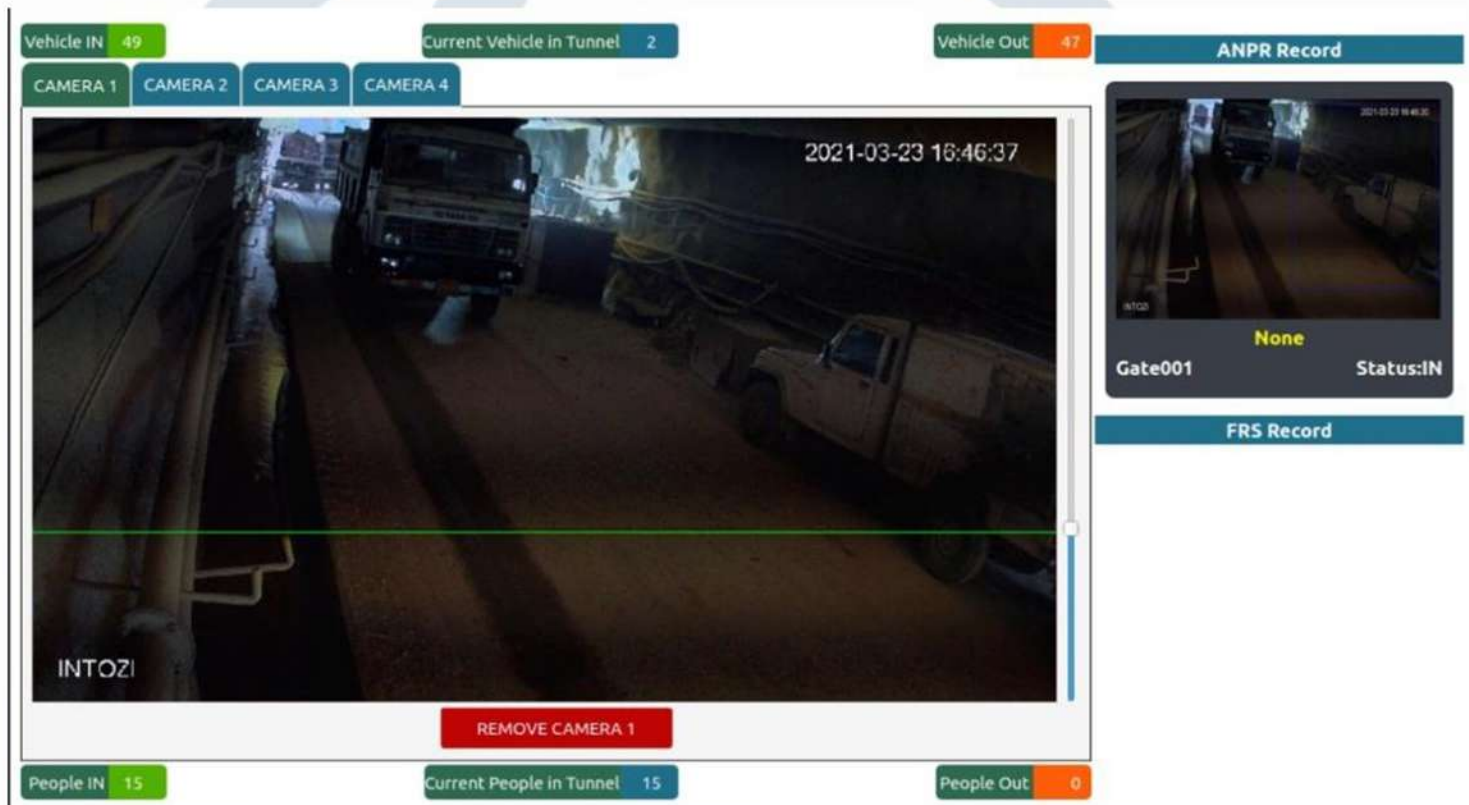


Objective: objective of this document is to list down all the key challenges faced in implementation of Video Analytic solution at three sites and approach adopted to solve these challenges. Case study of these challenges will help the implementation team to make clear strategies for future implementation by considering these challenges.

1. Positioning of Artificial lights:

Challenge: Lights mounted on the bothsides of tunnels were not fixed properly and their position gets changed time to time. These lights were creating problem for cameras to view the vehicles & workmen properly as light source facing camera directly diminish the camera visibility capacity.

Low Light Environment



The screenshot displays the Intozii video analytics interface for a tunnel. The main video feed shows a truck and a car in a dimly lit tunnel. The interface includes several data panels and controls:

- Vehicle IN:** 49
- Current Vehicle in Tunnel:** 2
- Vehicle Out:** 47
- ANPR Record:** Gate001, None, Status:IN
- FRS Record:** (Empty)
- People IN:** 15
- Current People in Tunnel:** 15
- People Out:** 0
- Camera Selection:** CAMERA 1, CAMERA 2, CAMERA 3, CAMERA 4
- Timestamp:** 2021-03-23 18:46:37
- REMOVE CAMERA 1:** (Red button)

Solution: All the lights impacting the vision of camera need to be fixed properly.

