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**Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)**

**Submission Title:** V2I CamCom Link for Long Railway Tunnel Emergency EXIT and Evacuations

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**Re:**

**Abstract:** This documents introduce the railway tunnel emergency EXIT based V2I Vehicle CamCom Concept models for Vehicular Assistant Technology (VAT). This proposed VAT using Image Sensor Communication to operate on the application services like ITS, ADAS, IoT/IoL, LED IT, Emergency EXIT, Digital Signage with Advertisement Information etc.

**Purpose:** To Provided Concept models of Vehicle CamCom for Vehicular Assistant Technology (VAT) Interest Group

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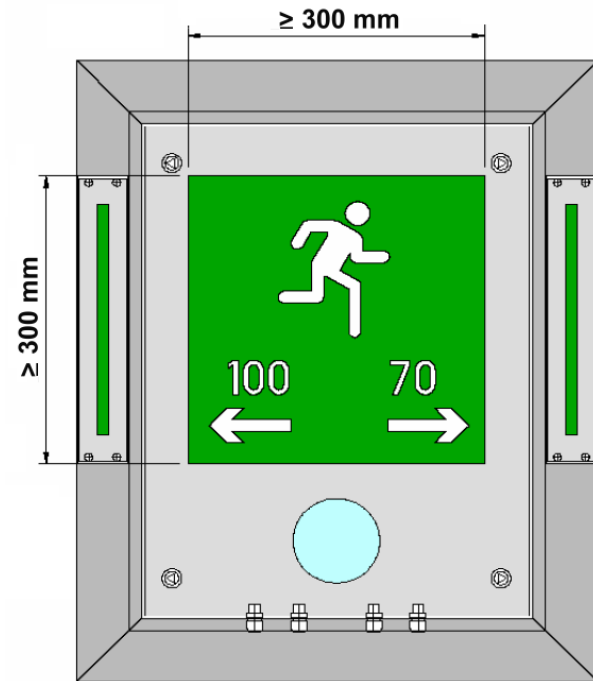
# Railway Tunnels Emergency EXIT

- Road Tunnel Emergency Conditions
  - Collision and Derailment
  - Fire and Explosion
  - Toxic GAS release
  - Natural disasters
- Emergency Aids in Road Tunnel
  - Smoke control Natural ventilation
  - Emergency exit and rescue access ventilation
  - Lighting system
  - Escape signs in tunnels
  - Communication and alarm system
  - Operation and traffic management
  - Fire suppression
  - General safety equipment



# Problems and Safety Measures in Railway Tunnels

- Possible Problems in Road Tunnel at Emergency Conditions
  - Accessibility of emergency walkways
  - Accessibility and usability of emergency phones and emergency telephone boxes
  - Locating the emergency exits
  - Opening the emergency exit doors
- Safety Measures in Road Tunnels
  - Emergency passenger exit
  - Emergency access for rescue staff
  - Drainage of flammable liquids
  - Open areas



# Railway Tunnel Emergency EXIT-CamCom Link

## V2I Emergency EXIT - CamCom Link



- V2I CamCom Link between Railway Tunnel Emergency EXIT and Rail Front View Camera
  - Emergency EXIT used for Indicating Tunnel emergency EXIT route as well as Emergency LED based CamCom Tx
  - Uses Modulation Techniques
    - OOK
    - Multilevel PPM
    - Inverted PPM
    - Sub Carrier PPM
    - DSSS SIK
  - Rail Tracking Emergency EXIT sing Front view camera work as Rx
  - Rail Tunnel Tx Transmits
    - Exit Locations, Location to Travel to get main entrance, direction to travel and Tunnel Environment Conditions Informations
    - Location Informations
    - Real-Time Traffic Informations Inside Tunnel and Near Area
    - First Aid Information
    - Near by Fire Station, Hospitals informations
  - Provide high end evacuation assistance information to escape and ensures railway human safety measures

# Railway Tunnel SLOW Sign-CamCom Link

## V2I Slow Sign - CamCom Link



- Advantages
  - Provides Safety Evacuation Assistance
  - Real-Time Environmental Condition Information Sharing
  - Guides to Emergency First Aid Centers

# Conclusion

- Proposed the Railway Tunnel Emergency EXIT-CamCom Link Technology Use Case Model
- Provides Safety Evacuation Assistance with first AID support centers help information use of Emergency EXIT to CamCom Technology
- Easy Integration support with ITS using Mobile Infrastructure Technology in Emergency Situations
- Novel railway safety system and directly related to human and material safety