

Automated Speech Recognition Technology: Hands-Free Solutions for First Responders



Homeland Security

Science and Technology

AUTOMATED SPEECH RECOGNITION TECHNOLOGY FOR FIRST RESPONDERS

First responders are often in critical situations where a hands-free solution could enhance their situational awareness and help ensure their safety. As part of its mission to support the identification and integration of emerging technologies for first responder communities, the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) has partnered with the Johns Hopkins University Applied Physics Laboratory (APL) and Think-A-Move Ltd to develop an Automated Speech Recognition (ASR) capability to:

- Make first responders safer
- Help first responders share data and critical information
- Help first responders' interoperable communications capabilities for enhanced situational awareness

PARTNERING WITH FIRST RESPONDERS, UNIVERSITY-AFFILIATED RESEARCH CENTERS & PRIVATE INDUSTRY

The ability for first responders to effectively communicate in the presence of loud ambient noise is not currently available via commercial speech recognition solutions. Therefore, DHS S&T asked Johns Hopkins APL, a University-Affiliated Research Center, to investigate potential solutions and work with first responders to develop an ASR capability that will work in their environments. Using a systems engineering approach and working directly with first responders from Howard County, Maryland, APL is partnering with Think-A-Move Ltd to develop an ASR.

PROTOTYPE DESIGN AND DEVELOPMENT

Early phases of this project included a Request for Proposal from which three technology developers were selected and then provided with requirements to develop prototype design plans. With the help of partnering firefighters and emergency response, APL recorded multiple hours of audio simulating a response to a house fire and provided the data to support the training and development of ASR algorithms.

In 2020, two prototypes underwent performance testing at APL, as well as limited field testing with Howard County Fire and Rescue Services. Both prototypes demonstrated the ability

to recognize voice commands and execute logic control of predetermined tasks in a high noise environment.

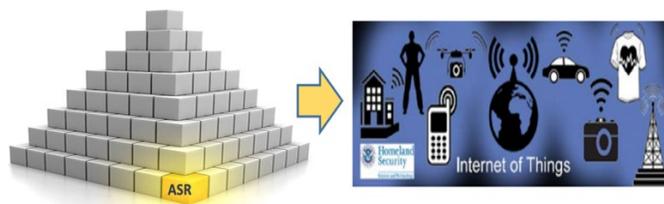
Following the testing conducted in 2020, Think-A-Move Ltd has further refined their ASR algorithms and demonstrated performance improvements within the noise level region that is comparable to firefighter environments. Recent prototype testing demonstrated ASR can perform in high noise environments – a cornerstone project for hands-free capabilities for first responder communities.



THE REALM OF THE POSSIBLE

The DHS S&T ASR project provides a “cornerstone” capability from which the realm of the possible for Internet of things (IoT) hands-free applications for first responders can be further built upon. The current prototype is focused on the firefighter environment, but could be adapted for use in police emergency medical services, and other high noise and limited resource environments.

With continued first responder input, the final prototype will need to easily integrate with existing first responder equipment and personal gear, as well as support and enhance human performance with limited or no interference. It is also expected that the final technology solution will have a learning component that enables continued self-improvement and provides active noise cancellation for real-time speech recognition without the need for internet connectivity.



ASR Prototype helping to meet First Responder needs in an IoT Future

