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# Technological Advancements for Safety In Confined Spaces

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By:  
Wisam Farjow, MAsC, P.Eng.  
Engineering Manager

**MINE RADIO SYSTEMS INC.**



*Underground Intelligence*  
ISO 9001 : 2000 CERTIFIED

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# Outline

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- **Overview**
  - **Solarian – Collision Avoidance System**
  - **Helian (Trapped Miner Locator System)**
  - **Helian (VHF Paging System)**
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# Overview

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- ❑ MRS has always focused on the development of safety systems for the underground mines operations
  - ❑ The actual requirements and needs for the enhancements of the safety in underground mine operations have been analyzed extensively
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# Solarian

## Collision Avoidance System

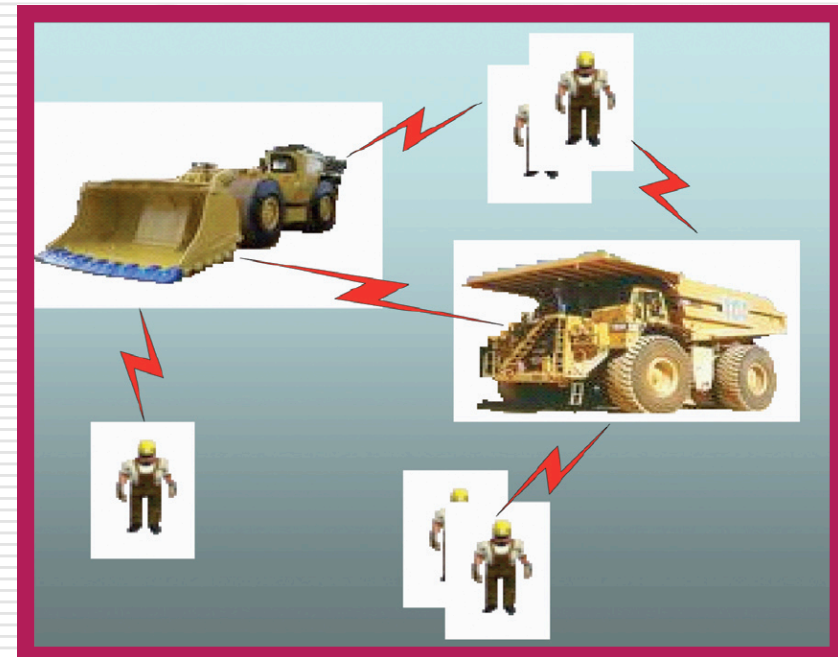
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- ❑ Drivers of mining vehicles face many challenges when driving in an underground environment
  - ❑ The Solarian collision avoidance system is designed to alert drivers of vehicles in underground mines for presence of personnel or other vehicles in their immediate area.
  - ❑ The driver is alerted, by a light and/or siren, when a vehicle or person is within 20m of their vehicle.
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# Solarian System Operation

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- ❑ The Solarian collision avoidance system uses personnel tags to wirelessly communicate with the Solarian Vehicle Unit located in the vehicle.
- ❑ Once a person/vehicle comes within range, the vehicle unit will set off an alarm (siren and/or flashing light).
- ❑ The vehicle unit will display the number of people and other vehicles within the proximity of the vehicle.
- ❑ The personnel transponder is capable of flashing the user's cap lamp when the transponder detects an oncoming vehicle. This will warn the person as well that a vehicle is approaching.



# Solarian System Components

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## Solarian Vehicle Unit

- Main unit,
- Display Unit
- Antenna



## Personnel Transponder

- Personnel Cap Lamp Transponder (IPT)
- Personnel Self Powered Transponder (ISPT)

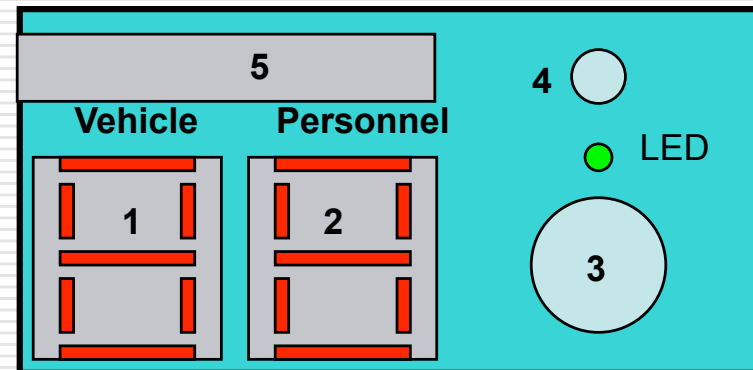


# Solarian System Components

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## Display Unit

1. Number of Vehicles in the vicinity of the beacon
2. Number of People in the vicinity of the beacon
3. Acknowledge Button to select driver tag ID and to deactivate the siren/light connected to external device
4. Push Button to scroll through the LCD display so the driver can select his tag ID
5. LCD display showing tag ID.



