A 'fingerprint' for safe display and operation using HMI interfaces

Computer-based HMI systems (Human Machine Interfaces) are increasingly used in many sectors for the control of vehicles and equipment. Apart from a particularly ergonomic design of the Human Machine Interface, they permit the integration of a multitude of functions and comfort elements. The particularly strict safety norms for trains (see DIN EN 50126) require safety measures when commercially available standard PC technology is used, so that the safe display and entry of information via HMI interface can be guaranteed.

How did the development of IconTrust® technology come about, Dr Ganz?

Drivers of modern (high speed) trains carry a large burden of responsibility for passengers, cargo and the expensive rail system itself. Since operator error can have serious consequences, organisational and technical measures must be taken which ensure that the data displayed to the driver is at all times correct. Based on this he can make his operational decisions.

DEUTA has been producing HMI terminals

RUDOLF GANZ and his team have developed IconTrust®, a patented electronic safety circuit which by means of a simple, innovative 'fingerprint' comparison monitors the correctness of display data. In addition, the technology enables safe data entry using touch-based operator panels. Here he is interviewed for Railway Strategies

for railway vehicles for approximately 20 years and with IconTrust® we have developed a safe multifunction terminal. Other kinds of technical approaches have existed for SIL-compliant terminals (Safety Integrity Level). These were classed as extremely cost intensive, as every

change of application software is accompanied by a complex modification process and requires verification.

Is retrofitting not associated with post-qualification?

Our customers especially appreciate that IconTrust® ensures that displayed data is verifiably up-to-date and correct, without the actual application for the display of information needing to be subjected to SIL verification. Because of this independence, the circuit has a multitude of uses without the extensive post-qualification and documented evidence of conformity usually associated with product and process modification.

Where is IconTrust® already being used?

IconTrust® technology is in use in test vehicles in India within the framework of an ETCS project and from autumn 2012 in vehicle tests as part of an IEP project in England. However, there are also projects in other areas of industry such as medical technology – in effect, everywhere where safe display and safe operation is needed.

We have developed two IconTrust® variants. The IconTrust® Plus variant is mostly embedded in our multifunction terminals and directly receives the evaluation of the comparison. The generic variant transmits relevant information to the actual sender of the information and enables him to recognise if the display is correct. Through the extension option SelectTrust even the correct touch operation can be checked.

But how could data displayed on a display actually be corrupted?

The complexity of operator systems should be minimised despite increased integration requirements. In order to counter increasing cost pressure, standard PC components are used in HMI systems. These, however, cannot identify erroneous technical data transmission to the monitor, errors in the graphics control or the graphics memory of the display, in the visualisation software, the operating software, the driver of the TFT signal or the microprocessor itself. The operator is not aware of this since he trusts the data on his display.

How can these errors be revealed?

Most system concepts for control centres and platforms generally concentrate on securing the electronic process control computer often leaving security vulnerability in the display. The verification necessary according to SIL requirements for HMI electronics must be provided. The safeguarding can happen in many ways – from a complex multi-channel design as in aviation to a cost-effective variant with integrated electronic protective circuit which we have implemented for the first time with the patented IconTrust® technology.

What exactly is IconTrust® and how does it work?

IconTrust® is a sensor unit independent of platforms which is available as a panel PC, TFT monitor or projector. Retrofitting of existing devices is generally possible so that the functional requirements for security up to SIL 4 are implementable and verifiable. The monitoring mechanism can control over 100 custom-designed configured areas simultaneously and independently, also when they overlap. A code is generated for each image – a 'fingerprint' of the display. This

is compared with the corresponding input variable of the safe computer based on an initialisation table. In the case of deviations an appropriate customised predefined safety reaction is activated. This means that all types of separately presented information can be independently and exclusively monitored as graphics, symbols, indicator instruments, text or colour coding.'

Apart from safe displays, the entry of information e.g. on a touch screen should also be secured. Can IconTrust® fulfil this requirement?

With SelectTrust, as an extension of IconTrust® we can also guarantee data entry on a touch screen and therefore the correct realisation of the selected operating function. The user can be sure that his entry has been reliably and correctly processed.

How does SelectTrust work?

The concept is similar to that of IconTrust® Generic. As well as the 'classical' treatment of touch events within a complex HMI structure, SelectTrust generates reference information which is independent of the first information path directly from the displayed screen units of the TFT data stream. This enables the safe computer to check the transmitted information thereby detecting errors. In this way, the user of an HMI system can be sure that the operating function selected continues to be correctly processed, or in the case of error, that a safety reaction will be triggered. ∎

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Zonegreen wins Australian safety contract

● Sheffield-based Zonegreen is turning the organisation upside down and taking the groundbreaking SMART DPPS™ (depot personnel protection system) product to Australia, in partnership with Australian firm Andrew Engineering.

