

KritiKal Offerings in Port Management Solutions

A deepening phase of globalization in the business world will impact every aspect of operations in the Port and shipping industry. A shipping port is a complex system and faces new challenges every day, requiring various technology solutions. Ports and Terminals everywhere in the world strive for efficiency, while increasing the service levels for their customers. The need is not of standalone initiatives but a complete set of integrated solutions that ease the process of port management.

KritiKal provides an entire range of solutions which can be applied to various ports and terminals. The system facilitates an effective management and operations at gate, yard, loading and unloading zones for modern ports and terminals. For better decision- making the system provides users with real time information about the cargo. The solutions can be customized as per the need and can improve the overall efficiency of the port and enhance profitability. The solutions comprise of the following:

- Container Mosaicing
- Container OCR
- Seal Detection
- Smart Camera
- KLiPR



Container Mosaicing:

Container mosaicing engine enables us to do selective mosaicing of a sequence of frames captured by cameras, which were positioned to capture video of top and side view of the container.



Functioning:

KritiKal designed and developed an independent module for CME. The software for CME consists of a Container Mosaicing Module (CMM) that encompasses an Interface module (IM) and a Mosaicing module (MM). Container Mosaicing Module manages the entire mosaicing process. At initialization, a system initiates an object of the CMM module and passes on the input parameters and the name of a configuration file to it. The configuration file contains various mosaicing specific parameters that are used by the Mosaicing Module and its sub modules. On receiving the signal for mosaicing transaction, the CMM instructs the IM object to read in the input images and then calls appropriate functions within the MM in order to create the mosaic. The MM returns the mosaic image (summary image) to the CMM, which then instructs the IM object to store the summary image on the disk and set the variables for the filename, width and height of the mosaic image. These parameters are then returned to the client's system.

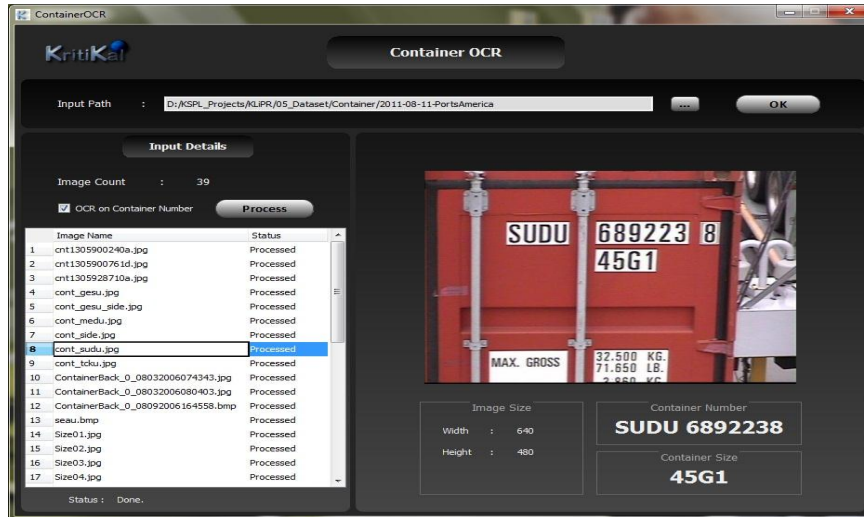
Features:

- ✓ Automates the surface inspection system.
- ✓ Reduces the inspection time per container, all surfaces are processed in parallel.
- ✓ Reduces the cost of operations.
- ✓ Provides transaction logs for future.
- ✓ Helps in object detection on vehicle surface.

As the vehicle enters the port, the Container Mosaicing Engine creates a mosaic of various sides of the container. These mosaics help in vehicle inspection, optical character recognition and object detection on vehicle surface.

Container OCR-

Kritikal's Container Number OCR system automatically identifies records and verifies the Container ID number for both fixed and moving scenarios.



Functioning:

The Container Number OCR system is based on Kritikal's proprietary OCR Engine Platform and runs on both Windows and Linux. The underlying OCR Engine is customized for Container identification numbers (ids). This helps to translate images of printed text (here container ids captured using camera) into machine-readable form with a standard encoding scheme with 100% accuracy. The Container No. OCR system can be easily integrated with Kritikal's proprietary Automatic License Plate Reading System (KLiPR) for integrated solutions for a port/container terminal. The integrated system is suited for capturing, recognition and storing the Container No. / IDs along with License plate of the vehicles.

