



Improving Crowd Resilience project abstracts

Track 1 Suppliers

Centre for Secure Information Technologies

Multi-view fusion for crowd analysis in video

Abstract

We propose to investigate the fusion of low and high-level semantic analysis of crowds in video for counter-terrorism purposes. For the former, we will use deep learning neural networks and probabilistic modelling for crowd density estimation and anomaly detection respectively.

For the latter, we propose to track subjects and combine these with evidential reasoning networks to extract high-level semantic knowledge. This system will deliver an early-warning alert of crowd behaviour that might be triggered by a terrorist attack at a public venue, such as sports stadiums. The project builds on significant existing capabilities at Queen's University Belfast and BAE Systems.

Createc

SLATE—Crowd Monitoring and Alerts

Abstract

Monitoring of crowds to detect suspicious threats is a complex challenge for technical reasons as suspicious behaviour takes many forms and crowds naturally respond to a range of events with similar behaviours. For example, a crowd may avoid an unattended bag like they would avoid a spillage. In addition to the technical challenges, arguably the biggest challenge is presenting a commercial package to building owners such that installation and maintenance is not a burden.

This proposal offers a different approach to crowd monitoring by offering a more generic system which alerts building owners to an event which needs attention including suspicious behaviour but also including events which would require some level of attention including for example, a member of the public falling over a broken escalator or lift. To achieve this, Createc will combine two key innovations: A LIDAR based tracking system which accurately captures crowd data including size and speed, with a machine learning approach to identifying changes in crowd patterns to alert staff to events. This proposal therefore addresses two key barriers to widespread adoption as all data collection is anonymous and cannot be used to identify an individual reducing the burden on building owners. The system would be installed and operated by building owners to manage the day to day running of the facility.



QinetiQ

Using a Crowd Emotion “Heatmap” to support decision making in Security Personnel

Abstract

QinetiQ with Professor Giacomini are investigating the use of infrared technology to detect emotional response to events in a crowd through facial temperature change. If successful, this approach will be used to create an “emotion heatmap”, showing security personnel early indicators of concern within the crowd and targeting limited resources to potential incidents.

This team have extensive expertise in emotion detection, measuring physiological response, social psychology, use of infrared cameras, facial feature tracking and statistical modelling and analysis.

University of Kent

Using social identity to enhance detection and response to threats

Abstract

Recent crowd attacks in Manchester and London, as well as abroad, have a repeating pattern of aiming at densely crowded areas to create maximum disturbance.

However, this positions the crowd as a key asset to the detection and reporting of potential threats before attacks occur. We propose using crowd members and their walking patterns to both detect and respond to threats in crowded locations, by combining recent advances in crowd psychology, computer modelling, and event safety management. We aim to use CCTV with computer models developed at the University of Kent and Manchester Metropolitan University to detect suspicious behaviour and pinpoint barriers to crowd members detecting and reporting threats.

University of Southampton

We’re in this together: Using evidence-based visual perception research to enhance the crowd’s ability to detect threats

Abstract

Public assistance in detecting threats is gained through appeals for vigilance. Our published research on visual search suggests we can make improvements to the reporting of threat through changing search behaviour. We will translate findings from basic science to enhance public information through video advertisement.

The video will explain sources of error in searching and how to change search behaviour to overcome them. We will test our video against other forms of information that serve to alert the public for threats.



Track 2

K Sharp Ltd

CRiB—Crowd Resilience through iBeacons

Abstract

To demonstrate an iBeacon network configured to adaptively broadcast threat identification information to the 'crowd'. The evolution of the application of iBeacons, from proximity marketing, towards improving security awareness and therefore crowd resilience builds on an existing infrastructure that provides an exploitation route and delivery platform.

The teaming of K Sharp and Daden provides expertise in user-centred design; influence psychology; mobile applications for crowd-sourced pattern-of-life data; and data visualisation techniques. We are supported by GCell, a supplier of iBeacon systems, and Marketing Gloucester who have invested in a digital testbed, including city-wide WiFi, iBeacons, WiFi footfall trackers and CCTV over IP.

Krowdthink Ltd

Making the crowd a participatory threat sensor and responder

Abstract

This proposal will deliver a technology-based system, underpinned by established behavioural sciences expertise, to significantly improve crowd awareness, consciousness and resilience. It innovatively combines a secure social-engagement app, called the Krowd®, with features to enhance safety and security operations within high footfall spaces.

It will enable threat, event, venue and safety information to be shared via their mobile devices, transforming 'the crowd' into a 'virtual sensor' to effectively identify threats and easily respond via alerts. The bid combines established technology and domain expertise with a low risk approach and exploitation path to deliver future improvements to safety in public spaces.