



● ● Equivital Black Ghost

Saving lives with battlefield wearables ● ●

For the soldier in the battlefield, technology can mean the difference between life and death, but there's so much of it – communications, navigation, situational awareness, not to mention weaponry – that soldiers can easily be overloaded with equipment. Wearable technology makes a huge impact, therefore, on the amount of technology a soldier can bring into the field, improving capabilities significantly. Commercial entities, military forces and educational research institutions are investing heavily in the development of wearable solutions to the benefit of the warfighter.

Wearable technology has become a major feature in the lives of many in recent years; we all know someone with a Fitbit or an Apple Watch, diligently tracking their steps, calories and heart rates. You can even monitor your heart rate using your Smart phone! While the consumer market might be a little unstable right now with certain companies quietly withdrawing from the arena, data from the International Data Corporation (IDC) Worldwide Quarterly Wearable Device Tracker shows that vendors will have shipped 125.5 million wearable devices in 2017, marking a 20.4 percent increase from the 104.3 million devices shipped in 2016. Indeed, in 2021, we can expect to be seeing some 240.1 million devices shipped, marking a CAGR of 18.2 percent.

“The wearables market is entering a new phase,” commented Ramon T Llamas, Research Manager for IDC's Wearables team. “Since the market's inception, it's been a matter of getting product out there to generate awareness and interest. Now it's about getting the experience right – from the way the hardware looks and feels to how software collects, analyzes, and presents insightful data. What this means for users is that in the years ahead, they will be treated to second- and third-generation

devices that will make the today's devices seem quaint. Expect digital assistants, cellular connectivity, and connections to larger systems, both at home and at work. At the same time, expect to see a proliferation in the diversity of devices brought to market, and a decline in prices that will make these more affordable to a larger crowd.”

As with many market-led consumer trends, the military has been markedly slower to uptake wearable technologies, and not without reason. New technologies must be ruggedized, lightweight, secure, and be able to deliver pronounced advantages to the warfighter before they are brought into use.

In the battlefield, it's vital that warfighters make use of every possible advantage to achieve the best possible chance of mission success, survival, and injury avoidance. Access to the best possible armour and equipment makes a huge difference. Today, the best armour available is lightweight, tough, and flexible, exceeding everything that has come before. In addition, as wearable technology in the consumer market has gained pace, battlefield armour is now being embedded with the latest technologies to deliver secondary features such as communications and situational awareness equipment.

As technology has advanced, soldiers require more and more equipment in the field. This might include communications technology like radios or VSAT systems, navigational or computing equipment. For medics, the list of equipment is endless. As such, commercial and military research groups have been working on making equipment increasingly mobile, with wearable technology a key focus. When vital equipment can be miniaturised and worn on the body, soldiers can keep more equipment directly on-hand, enabling enhanced capabilities in the field, while keeping their hands free for more pressing tasks.

The beginning of the Internet of Battlefield Things

We're all familiar with the Internet of Things (IoT) now; the interconnection via the Internet of computing devices embedded

in everyday objects such as lights or cameras, which enables them to send and receive data. But now we have the Internet of Battlefield Things (IoBT), which will perform the same function, but for battlefield technologies.

In October 2017, it was revealed that the US Army has outlined plans for the IoBT and is looking to implement connected technologies on the battlefield through collaboration with several US research institutions, led by the University of Illinois, with a six-year, US\$25 million Army Research Laboratory project.

The Alliance for Internet of Battlefield Things Research on Evolving Intelligent Goal-driven Networks (IoBT REIGN) project will see predictive battlefield analytics guide the Army's weapons and provide soldiers with 'extra sensory' perception of threats. Enhanced situational awareness and data science-driven risk assessments will also be included in the project goals.

"The goal of this programme is the development of new intellectual foundations and new knowledge. How do we empower the US Army to have a higher competitive advantage in a world where adversaries are becoming increasingly technologically sophisticated?" Explained Dr Tarek Abdelzاهر from the University of Illinois at Urbana-Champaign to Silicon Republic.

No new hardware will be developed during the project; existing devices will instead be connected into a single military network that will work intelligently. Warfighters will be equipped with smart technology, possibly including armour, radios, cameras, sensors, vehicles, weapons, and other wearables.

The advantages are clear. Technology is better able to track and predict enemy movements, which could lead to a reduction in casualty numbers, while more efficient supply operations could result in significant cost savings. There are, of course, risks with such a programme. A systems breakdown or cyberattack could be catastrophic in the field, and it might be possible to effectively shut down connected weapons just when they're needed most. The cybersecurity aspects, are therefore, of the utmost importance.