Features:

- ✓ Facilitates effective management and operations at gate, yard, loading and unloading zones for modern ports and terminals.
- ✓ Provides maximum access control and security management.
- ✓ Increases efficiency by processing images at less than 1 sec per image.
- ✓ Improves terminal entry and exit security, by providing 24-hour non-stop container number recognition.
- ✓ Facilitates automation of terminal, depot and/or vessel operations.
- ✓ Reduces operating costs by facilitating real-time global tracking and tracing of containers.
- ✓ Enhances and facilitates terminal's operations through consistent performance.
- ✓ Supports recognition of Container ID No., ISO Codes and Chassis No. reading on both moving and stationery containers.
- ✓ Automatic real-time recognition, recording and verification of Container ID Nos.
- ✓ Intelligent character recognition regardless of image source quality - image source may be partially distorted by rust, mud, peeling paint, fading colors and/or uneven lightning conditions.

The Container Number OCR System captures the number plate of the vehicle as it enters the port. It enhances the security at the port by keeping a track of the Container ID's of the vehicles, entering and exiting the ports. It also helps in Container Damage inspection.

Seal Detection-

The Seal Detection Engine looks at the images captured for the rear of the container and performs the seal detection on the images through the use of advanced object detection techniques.



Functioning:

KritiKal designed and developed an independent module for Seal Detection Engine (SDE). The software for SDE consists of a Seal Detection Interface (SDI) module that encompasses a Localization module (LM), Detection Module (DM) and a Correlation module (CM). At initialization, the existing system initiates an object of the SDI module and passes on the input parameters and the name of a configuration file to it. These parameters control the behavior of the different functional components viz. localization of seal in images, detection of seal in localized images and consolidation of individual results to derive final result for the transaction. The SDI reads in the configuration file and initializes itself and its sub-modules. This initialized SDI object is then used by existing system to initiate process of seal detection for transactions. Once the process of seal detection is initiated, SDI first invokes the Localization module to identify probable regions containing seals in each image of transaction. Once the localization module has done its job, SDI feeds all marked images to the Seal Detection Module (SDM). SDM comes up with an affirmative and negative response on every image for presence of seal with certain accuracy. After this, SDI would collate all these individual results from the individual images and pass it on to Consolidation Module (CM) to generate a consolidated result of seal detection.

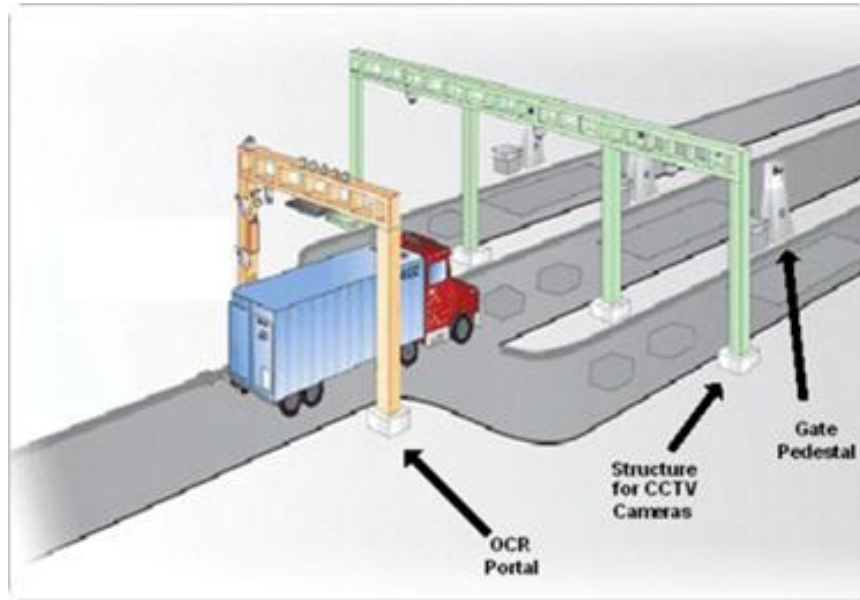
Features:

- ✓ Reduces the inspection time per container with instant result to the operator
- ✓ Obviates human intervention to detect seal on the container surface.
- ✓ Provides reports of all transaction records, providing visual evidence.
- ✓ Reduces the cost of operations.
- ✓ Provides competitive advantage in fiercely competitive container logistics industry.

Seal Detection Engine enables authorized marine operators to detect the presence or absence of seal on the containers as it enters the port. It saves time as the entire process is automated and devoid of human intervention.

Smart Camera:

Smart Camera is a camera based solution which uses Matrox Iris Camera to produce high resolution images for successfully performing OCR on container Ids.



Functioning:

SmartCAM Lite records video and create / save relevant frames to the existing system server. SmartCAM Lite can start / stop recording video based on motion detection algorithms. When a new object enters the cameras view, SmartCAM Lite starts recording. When an object stops moving or exits the camera view, SmartCAM Lite stops recording.

