Archived Content

In an effort to keep DHS.gov current, this document has been archived and contains outdated information that may not reflect current policy or programs.

Data Overload for First Responders

The sheer volume of data from next generation communication tools and sensors risks overwhelming or distracting first responders from their critical activities. As a result, first responders may make the wrong decisions, not because they lack relevant data, but because they are unable to quickly extract key insight from this flood of information. Information overload creates obstacles for first responders to perform their duties safely and efficiently. This situation applies not only to first responders on the ground, but also to those tasked with managing and directing an incident response from a higher level.

The problem faced by first responders is a common one in the age of big data. Because of this, there is a critical need for an automated system that can determine what data is important and how to transform this information into actionable knowledge or insight. This need is especially challenging during first responder scenarios, where real-time capabilities are paramount and the choice of what information to send to first responders is crucial. Not only does the information need to be transformed into insight, but also it must be situation-relevant. The system must be able to automatically provide individually curated insight to those on the ground while delivering global situational awareness to incident response managers. Because every incident is different and appropriate responses are many, the system must also be flexible enough to rapidly adapt to an evolving operational environment.

Transforming Data to Insight

In response to this capability gap, the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) is partnering with the NASA Jet Propulsion Laboratory (JPL) to apply JPL's state-of-the-art human-like reasoning system Assistant for Understanding Data through Reasoning, Extraction, and Synthesis (AUDREY) to perform data fusion and provide tailored situational awareness information to first responders.

AUDREY is an extendable, integrated platform for transforming multimodal data into contextually relevant insight. AUDREY will connect with sensors on the first responder's personal protective equipment (PPE) and information provided by the Internet of Things (IoT) through a suite of plugin tools, and will intelligently consider the situation of each first responder and extract key information as it pertains to their needs.

Rather than simply forwarding this information and risk distracting the first responder, AUDREY will synthesize high-level actionable information and provide it to the first responder when appropriate.

Revolutionary Reasoning System

At its core, AUDREY contains a revolutionary, domain-independent reasoning system capable of simultaneously performing inference and learning in real time. AUDREY can retrieve crucial data from disparate sources, dispatch analytics to extract information, and apply "human-like reasoning" to synthesize and deliver essential insight to the first responders. In effect, AUDREY can perform the role of an autonomous assistant serving individuals and groups tasked with incident response.

To carry out this functionality, AUDREY leverages revolutionary capabilities from a new field of artificial intelligence (AI) called Artificial General Intelligence (AGI). Unlike existing AI technologies, which must be explicitly programmed with all relevant information prior to being deployed, AGI technologies accept the premise that perfect knowledge may not be available and that information may be contradictory. As a result, AGI technologies are capable of "thinking outside the box" and handling experienced inconsistencies, while traditional AI systems break in these situations. The core reasoning capability of AUDREY, Human-Like Reasoner (HLR), implements AGI concepts to serve as the "brain" of the system and provides control, inference and context-awareness. HLR directs the attention of the system, guides the reasoning process, and recognizes situations when new information is needed and how external tools should be leveraged to transform raw data into insight.
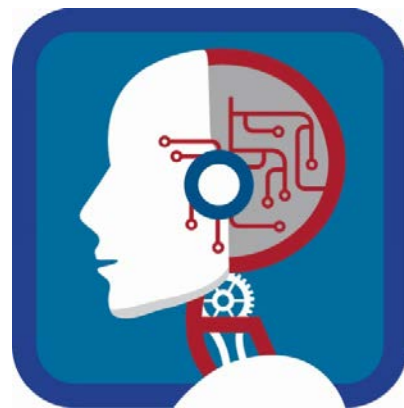
Artificial Intelligence for First Response

In the case of the first responder, IoT can supply highly valuable information about everything from infrastructure status to demographic reports to public social media postings. AUDREY can deliver this advanced situational awareness by seeking out information that is relevant to a given first responder's immediate situation. One of the key benefits of AUDREY is its ability to sift through vast amounts of data and intelligently use only the most appropriate information and optimally deliver the relevant and actionable knowledge to the end user.