# Helian

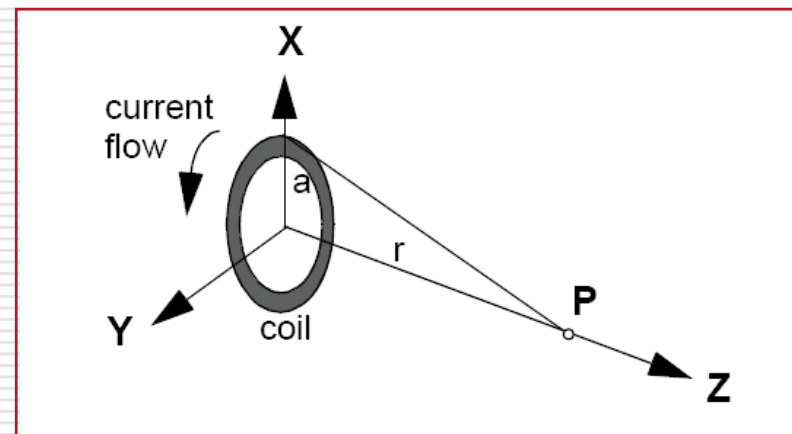
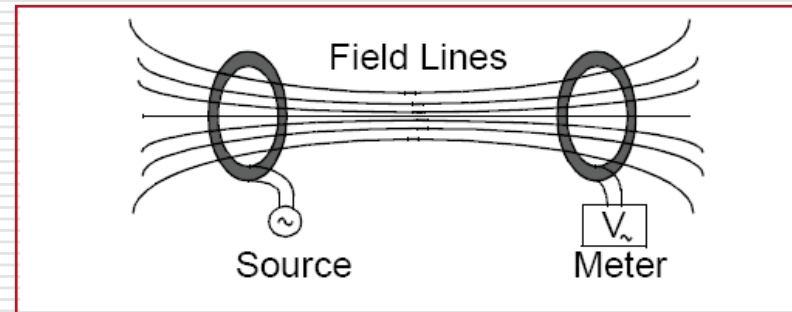
## Trapped Miner Locator System

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- ❑ Typical communication systems infrastructures installed in underground mines are very susceptible to failures in the events of mine collapse
  - ❑ A reliable mean of quickly locating trapped miners.
  - ❑ Interactive detection and location of one or more trapped miners. This provides a rescue team with information on the direction and distance to each trapped miner.
  - ❑ A miner trapped underground is subject to negative psychological effects from the isolation and darkness imposed upon him
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# Trapped Miner Locator System Operation

- The System utilize Very Low Frequency (VLF) spectrum to transport information between the Search Unit and the Miner Unit
- The VLF transmission characteristics are such that direct line of sight is not required between the transmitting antenna and the receiver, that is, the signal transmission can penetrate through earth to some distance.



# Trapped Miner Locator System Operation

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- ❑ The Trapped Miner Locator system involves two devices, a miner unit and a search unit.
  - ❑ The miner units carried by underground miners stay dormant until they are contacted by a Search unit.
  - ❑ After establishing contact, the search unit determines the location of the miner unit (distance and direction) while the miner units emit audible and visible signals.
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# Trapped Miner Locator System Components

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## ❑ Searching Unit (SU)

