THE INTERNET OF THINGS FOR CONNECTED SOLDIERS & BATTLEFIELD SECURITY

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ABSTRACT

Today, the Internet of Things (IoT) is considered to be the future of smart technologies; not only the integration of wide variety of commercial applications/devices but the intelligence data/information – exchange among these applications over the web. The utilization of IoT- related technologies in military applications will be of great impact on protecting our soldiers in these harsh environments especially in battlefields. The idea of the “Connected Soldier” relies on multiple radios for communications, navigation, data and video links etc. In order to maintain safety and insure mission success, critical real-time situational awareness must be available to the soldier on the battlefield. The battlefield itself represents a harsh RF environment with numerous radio systems and other sources of RF emissions spread out over the entire electromagnetic spectrum leading to the potential for serious radio frequency interference (RFI) issues.

In this work, ANSYS simulation tools (HFSS and EMIT) are used to analyze the RFI experienced by the connected soldier for a scenario that involves an RF link from the soldier to a hovering UAV providing a radio relay. The impact of other sources of RF signals on the soldiers RF link is analyzed, as well as the potential RFI between systems on a nearby vehicle with multiple radio systems in simultaneous operation. Having identified the sources of interference, appropriate interference mitigation techniques are implemented.

On the other hand, connected soldiers are usually protected by increasingly effective high technology body armor. Additional safety is provided connectivity to equipment, such as a Humvee, a drone or a satellite. Having continuous communication as with IoT in the commercial world is critical. Bomb fragments or bullets may miss the soldier but disable the antenna’s communication. ANSYS Explicit Dynamics is use to examine the response of the antenna on a Humvee to determine whether it will survive an impact. The impact velocity is a little bit over 100 m/s, which is in the lower range of a typical fragment velocity from near-field bomb explosions. Simulation results shows that the antenna has been deformed severely but has not necessarily broken. The deformed

geometry can be exported back for further electromagnetics analysis to check if the antenna is still working or needs to be replaced.