Ideal lighting positions



2. Dust:

Challenge- video analytic solution finds it tough to read the vehicle number clearly when the image is taken in dusty environment as extreme dust results poor visibility. Vehicles entering or leaving the camera view site on high speed likely to erupt more dust as compared to vehicles moving at slower speed. High speed will result more and more dust coming up from the surface.

Solution:

Water Spray: water spray should be done on regular intervals in camera view site to minimize the dust. Responsibility should be defined among site staff to do this activity on regular basis.

Speed Controllers: guidelines should be defined to slow down the vehicles while crossing the camera site. Implementation of speed breaker is another option to slow down the vehicle's speed.

3. Poor Number Plate Visibility:

Challenge: a majority of vehicle were either without number plates or number plates were covered by dust and mud. It was impossible to read the number plate characters properly as characters were not visible clearly. Machines like Cranes, man lifter machines etc. were without number plates. System was able to count the vehicle instead of reading the vehicle registration number

Muddy Number plates



Solution: custom tags (asset codes) were pasted on all the registered vehicles and system was trained to read the asset codes along with vehicle registration number. System was able to track the vehicles without number plates by reading

tags getting distorted are less as compared with number plates as these tags are pasted on inner side of windshield so that external factors like mud and dust should not distort the font written on tag.

Custom Tag for Asset Code



4.Width of Tunnel:

Challenge: there are sites (ADIT-2 particularly) where tunnels are very wider as compared to other sites. Higher degree of angle between Camera position and vehicle's number plate resulted inaccuracy in reading the characters from number plates.



Solution: solution to this challenge is addressed in two steps one is to define a proper path for each vehicle while entering and leaving the premise and another is to enhance the camera features to read the number properly for wider angle scenarios.

Entry Exit Path: A path must be defined for all the vehicles entering & leaving the tunnels so that camera should read the number plate properly. Marking of the path must be done while crossing the ROI of camera devices and it should be strictly followed by each driver, driving the vehicle.

Camera Upgradation- cameras with enhanced features to provide a clear view even for wider area should be selected for these sites. Camera should be selected after analyzing the area to be covered to track the vehicles. We suggest to go with PTZ camera for better accuracy.

5. Processing Hardware Capabilities - a small processing unit is being used for each site to process the live stream of 4 cameras. Current video analytic suit consists of 5 AI applications: Vehicle detection, Number Plate Detection, OCR reading, Face detection, Face matching. As required it is expected to detect and read asset code pasted on custom tag. Addition of two more AI apps will impact the system performance as hardware processing capabilities are

Solution:

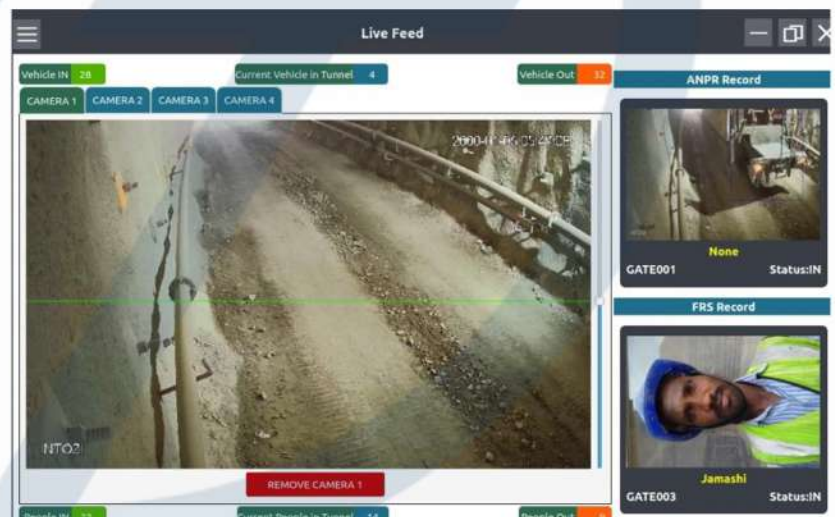
Hardware Upgradation: it is advised to use the hardware with higher processing capabilities in case there is addition of new AI apps to video analytic solution or in case there is addition of more cameras.

Intozi will provide hardware specification document for next sites

Workmen Tracking Module

1. User Training issue:

Challenge: a clear image should be used for user registration but few cases were reported where image quality was not adequate enough to use for face recognition by video analytic application. There were images with lot of objects & lights in the background. System had provision to browse any image file



Solution:

User training: guidelines for image quality standard for images to be used for user registration were provided to administrator of the system from L&T team.

System Modification: provision to browse image in user registration section is removed and user can only capture the image using live camera attached with his/her system. Secondly administrator can register a user using mobile application.

2. Face Punching guidelines:

Challenge: few workmen did not followed guidelines for punching. Using mobile phone while punching, using



Intozzi is a company which works on new age technologies like Artificial intelligence, Computer Vision and Machine learning, with the moto of taking leverage from cutting edge technologies like A1 and computer vision we are focused the use these technologies in order to solve the complex problems of real life scenarios.



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