

Dual focus of Army scientists yields spinouts

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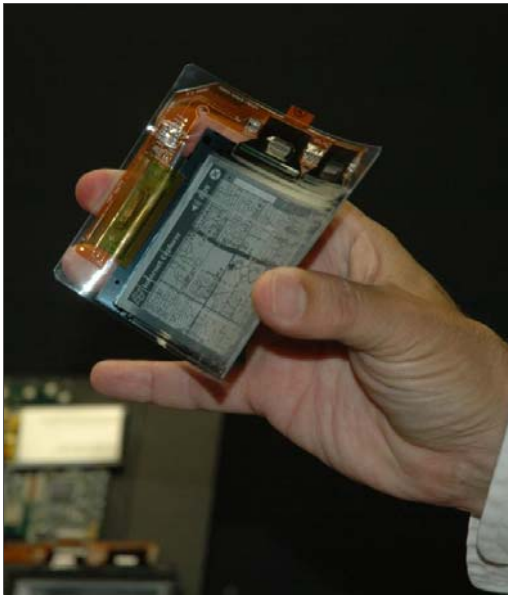


Photo credit **Andricka Thomas**

The U.S. Army Research, Development and Engineering Command's Army Research Laboratory and Arizona State University have partnered to develop a flexible display screen, pictured, with more flexibility than the existing glass screens presently used in Soldier equipment. The flexible screen is lighter, will bend and potentially roll up for a Soldier to carry easily in a ruck-sack. It may also have the potential to be used with wearable computer applications

WASHINGTON (Army News Service, Feb. 26, 2009) -- The Army has a dual focus in its development of science and technology: modernization for the future and accelerating technology for today's warfighter.

During the Association of the United States Army's Institute of Land Warfare Winter Symposium and Exposition, Feb. 25-27, in Fort Lauderdale, Fla., Dr. Thomas H. Killion, deputy assistant secretary of the Army for Research and Technology, and the Army's chief scientist, explained how the Army is doing research and development in technology that will help the Soldier fight better in the future and in the near term.

"We are always focused on the future, in terms of looking at the boundaries of what technology can do and how it will enable our future Soldiers," Killion said. "Doing basic and applied research, and advanced technology development to really explore what is feasible, what is possible in terms of demonstrating, and then demonstrating prototypes of that capability, are phases we go through in technology development."

Killion said the Army is concerned with getting technology out to the field as soon as possible, even if the larger systems that technology is part of are not ready to be fielded.

"Because we are at war, we have to look at how we accelerate the delivery of that technology and take advantage of what we know now about technology and create capabilities that we give to Soldiers today," Killion said.

A "spinout" of technology means that parts of larger systems may be ready to field, even if the larger system is not ready yet. Some of the unmanned vehicles in use now, derived from technology developed for Future Combat Systems, are examples of spinout technology currently in use.

"It's not just about delivering FCS sometime in the future; it's about bringing technology forward that we have developed for FCS and putting it in the hands of Soldiers today, something we are doing right now," Killion said.

Some examples that support the current war are unmanned systems. Robotics, for instance, like the UAV, which have been around for decades.

"They are being used on a broad basis today," he said. "(And are) critical to maintain situational awareness for Soldiers."

Also included in FCS spinout technology are the ground robots in use. In years prior, those unmanned ground vehicles were not prevalent in the force, now they permeate the Army.

"They were not deployed in numbers -- if you go out in the field today there are thousands of them -- on the order of 10,000 or so, doing significant tasks," Killion said.

The scientist also said that putting that technology out to the field doesn't just help Soldiers. Having technology in the

field also helps scientists that developed that technology in the first place, because of the valuable feedback from Soldiers that use it.

"It's amazing the kind of feedback we get back from our Soldiers -- on what they were doing with the robots and on some of the challenges they were having in terms of the technology that we need to improve to provide additional capability to make them more reliable and effective in the jobs they are doing," Killion said. "(Soldiers) look at unmanned systems as just as important as manned systems."

The Army is working today to tackle problems that are plaguing Soldiers in the field, including finding ways to reduce the weight of technology that Soldiers are being asked to carry or may be asked to carry in the future. As technology increases, and as the Army ensures Soldiers are more connected to networks, the amount of gear they will carry will increase. And the weight of those systems can be reduced, for instance, by decreasing the weight of display technology and by reducing the number of batteries that Soldiers must carry.

"The Soldier is burdened because we are giving him greater situational awareness -- he is part of a network of information," Killion said. "Today we give them a personal data assistant, essentially like a Blackberry, but it tends to be somewhat heavy and uses a lot of batteries. It also has a glass display that happens to break if dropped, even if ruggedized."

A response to that technological challenge is the flexible display the Army is developing in conjunction with industry and academia. The flexible displays are similar to the displays on the Sony Reader or the Amazon Kindle.

"It arranges molecules so they either reflect light or don't reflect light," Killion said. "Depending on how many molecules, you can get different shades of grey. It's a very low power consumption display. Once you orient those molecules, you don't have to apply any further power."

Once an image is put on to the flexible display, the image stays put, even if the power is disconnected. So unlike liquid crystal displays, continuous power is not needed. Power is only needed if the image needs to be changed again. In that way, power use for the flexible displays is minimized. Additionally, the flexible displays don't need to contain glass, meaning they can be curled and flexed without damaging them. They will ultimately be part of information tools that are far more durable than what is currently available, Killion said.

Killion showed a video that illustrated the durability of the current flexible displays. A metal ram smashed several times into the display device with what appeared to be a force great enough to smash a typical LCD. But the flexible display remained undamaged.

"Try doing that with your Blackberry," Killion said. "That's why you want a capability like a flexible display. It's lighter weight, lower power, and very rugged for use in the field. That's the essential idea."

"We see a real need to drive down the power demands, increase the ruggedness and reduce the weight of displays we give to our Soldiers or even that we put into our systems," Killion said. "And we need to push the state of the art in terms of what can be done with such displays so we can provide displays that have the necessary characteristics in terms of resolution, brightness, and color that is not available in the commercial marketplace right now."

Killion said such flexible displays could be wrapped around a Soldier's arm or even built into the fabric of his uniform.

Supplying power for all the new technology is a critical problem for the Army, Killion said, especially for dismounted Soldiers -- who ultimately must carry the technology and the weight that goes with the related power supplies. The Army is looking into ways to solve the problem though reduction in need for power and for improved portable power technology.

"We've improved the chemistry of batteries and provided rechargeable systems that use the rollout solar cells to recharge them, to reduce the burden on the Soldier to have to carry multiple sets of batteries," Killion said. "Like a map it can be rolled up in your backpack, and when you need it you unroll it and hook it into batteries and get a recharge."

Killion also said the Army is looking into technologies such as fuel cells or hybrid electric.

"If you talk about the kinds of power systems we are going to field in the future, it's likely to be hybrid electric, to some degree because of energy efficiency," he said. "We can drive down fuel consumption, but an even bigger factor is that we have to have larger and larger amounts of electricity to support all of the electronic and computing systems we are putting into our vehicles. We are definitely a high-tech Army today and are becoming more high-tech. We are becoming more dependent on the support to those systems."

In its quest to create the technology it needs for today and tomorrow, Killion said the Army is not on its own. He said the Army invests in important defense technology with other Department of Defense agencies such as the Navy, the Air Force and the Defense Advanced Research Projects Agency, known as DARPA. Outside DOD, Killion said the Army partners with the Department of Energy, the national labs and with academia and industry.

"The Army cannot sustain the base of science and technology that is needed for our future capabilities on its own," Killion said. "We have to depend in part on the investments of others. And those investments are affecting the technology that is available to us."