

What is an Intuitive Cockpit Display?

Value Proposition

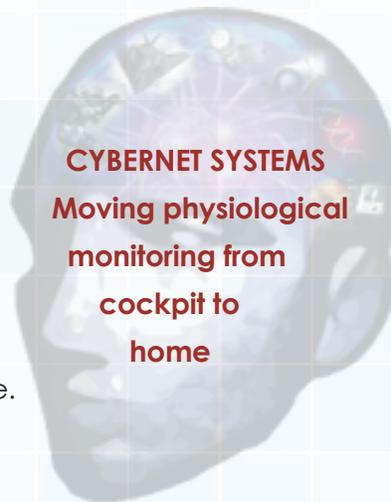
New cockpit display technology developed under DARPA SBIR award to measure stress levels of test pilots applied to collection of physiological data from patients and their in-home devices to support a web-based electronic patient data management system.

About the Company

Year founded: 1988

Heidi N. Jacobus, Chairman & CEO

Cybernet Systems is an 8(a) certified, woman-owned small business that applies human performance analysis in robotics, computer vision, ammunition automation, artificial intelligence, telemedicine, and information assurance.



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Technical Description

Cybernet's initial DARPA SBIR effort implemented human factors data capture methods needed for workload and stress analysis of pilot/aircraft interfaces and displays. This led to technology that improved the capture of physiological data. In the DARPA projects (DAAH01-94-C-R098 and MDA972-97-C-0004—both titled "A Wireless, Portable Device for Monitoring the Physiological Status of Multiple Remote Patients"), a state-of-the-art, high-performance, linear amplifier integrated circuit (IC) technology was applied to miniaturize a 16-channel EEG device from ≈ 1 cubic meter to 10 cubic centimeters. Because this small size was not compatible with integrated large-screen format displays, Cybernet developed technology to record data over a distributed multi-user access network that included distributed database capture and data presentation services. This technology was applied in the monitoring of soldiers' physiological status for medical diagnostic purposes.

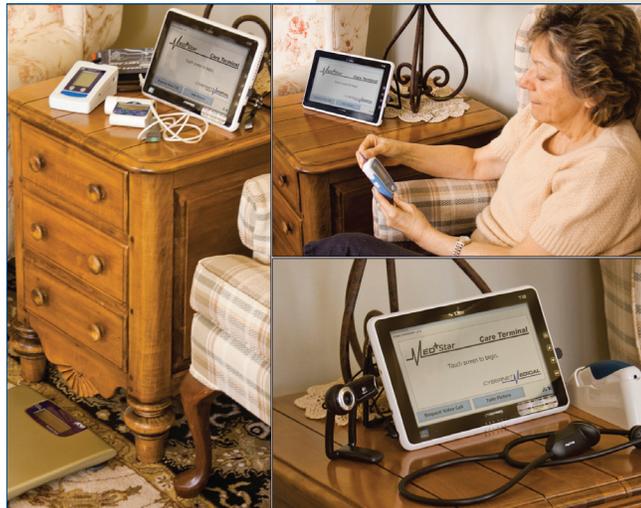
These methods were applied to the Pilot's Associate system, and expertise acquired in that effort in turn, led to a project to develop an innovative tactile panel interface for aircraft simulators. The developed open, secure, and reliable Internet-enabled physiological data capture and presentation system was the first such system patented for remote patient monitoring, and Cybernet commercialized it as the MedStar telehealth system (www.cybernetmedical.com) in 2001. This comprehensive telehealth service facilitated remote monitoring of chronically ill patients in their own homes, leading to its induction in the Space Technology Hall of Fame in 2004.



Cybernet's Portable Physiological Monitor

Technical Challenge Addressed

The challenge was to develop technology and methods to assess the stresses on a test pilot when using newly-proposed computer glass cockpit interfaces and displays. This required the development of improved methods for combining the data capture of pilot interactions with displays with data on the pilot's physiological response, including time-stamped video, electroencephalography (EEG), eye movement, electromyography (EMG), galvanic skin response, pulse rate, and breathing rate. Limitations in available physiological data capture technology had to be overcome by the development of miniaturized technology in order to achieve higher data capture rates. In addition, improved methods were required for recording the data into a distributed database, as well as for rapid retrieval and presentation to large screen displays. In successive DARPA projects, Cybernet overcame these challenges and applied the techniques to telemedical monitoring of remote patients.



Present derivative Cybernet MedStar Products

Lessons Learned and Best Practices

- ▶ Most human measurement technology needs to be commercialized through medical practice, not defense practice.
- ▶ The core technology, developed under DARPA funding, required two generations of further evolution to achieve a commercial medical product.
- ▶ Meeting the quality standards required for Food and Drug Administration (FDA) approval is a difficult and time consuming aspect of bringing a medical device to market.
- ▶ The expertise developed in meeting strict quality standards and certifications was valuable for both Cybernet's defense and medical business practices.

Applications

The Cybernet telehealth products from this effort are used by home care providers, hospital systems, and medical practitioners to monitor over 2000 chronically ill patients (many more if including all derived third-party products) from their own homes. The quality design, development and manufacturing processes derived from this effort have helped Cybernet develop both civilian and military systems that are rugged, reliable, and meet customers' specifications.

Partnering and Collaboration

The physiological monitoring methods contributed to other DARPA initiatives like robotic surgery and to the Lifeshirt, and to the telemedicine technology behind Cybercare, one of the most successful pre-1999 medical IPOs. Such telemonitoring is used in products from Bosch, Intel, Honeywell, Viterion, American Telecare and other telehealth companies.

Economic Impact

- ▶ Since the DARPA award, Cybernet has grown from a four-person company to over 60 full-time personnel (with offices in Ann Arbor, MI and Orlando, FL; as well as satellite offices in San Diego, CA; Washington, DC; and Johnstown, PA).
- ▶ Over \$5 million in funded research and development was derived from this project, and over \$2 million in commercial non-DoD income, making Cybernet an early pioneer in the home-based physiological measurement telehealth market, estimated at over \$3 billion per year in 2009 (Frost and Sullivan/Datamonitor).
- ▶ The company now offers a complete family of patent-protected telehealth products for remote patient monitoring.