As market leaders in the delivery of electronic control systems and depot personnel safety, Zonegreen is fast becoming sought-after all over the globe and has recently won a safety contract with one of Australia's leading providers and maintainers of passenger and freight rolling stock in Australia.

The contract sees Zonegreen's highly-advanced SMART DPPS™ system being installed on 13 roads at one of Sydney's newest train care depots in Auburn. The system will be used to protect staff and equipment from harm when working within the depots, and works using intelligent control and communication technology. Electronic personnel datakeys identify staff working in different safety zones, helping minimise accidents and promote safe working practices within the workplace.

Australian rail company Andrew Engineering is due to carry out the installation works, under the guidance of Zonegreen's expert researchers and engineers. The partnership with Andrew Engineering allows Zonegreen the scope to meet the needs of the rapidly expanding Australian rail market.

"We are delighted to bring our extensive knowledge and experience in designing safety systems for rail depots to the Australian market. There's significant potential for improved safety and efficiency within Australia's growing number of traincare depots, and we are well placed to assist in that process," said Zonegreen's managing director Tony Hague.

"Quality, safety and reliability are at the core of our company values; by developing long-term working relationships with our clients, we ensure our products consistently meet the highest standards of safety."

Zonegreen
Web: www.zonegreen.co.uk

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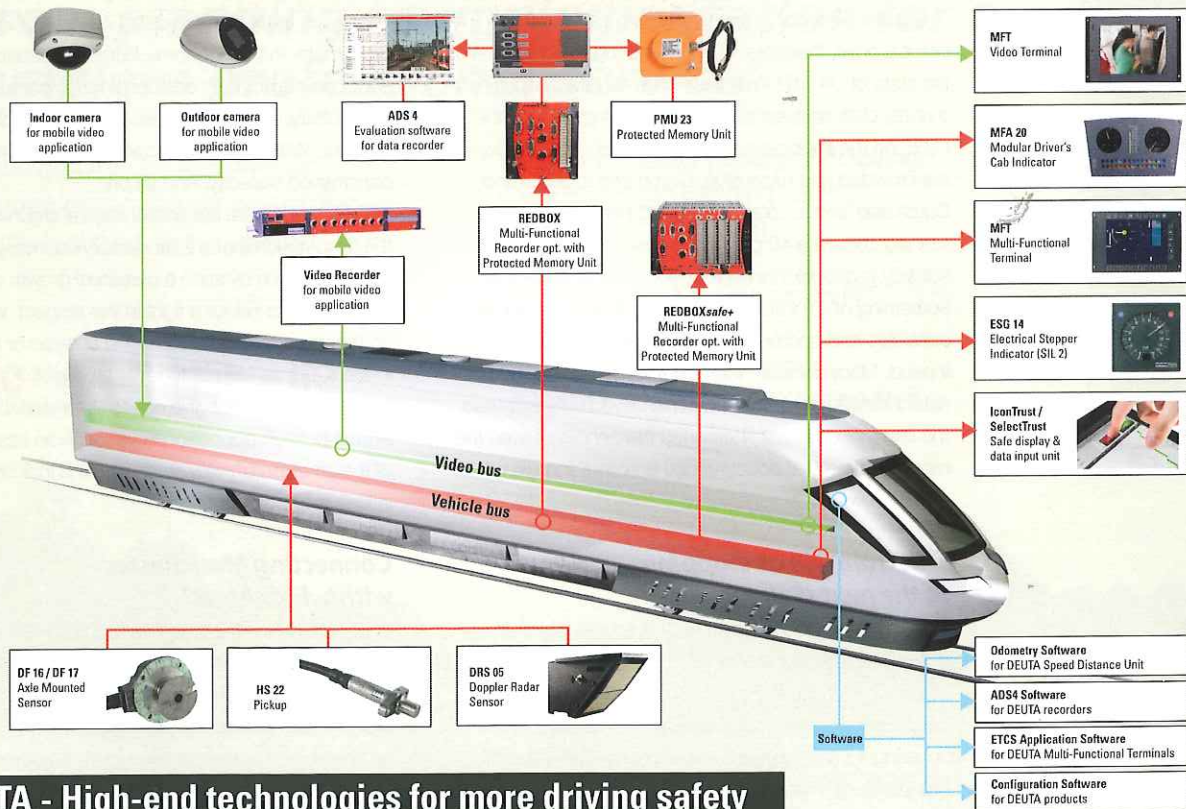T965 Facilitating testing and trialling to assist technology development

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IconTrust / SelectTrust Safe display & data input unit

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