Australian Defence Force ponders battlefield black box

Flight data recorders, or 'black boxes,' have been in use in aircraft

for decades now, recording key information in the event of an aviation accident. It's now been proposed that a similar device could be worn by soldiers in the field to enable faster tracking of warfighters in emergency situations, which could save lives.

In September 2017, it was announced that telecommunications company Myriota and wearable technology company IMeasureU had been selected by Australia's Defence Ministry to develop Fight Recorders for soldiers in the battlefield. Versions of the device could also be developed for the police, firefighters and other emergency workers.

The \$700,000 contract will produce Fight Recorders which enable satellites to rapidly pinpoint the location of injured soldiers and record information from monitoring the soldier's body which could be used to reconstruct the events of an enemy engagement. When the emergency beacon is activated by the wearer or an attending medic, the Fight Recorder will connect with low Earth orbit (LEO) satellites to transmit geolocation information as well as other collected data. The information from the reconstructed events could be used by the Army to develop new procedures and in the development of protective equipment.

"Survival rates for battlefield casualties are closely tied to response times and the Fight Recorder will enable Defence to quickly locate and treat casualties," said Defence Industry Minister Christopher Pyne. "In addition to serving as a location beacon, the data captured by the Fight Recorder could be used to inform the design and performance of soldier equipment and protective wear."

The project is being financed by the \$730 million Next Generation Technologies Fund which involves Australian companies and universities in developing solutions to the challenges faced by the defence sector.

US Air Force field-tests BATDOK

The US Air Force has been working with a similar goal to the Australian Defence Ministry. In 2014, the US Air Force initiated its Battlefield Air Targeting Man-Aided Knowledge (BATMAN) project to evaluate the potential applications of wearable technology that was either available or in development. It emerged in August 2017 that the project could soon be brought



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into fruition, as the US Air Force had recently completed trials for the Battlefield Assisted Trauma Distributed Observation Kit (BATDOK).

A software package that can be installed on a Smart phone, tablet or other wireless wearable device, BATDOK is fed information from sensors placed on a battlefield patient that monitor vital signs of multiple injured soldiers. The system can be used by medics or non-medics, making it a great solution for the fast-paced nature of many battlefields. Alerts can be set to deliver audio or visual signals if the soldier's condition deteriorates. The data gathered from the sensors can be transmitted off-site and compared with electronic health records, while the sensors also provide geolocation data for rescue. A medical library is also available on-site using the system.

"BATDOK is a multi-patient, point of injury, casualty tool that assists our human operators and improves care," said Dr Gregory Burnett from the 711th Human Performance Wing's Airman Systems Directorate in the Warfighter Interface Division. "It can be a real-time health status monitoring for multiple patients, a documentation tool, a user-definable medical library, a portal to integrate patient data into their electronic health records, and finally it is interoperable with battlefield digital situation awareness maps, which helps identify the exact location of casualties."

BATDOK has been field-tested with US Air Force flight medics, pararescue jumpers, and Special Forces personnel, with developers on-site to evaluate and tweak the system. "From day one, every interface, every button, every menu was user-validated by pararescue Airmen and combat rescue officers that were involved in the design, integrations and testing process. Nothing is added without the explicit request and review by the operator," explained Burnett.

Equival addresses heat stress

Heat stress is a major problem for defence forces the world over. Increased training schedules and the need to carry more and more equipment in the field is having a detrimental effect on soldiers worldwide, causing illness, injuries, and even fatalities.

In an attempt to combat this problem, Equival launched V5 of the Black Ghost system in September 2017. The wearable system delivers valuable information to commanders and medics on warfighters' temperature, heart rate, breathing rate, position and activity. Alerts and thresholds can be tailored to each user, and commanders can intervene when a threshold is breached. Black Ghost includes a novel Heart Strain Index (HSI), which estimates current heat strain and predicts impending heat-related injuries, and is also able to predict 15 minutes in the future the heat risk related to an individual if they were to continue in the same environment at the same activity level.

"Heat stress can impair a person's cognitive function, and this is dangerous for those operating in extreme and unpredictable environments," said Anmol Sood, CEO of Equival. "The Black Ghost system is designed to provide supporting data to a team leader or medic and reduce the burden on the individual. The Heat Strain Index empowers individuals and teams for better decision making backed up by contextualised data. Black Ghost enables commanders to provide smarter, safer training and ultimately to save lives."

This latest version of Black Ghost, V5, delivers unparalleled accessibility, new functionality and improved usability, having taken on detailed feedback from multiple military partners. The new system will enable commanders to make informed decisions, faster, with relevant data at their fingertips, on a mobile device or PC.

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