X-aid™
Telegra's Automatic Video Incident Detection
X-aid™, Telegra’s Automatic Video Incident Detection System, is the industry most innovative and precise AID system currently on the market. X-aid™’s leading edge is based on unique and the most advanced algorithms, including video recognition and object tracking, pattern recognition and foreground object recognition algorithms.

Main purpose of Automatic Video Incident Detection System is to increase safety on the road.

With hundreds of cameras deployed throughout highways and tunnels delivering the immense amount of information simultaneously, it is impossible even for a group of human operators to
monitor and evaluate the information effectively or efficiently. Reliable AID system is a must in such environments because it significantly improves the efficiency of traffic management systems. It automatically reports dangerous situations and irregular traffic conditions, such as fire or smoke in a tunnel, stopped vehicle, slow vehicle, driving in opposite direction, pedestrians in traffic lanes, dropped cargo, or traffic congestion.

Lack of AID system means not to have an information on time (or not to have it at all!) about various incidents on the road, e.g. collision. These could mean further accidents as a result of queue and/or consequentially other damages.

**PERFORMANCE**

X-aid™ has superior detection performance compared to current video incident detection systems on the market, due to use of own unique algorithms. Video Automatic Incident Detection quality is evident in these most important AID parameters:

- **High Detection Ratio** - the number of incidents detected to the actual number of incidents in a data set
- **Low False Alarm Ratio** - the number of incorrectly detected incidents to the number of all detected incidents

**Detection Ratio** has direct effect on operators and concessionaires:

- Not spotting a Wrong-Way Driving on time nearly always results in a head-on collision. This will cause road closure and consequently, loss of income from toll. In the worst-case scenario, it may end up with the **loss of human lives**.
· Smoke/fire detection through video incident detection is the fastest information to be received if fire occurs in the tunnel. Seconds matter in that situation and not having timely alarm will cause slow reaction on the incident (e.g. if the tunnel is not closed on time more vehicle and people will be involved in the incident). This would cause serious implications such as: injuries, damage on infrastructure, cost of repair, cost of not having the tunnel in operation, etc.

· Without an AID in place, a stopped vehicle, usually caused by an accident, won’t be noticed until the operator sees a queue on CCTV streams. Typically, an operator can’t monitor video streams from all cameras deployed simultaneously. As a result, the operator’s reaction will inevitably be delayed and might result in further accidents.

False Alarm is the most annoying phenomenon related to AID today. Presence of False Alarm causes:
- **Cry Wolf Syndrome** - too many false alarms cause the operator to stop paying attention and not react when there is a real need for reaction.
- Not reacting to an alarm can lead to seriously deteriorated tunnel safety
- The Management will be forced to increase the number of operators to monitor all video streams simultaneously to prevent such situations
- The system will not be used to its full potential, which translates to irrational expense
- State-of-the-art automatic procedures that were deployed to help operating the highway/tunnel could become useless as their inputs are false or even worse are causing the damage. In some cases false alarms could cause a complete road closure. Road closures translate to direct financial losses (e.g. toll income loss, reopening costs, additional working hours for highway crews, etc.), but also indirect losses from bad publicity.

· **Agitated Operators** are unable to perform their duties properly, because of constant

*High immunity on all weather conditions*
harassment by false alarms. Agitated Operators lose focus and might overlook a critical alarm, skip procedural steps in emergencies, etc. in a tunnel is an operator that operates this sensitive and expensive construction not being focused.

ENSURING TOP PERFORMANCE

X-aid™ achieves both of the goals: low false alarms ratio and high detection rate, through these most important features:

- Use of own unique detection algorithms
- X-aid™ is not affected by the most common causes of unreliable operations:
  - Camera Vibrations
  - Weather Conditions
  - Luminance Variations
- Machine learning setup process and automatic calibration ensure that there is no need for periodic setup or calibration once the system is deployed.

MOST ADVANCED VIDEO RECOGNITION AND INCIDENT DETECTION TECHNOLOGY

Traditionally, counting object was dependent on the vehicle path line within a camera zone, Smaller objects (i.e. motorcycles) could be missed by a camera if there was another vehicle in the same zone. X-aid™ artificial intelligence recognition algorithms and machine learning setup process assure that no vehicle is missed, regardless of vehicle size or number of vehicles appearing within the configurable area supervised by a camera. X-aid™ guarantees high accuracy and the highest performance.
X-aid™ enables the user to configure the responses as well as parameters for video incidents using the intuitive, user-friendly topXview™ GUI, eliminating the need for switching between multiple platforms / systems.

INTEGRATED IN topXview™ PLATFORM

X-aid™ Video incident detection module is an integrated part of topXview™. This enables X-aid™ to have the fastest and the most reliable responses to visually detectable incidents. Combined with topXview’s configurable automated procedures, X-aid™ becomes a must-have life-saving tool for any responsible ITS owner.
# TECHNICAL CHARACTERISTICS

## Video Input
- Analogue [PAL, NTSC] with encoders (MPEG4...)
- Digital (IP) cameras
- Video capture card
- Video streams from topXview™ streaming server
- X-aid is capable of decoding the most common video formats. This includes, but is not limited to, MPEG 1/2/4 (including H.264 / AVC), MJPEG, etc.
- Multiple camera streams can be connected to a single AID analyzer. AID software detects events simultaneously from all cameras connected to the analyzer

## Detections
- Location of the vehicle in the wrong direction
- Location of stopped vehicle
- Traffic Slowdown (traffic congestion, configurable, 10 km/h threshold)
- Slow vehicle (speed threshold under which the vehicle is classified as slow is configurable by the user)
- Pedestrian presence and location
- Reduced or Loss of Visibility (smoke, fog, etc.)
- Fire

## Statistics
- Average Vehicle Speed (per interval)
- Vehicle Volume (per interval)

## Error Notification
- Video Signal Loss
- Camera Displacement - camera has moved from its original position

## System Error Notification
- Video Analyzer Error
- Video Analyzer Communication Loss

## Configuration
- Detection Zones
- Traffic Direction
- Events (alarms, statistics) for each zone
- Camera Calibration Parameters
- Enabling/disabling of events/statistics

## Operating System
- Windows

## Integration
- Completely integrated in topXview™ platform