and reducing the propensity for erratic moves.

Active Noise Reduction System. This technology reduces excessive background noise and enhances voice communications. Active Noise Reduction (ANR) produces an out of phase signal that acoustically cancels noise within the headphone device in use. It improves effectiveness by reducing auditory fatigue. This technology is easily transferable to other high noise level environments and may be useful in the design of improved hearing aids.

3 Dimensional (D) Audio System. The 3D audio system presents sounds over headphones that are perceived as coming from specific locations in the same way that we normally hear in a "free field" unobstructed environment. Coupling of this technology to hearing aids will enhance the quality of sounds perceived by the user allowing them to hear sound in a more natural lifelike way. This technology is considered an excellent candidate for transfer to the civilian market for entertainment industry applications such as Nintendo, Sega, and similar devices as well as the hearing aid industry.

Fundamental Skills Tutor. Fundamentals Skills Training is an outgrowth of Armstrong Laboratory research in Intelligent Training Systems. This technology has been applied to resolve the problems

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faced by the educational community. Intelligent technology was used to construct three tutors intended to improve 9th grade student critical thinking skill in mathematics, word problem solving, reading/writing, and life sciences. The word problem solving tutor produced an average gain of 2.5% in the treatment group. The intelligent tutors emulate the human tutor who knows what to teach, how to teach, and who to teach. Like a human tutor, they adapt to the needs of the student, but they are designed to supplement, not replace the human teacher. The Air Force's interest in intelligent tutors is to provide better training to its personnel. The application to the civilian community quickly became apparent and the Laboratory moved to transfer this technology and the nation as a whole will benefit by having a better educated workforce.

Whole Body Scanning System. Researchers at Armstrong Laboratory developed the world's first high resolution whole body scanning system that captures the shape of the human body in just 17 seconds. Designers will use it to develop cockpits and crew

stations. The Apparel industry is interested in the scanner technology for affordable custom tailored clothes. This technology has potential applications in the field of prosthetics by improving the fit quality of artificial limbs.

Allied health care providers are being challenged as never before to provide efficient, cost-effective health care to meet the demands both by our customers and the growing health management industry. The allied health care career fields are not an exception. It is of utmost importance that we as providers focus our efforts towards prevention rather than intervention. However, we know that prevention can reach so far and then intervention is necessary. The technologies I discussed above provide a sample, a taste if you will, of how these new technologies can help our customers and help us as providers in giving the best care possible. Our role should not only be as a user of the technologies but also as a developer/inventor of new technologies or new applications to the existing ones. In doing so we will facilitate healthier and happier customers.