



SELEX GALILEO

A Finmeccanica Company

BAE SYSTEMS

THALES

roke

Roke Manor Research Ltd
a Siemens company

EMRS DTC
Electro-Magnetic Remote Sensing (EMRS) Defence Technology Centre (DTC)

Transducer Embedded Processing Research Theme: Overview

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Dstl

The Message From the Defence Technology Strategy, DTS

“A resounding message that has emerged in producing the DTS is that signal processing is a core technology where the UK is world class, and must remain so”.

“Military sensor systems must operate in real-time, often using compact, low power-consumption processors. Signal processing techniques provide the first step in the overall information processing chain and signal processing performance is therefore critical to the whole chain”.

Over 20 separate references to the important role of signal processing.

Science Providers

BAE Systems ATC
Queens University, Belfast
Roke Manor Research
QinetiQ
Nallatech
Blue Bear Systems
Cardiff University
Royal Holloway University
2d3
Selex
Thales

Technical Areas

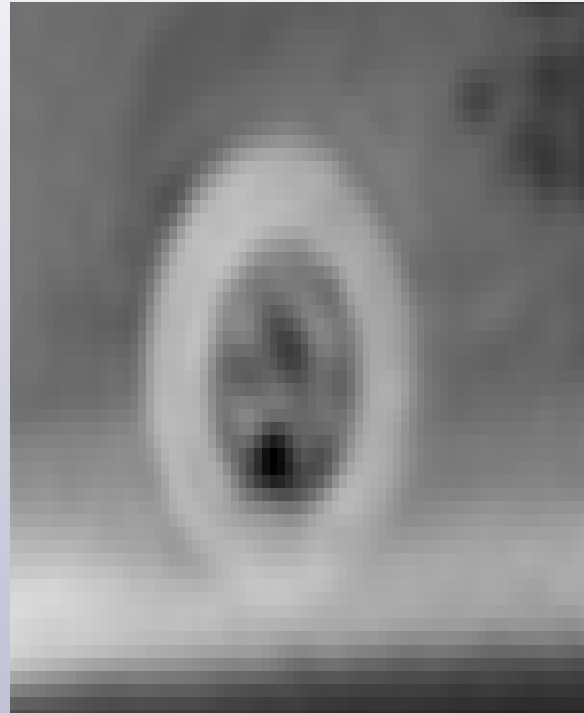
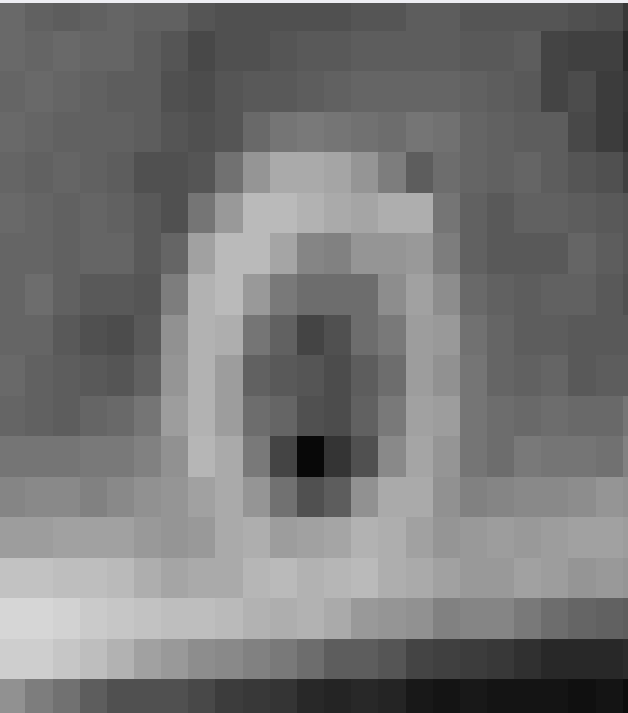
- Rapid development methods
- System dynamic range enhancement
- Signal processing based sensor improvement
- 3D computer vision
- Neural networks
- Counter IED Processing Methods

Military Drivers

- To extract maximum performance from a sensor before the data is provided to a bigger system
- Reduce development cost by reducing design cycle times
- To improve design longevity via high level design abstraction
- To improve system performance through innovative signal processing methods

Overview of TEP requirements

Signal processing is fundamental to extracting the maximum performance from almost all current sensor systems. The DTC is keen to encourage innovative signal processing techniques that can be used to extract more information from a given sensor but also techniques that can be used to improve system costs, reliability, availability or robustness.



Temporal resolution enhancement of a vehicle wheel.

