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Human Systems IAC (HSIAC)



Concepts of Operations for Exoskeletons for Human Performance Augmentation (EHPA)

The Human Systems Information Analysis Center (HSIAC) has developed the concepts of operations (CONOPS) for the Defense Advanced Research Agency's (DARPA's) Exoskeletons for the Human Performance Augmentation (EHPA) program. The primary goal of the EHPA program is to develop human performance augmentation capabilities that increase the speed, strength, and endurance of individual soldiers in combat environments. The program's expected benefits include increased lethality and survivability of ground forces in all combat environments, especially urban terrain.

[Continued on Story 1](#)

Status Update of Alternative Control and Display Technologies

The integration of advanced technologies into Army ground-based and airborne systems has the potential for making soldier operation of these systems more efficient and effective, as well as providing the soldier with greater situational awareness at lower levels of cognitive workload. Some of these alternative control and display technologies involve the aiding or augmenting of information to and from the soldier by nontraditional modalities so they can respond more quickly to the demands of the battlefield.

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Human Systems IAC (HSIAC)



Concepts of Operations for Exoskeletons for Human Performance Augmentation (EHPA) (continued)

To support DARPA's EHPA program, HSIAC developed a set of CONOPS vignettes. HSIAC began the process by interviewing retired military officers to learn from those who have experienced combat first-hand. The interviewees provided insight into how they would ideally design an exoskeleton device, how they might employ such a device, and how it might change tactics, techniques, and procedures in military operations. From the data collected in these interviews, HSIAC developed a task matrix to characterize the potential environments in which an exoskeleton might be expected to operate, and potential employment variations for exoskeletons.

From the task matrix, HSIAC, in conjunction with the panel of retired military officers, chose two representative operating conditions for further development. These two operating conditions were then developed into CONOPS vignette documents. To further enhance the vignettes, each was developed into a computer-animated movie. These movies graphically depict the actions of the vignette and highlight the military utility of the Exoskeleton devices. The Exoskeleton equipped soldiers are shown with increased firepower, increased load-carrying capability, increase speed and range, and increased survivability through the addition of armor.

The CONOPS scenarios and accompanying videos developed by HSIAC will help ensure effective communication of the EHPA program concepts and utilities to the military user community.

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Human Systems IAC (HSIAC)



Status Update of Alternative Control and Display Technologies (continued)

This Human Systems Information Analysis Center (HSIAC) Review & Analysis (R&A) provided support to the Human Research and Engineering Directorate (HRED) of the U.S. Army Research Laboratory (ARL) and addressed human systems integration research associated with alternative information processing controls and displays that might be suitable for use in future Army ground-based and airborne crew stations. The effort was designed to provide ARL researchers an overview of the alternative control and display literature to include (1) technology descriptions, (2) assessments of advantages and disadvantages those technologies may provide to Army systems, and (3) estimates of technology availability and maturity for operational use.

The final R&A provided a broad baseline of information on speech-based/auditory, eye- and head-based, gesture, tactile, and biopotential control and display technologies. Where the literature was lacking, subject-matter experts were contacted to determine technology status and assess its relevance to the improvement of soldier performance. A matrix containing technology descriptions, point of contact and web source information, estimated technology maturity level, and perceived benefits to the warfighter as stated in the technology description or subject matter contact was developed to compile and summarize the project results.

The report concludes that a noticeable amount of work remains to be done by researchers and engineers to prove and provide the benefits that might be gained by integrating alternative technologies into future Army crew station environments. ARL researchers are using the R&A results, together with a synergistic effort involving research labs, system manufacturers, and equipment makers, to achieve meaningful and intelligent implementation of these technologies.

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