DHS Science and Technology Directorate

Next Generation First Responder: Integration Demo

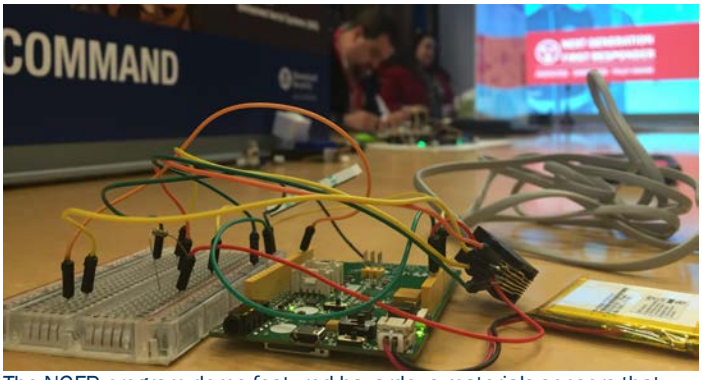
Internet of Things for Public Safety

The proliferation of miniaturized sensors embedded in real world objects, such as intelligent buildings, transportation networks, utility grids, clothing and devices, form what we now call the "Internet of Things" (IoT). The effective integration of physical, digital and human systems in the built environment is the foundation of Smart Cities. This platform has the potential to serve first responders by enabling them to sense the environment, collect information and communicate and interact with each other in real time during emergencies. While instant access to information is critical for first responders, so is standardized technology that makes sensors easily and immediately identifiable, usable and useful across all teams and information management platforms involved in an incident response.

To address this need, the Department of Homeland Security Science and Technology Directorate's Next Generation First Responder (NGFR) program held a demonstration highlighting the ways in which various proprietary technologies come together to improve communications and situational awareness of first responders in the field. The demonstration integrated a number of physiological monitoring devices, environmental sensors, streaming video from body cameras and unmanned aerial systems (UAS), hybrid communications, wearables and alerting devices during an emergency scenario requiring a coordinated response from law enforcement, firefighters and emergency medical technicians.

Technology Integration Through Open Standards

The NGFR program is working toward creating an interoperable public safety environment that fosters open standards required to develop technologies that integrate seamlessly. These standards enable responders to adopt commercial-off-the-shelf products and adapt technologies to better meet responder mission needs. This open and integrated approach to IoT advancements forms the basis of the NGFR framework. The modular and extensible design is intended to work for responder organizations with different environments, budgets and mission requirements. The NGFR framework contains the architecture, standards, public safety cloud and hardware, which allows first responders to discover, access, consume, translate and display voice, video and data, making them better protected, connected and fully aware.



The NGFR program demo featured hazardous materials sensors that detect airborne contaminants.

The NGFR demo showed the ability to integrate capabilities into the NGFR framework, including:

- Personal protective equipment that increases the resilience levels of duty uniforms against liquid and chemical splashes, bodily fluids, slashes and tears
- Body-worn physiological monitoring systems that can monitor for signs of strain, indicating a responder is at risk
- Low-cost, connected and deployable hazardous materials sensors that detect airborne contaminants
- A hybrid communications device that enhances legacy radio system capabilities by using commercial broadband networks
- Datacasting that transmits secure video and data over existing broadcast television signals to targeted audiences
- Body-worn, networked cameras that provide both an immediate picture to a remote viewer
- Video-equipped UAS that are able to cover a large area rapidly, and provide a perspective different from that on the ground
- UAS with Wi-Fi Signal Location (Wi-Finder) that has an antenna to collect cell phone emissions and uses the information to create a heat map of casualty location

The demo also showed the importance of connecting the NGFR architecture into an existing municipal infrastructure – including public broadcasting and Long Term Evolution, or LTE networks.

Future demos will integrate more technologies as they mature, and define and test how commercial capabilities can use open standards to be interoperable within the NGFR system.

Homeland Security
Science and Technology

To learn more about the Next Generation First Responder program, contact SandTFRG@dhs.gov.

2016-06-13