ULTRA LYNX

Open Architecture - Enabling the future

Ultra Precision Control Systems (PCS) is a provider of high integrity control products for aerospace, military vehicle and soldier applications. Precision Control Systems is part of the Ultra Group

The move towards an "Open Architecture" for soldier systems is not new, and the term has perhaps been over-used at conferences and industry briefings. The benefit of having a so called "plug & play" solution for our warfighters is now well understood, with many vendors offering up their products & professing to comply with the various Open Architecture standards.

There are of course continuous advances in all aspects of wearable technology and this article explores a few of them in more detail.

The architecture itself is realised as a wearable Power and Data infrastructure, capable of providing power for each peripheral device, and connectivity such that intelligent peripherals can interface with each other to provide soldier worn functions that benefits the solider and /or the mission. This function can be achieved using a Power and Data hub such as UltraLYNX, which not only offers an Open Architecture solution for device integration, but also has an application processor capable of enabling the future capability requirements.

Looking at advances in power, lithium cell technology has continued to be developed over the last decade, but there has been nothing revolutionary in terms of significant increases in energy density. A year on year increase has certainly made longer endurance missions possible, but to really enable digital soldier of the future more needs to done.

Standardisation of battery connectivity (the UK, US and NATO are all converging into a common connector standard) will mean that soldiers can be interoperable by utilising

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batteries across nations. As well as providing power, the batteries can report their status using serial bus enabling power management applications to read parameters such as "% power available & equipment power consumption. These smart batteries can be augmented with smart power management, power scavenging and perhaps other power sources such as wearable fuel cells. Ensuring the power architecture is open and can accommodate these is essential.

With new power delivery mechanisms coming on stream (such as USB PD), it is now possible for a smart hub to intelligently manage the power to each connected device and control the charging regimes for the power sources. Such a hub can also use Artificial Intelligence techniques to optimise power usage without the need for soldier input (helping to reduce the cognitive burden).

Perhaps the biggest push is the area of wearable computing. The aspiration to push sensing out to the tactical edge is driving the need for lightweight, low power computer resources that have the processor capabilities to host AI/ML algorithms. These algorithms will be essential in converting sensor information into meaningful data that can then be disseminated across the soldier radio net and up into the higher C2 echelons.

The data infrastructure will need to ensure that computing can be scaled according to the mission, and that essential services for device management can live alongside the AI applications. Carrying yet another "box and cables" would not be a solution that many soldiers would be keen on, Instead, a smart hub that is already designed to host AI would be a positive advantage in providing a SWaP optimised solution that is integrated into the power and data architecture itself.

Consideration is also given to security, where the smart hub can be configured as part of a Cross-Domain solution to allow data exchange between radio nets at different classifications (essential for reporting a Common Operating Picture).

Another technology that is likely to be deployed in future missions is physiological monitoring. This real time monitoring of soldier health will be necessary to not only report the obvious life signs but also indications of wellbeing. A smart hub such as UltraLYNX can host the algorithms necessary to ensure the solider of the future is kept healthy in both body and mind.

Finally, for any wearable system, there is a need for the user to be able to interact with the connected devices via some kind of user interface known as an End User Device. Today the most commonly adopted EUD is a Samsung phone. A new programme in the US sees the adoption of Augmented Reality goggles, whilst research programmes are looking at gesture control, virtual assistant technology (similar to Alexa or Siri) and even measuring brainwaves possible ways of controlling peripherals. Adopting these new EUD technologies is made easier if the Power and Data infrastructure is managed with a smart hub. The hub provides an abstraction layer allowing the type of EUD to be changed at will, without effecting the connectivity of the other peripheral devices. As new EUD technology is developed it can be easily integrated into the soldier system.

By deploying an open power and data architecture, along with embedded computing, the war fighter can integrate devices that were never intended to work together, not just for today's fight, but for missions well into the 21st Century. ■

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