- TX Antenna
- RX Antenna
- User Interface



## ❑ Miner's Unit (MU)



# Helian

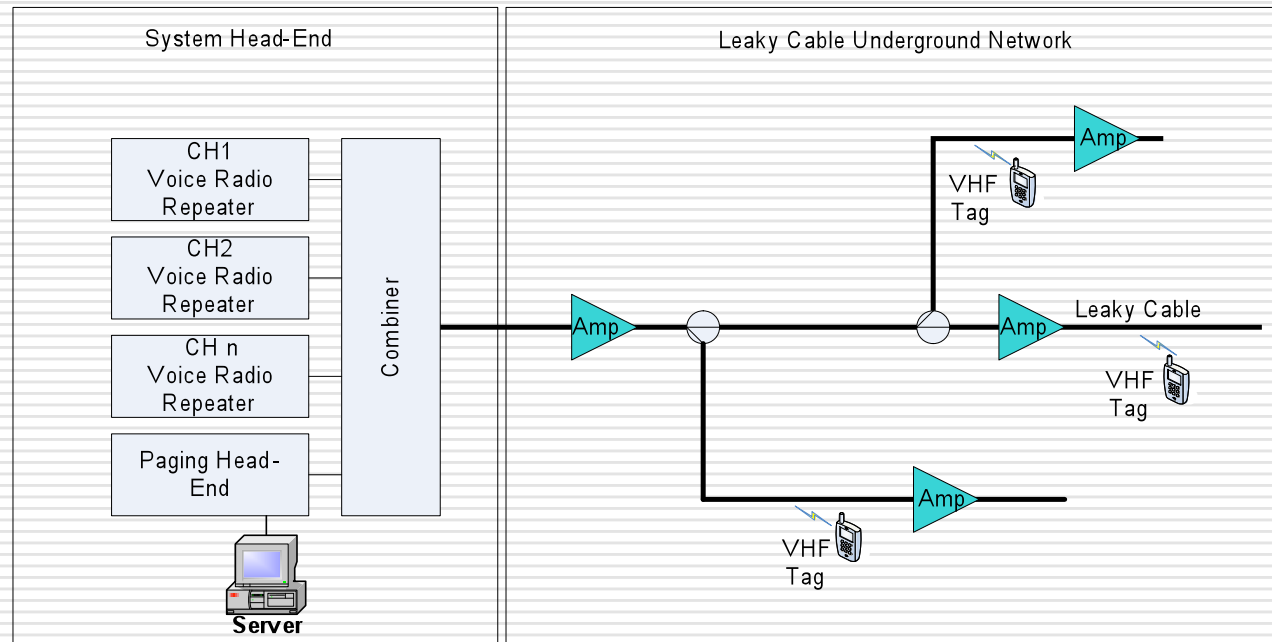
## VHF Paging System

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- The system can provide mine wide alert, warning, and evacuation messages to every miner wherever leaky cable exists.
  - Mine Radio Systems has developed the VHF paging and alerting system to be based on the use of leaky feeder
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# VHF Paging System Operation

- ❑ Alert messages can be transmitted via a push button at the surface head-end.
- ❑ The VHF receivers (pager) powered by a cap lamp battery can be mounted in or attached to a cap lamp holder

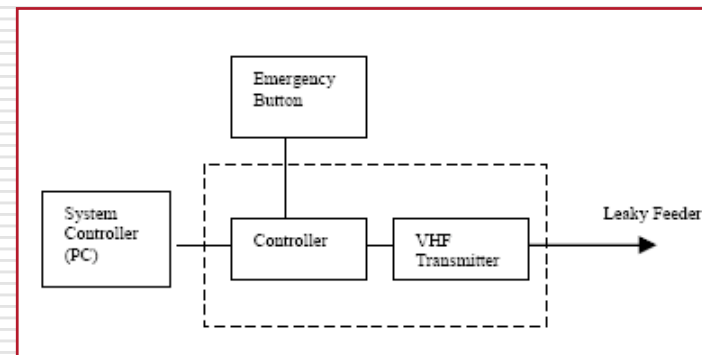


# VHF Paging System Components

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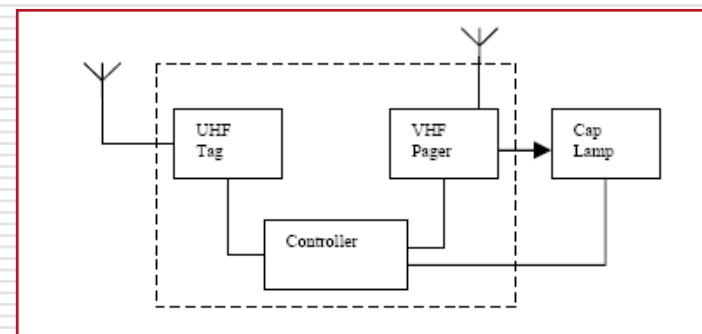
## VHF Paging Controller

- Located at the System Head-end typically on the surface
- Emergency button will initiate a mine wide paging message sent by the controller to the VHF transmitter.



## VHF Pager tag.

- The VHF pager circuit is packaged with the existing UHF tag and form fit within the cap lamp battery cover.



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Thank You

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