(courtesy of QinetiQ and Wescam for the data)

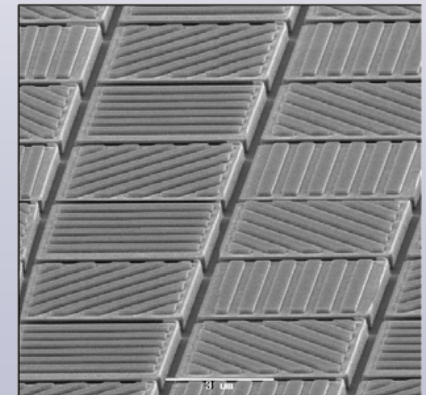
<bryan.rickett@roke.co.uk>

Counter IED Camera Processing

- Processing of images from dual band and polarised cameras is making headway against current threats
- Trials results in various environments are fuelling algorithm development and yielding encouraging results



(courtesy of SELEX)



(courtesy of Thales)

Change Detection

A computer may be better at remembering the scene than a series of human operators (who may not spot the threat)

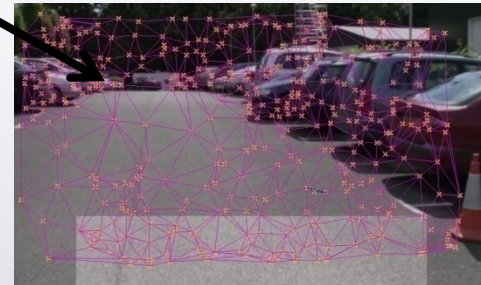
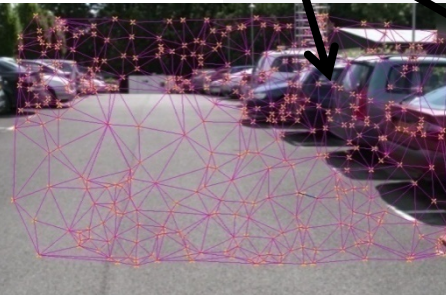
Frames from different passes of the same scene



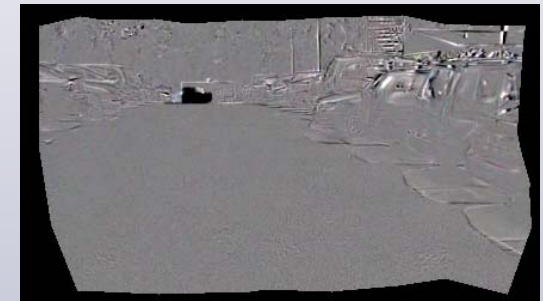
VIDEO
FRAMES



SYNTHETIC
IMAGERY



DIFFERENCES



Differences

(courtesy of Roke)

(courtesy of 2D3 Ltd)

Visual MTI For UAVs

Visual detection of moving targets over extended areas and times for the analysis of patterns of behaviour and auto alert of changes

Integration of MTI data into bigger picture using image mosaicing techniques

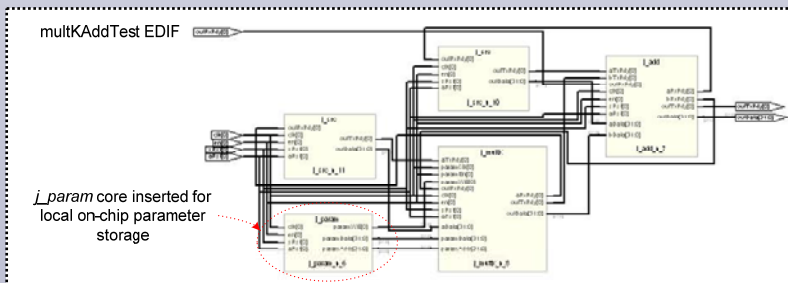
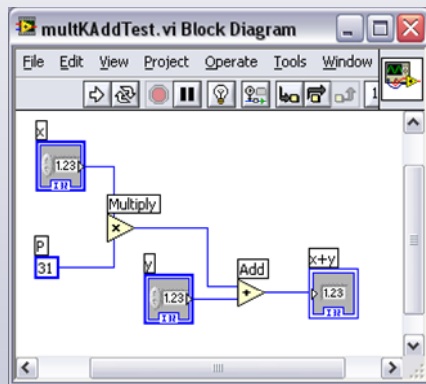
Obtain global map alignment using chaining and loop closure



(courtesy of Roke)

Rapid Development Methods

Rapid FPGA development Tools, capable of rehearsing architecture changes, technology changes and fit problems ahead of detailed design work. Speed up development time by a factor of 5!



Now part of a spin out company



(courtesy of Queens University Belfast and Capna DSP)

Conclusions

- The TEP theme within the DTC has been heavily subscribed
- Significant benefit has been derived for MOD, industry and science providers
- A number of projects have achieved rapid exploitation
- Others are being supported and tracked by interested exploitation partners
- Some projects have potential for exploitation and await formal transition

Overall the theme has benefited from a stream of good ideas implemented by talented individuals and companies