Presentation at the
NSW DPI 19th Mechanical Engineering Safety Seminar

Title: Proximity Detection System – the application of digital tracking technology for an additional level of control around vehicles

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Background

Mine Site Technologies has extended a general RFID based tracking and tagging technology to form a Proximity Detection System for underground mines, as well as surface mines and industries. The system was developed with the support Australian Coal Association Research Program (ACARP) and a number of coal and hard rock mines in Australia, including Xstrata Coal, Centennial Coal and Xstrata Zinc. The "Proximity Detection" system has been developed to reduce the risk of the people coming into contact with vehicles in an uncontrolled manner (i.e. being "run over").

The Proximity Detection System (PDS) was developed as the occurrence of "near misses", and previous fatalities, have been acknowledged by both hard rock and coal mining companies, as confirming the need for some form of "Proximity Detection" to provide an additional level of control in vehicle-person hazards. Increasing levels of vehicle use, automation and remote control has added to this requirement.

The Proximity Development leveraged off the Intellectual Property and experience gained with our existing ImPact TRACKER tagging technology.

Principles of Operation

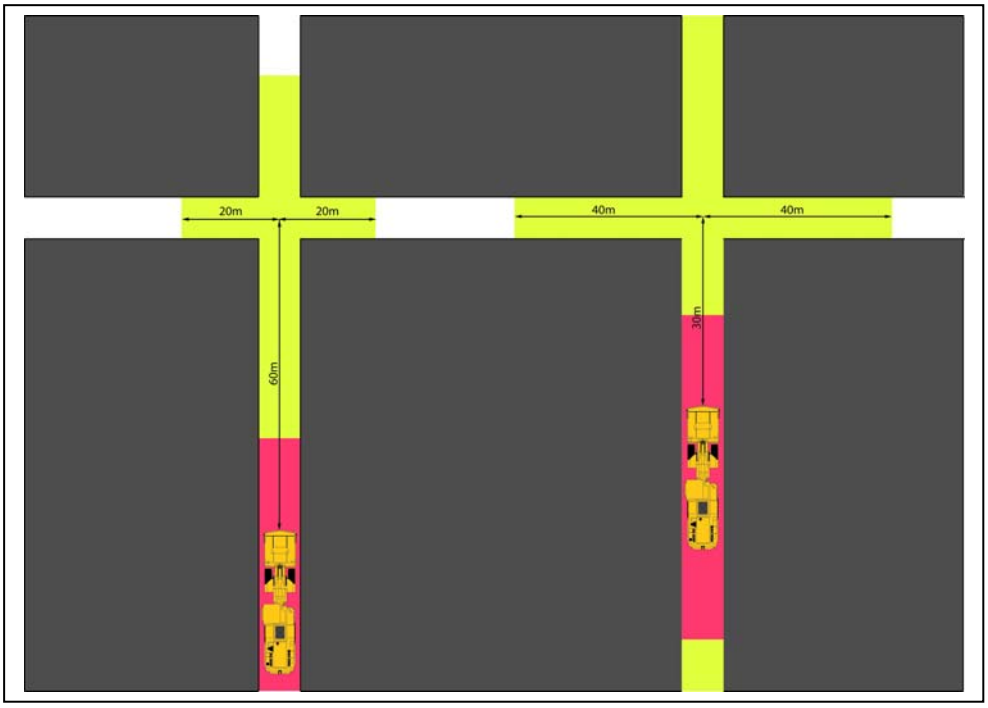
The basic concept is to use active Tags worn by miners underground to be detected by vehicle mounted Readers. The Reader is our existing Vehicle Intelligence Platform (VIP) Wi-Fi enabled data logger module. This VIP module is interfaced to a Display Unit to alert the driver of a person encroaching within the vehicles vicinity. The Display Unit will also provide the interface between the operator and the system, e.g. a means to acknowledge Tags and other necessary controls, such as alert outputs, etc.

The system uses a vehicle mounted Reader that would detect the approach of an active Tag, and provides two levels of warning:

Proximity Inner & Outer Zone Detection

Outer Zone – 60 to 120 m:
- Gives a first warning to operator that there is someone around
- Detection Range is roughly adjustable from 60-120m
- Detects personnel around corners and blind-spots

Inner Zone – 2 to 15 m:
- Uses a Very Low Frequency (VLF) magnetic field to give an accurately-shaped detection zone around the vehicle
- Detection Range adjustable from 2-15m with +1m tolerance
- Triggers a higher-level alarm



Proximity Detection around corners

The basic principle is to install a VIP Module to operate as a Reader on a vehicle to detect active RFID Tags worn by miners and to process the data for presentation on the operator interface and touch screen.

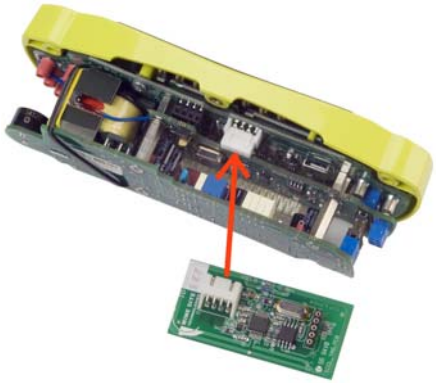
Operator Alarm Unit & Touch Screen Interface in LHD cab

The technology creates an additional level of control, to complement existing anti-collision procedures, for:

- People-Vehicle collisions;
  and potentially;
- Zone control; for example a shutdown system if some unauthorized person or vehicle intrudes in an area where remote controlled vehicles are operating, or as a more reliable means for control of non-Flameproof (FLP) vehicles in coal mines.
- Vehicle-Vehicle collisions

The system has been developed to use our existing RFID Tags. The reasoning behind this include:

- One tag being used for two applications makes engineering & economic sense.
- Also, mines that have installed a tagging system can have the option to gain further value from their investment, as it will allow these mines to easily implement this Proximity Detection by simply adding VIP Module to their vehicles, as their workforce will already be equipped with Tags.
- The two Tag types are:
  - Self Contained Tag with it's own battery supply, which can be carried by personnel (e.g. in a pouch) or mounted on a vehicle (to allow vehicle tracking).
  - A Tag that is integrated into the new ICCL (Integrated Communications Cap Lamp), this ensures it is a personal item that the miner will carry with them at all times.



RFID tags can be incorporated into the top of cap lamp, or be self contained & attached to vehicles