Container terminal operators worldwide have expressed the need for accurate real-time accounting of incoming, outgoing and existing inventory. Accelerated growth in container traffic, coupled with new port and security initiatives have caused terminals to employ systems providing automated identification and tracking of containers as they enter and exit a terminal. Structures consisting of multiple cameras are positioned to capture critical cargo attributes (i.e., container ID) as trucks enter and exit a facility. It captures video clips based upon objects recorded from video streams, and logs them in an indexed database by timestamp. To successfully perform OCR (optical character recognition) on Container IDs, images should be captured at a high resolution. Such a requirement is met by installing Matrox Iris P Series cameras. The Matrox Iris is a high resolution progressive scan camera with hardware for image sensing and an embedded PC.

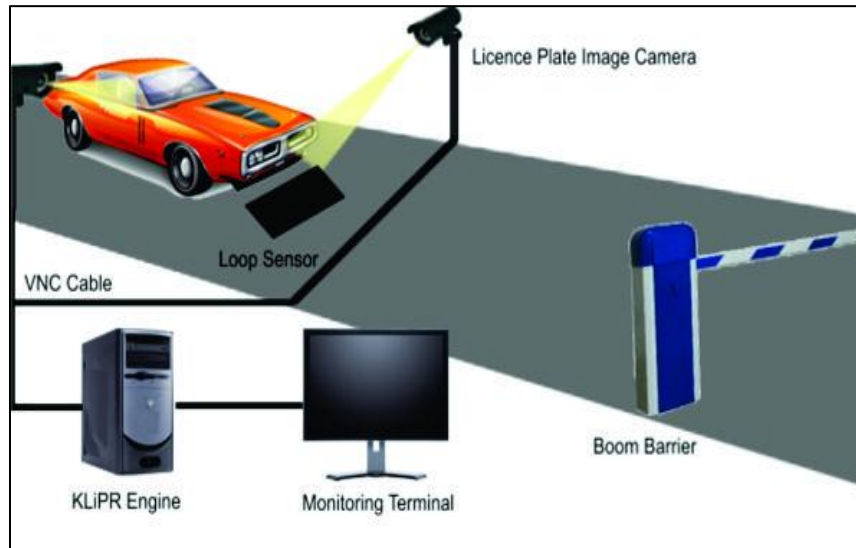
Features:

- ✓ Localizes the image processing on cameras.
- ✓ Reduces load on the server
- ✓ Reduces bandwidth usage within the network.
- ✓ Reduces the cost of operations.
- ✓ Provides competitive advantage in fiercely competitive container logistics industry.

As the vehicle enters the port, the smart camera records the high resolution photograph and processes it. Containers can be easily identified with the help of OCR technique.

KLiPR

KLiPR is a state-of-the-art automated number plate recognition system that enables real-time identification of vehicles by capturing and analysing a moving vehicle's number plate using live camera feed.



Functioning:

KLiPR is based on advanced pattern recognition, image processing and artificial intelligence techniques. The system uses KritiKal's proprietary localization & segmentation algorithms for detection and OCR engine for reading number plates in any language. KLiPR can detect heterogeneous number plates in variable character sizes, fonts & colours. It can easily integrate with physical access control devices like boom barriers and sliding gates. KLiPR also has the added advantage of driver face detection module. The automated information resource of the system adds a vital dimension in decision-making process for the marine operators. They can easily record the number plate of the vehicle as it enters the port.

Features:

- ✓ It can be easily integrated with entry exit control system, automatic container monitoring solution etc.
- ✓ The product has been designed keeping in mind Indian non-standard heterogeneous type of license plates.
- ✓ Works with both analog and digital cameras.
- ✓ Provides the added advantage of driver face detection.

All the above solutions from KritiKal can either be applied individually or be seamlessly integrated to provide a complete solution for port management. The complete automation of container management and logistics will not only increase the efficiency of ports and terminals, but also provide them with a competitive edge.

Cameras can be installed at all entry and exit point of ports and terminals. As the vehicle enters the port, the mosaicing engine creates a complete mosaic of the vehicle and the OCR engine detects the container ID number. The seal detection detects the presence or absence of seal on the container, simultaneously checking if any seal is broken or not. The images are recorded with the help of a Smart Camera which provides us with high-resolution images ensuring 100% accuracy. KLiPR provides us with the number plates of the vehicles entering the port. This helps us to keep a track of the vehicles entering and exiting the port. All the solutions, when combined provide a fully automated Port Management System.