



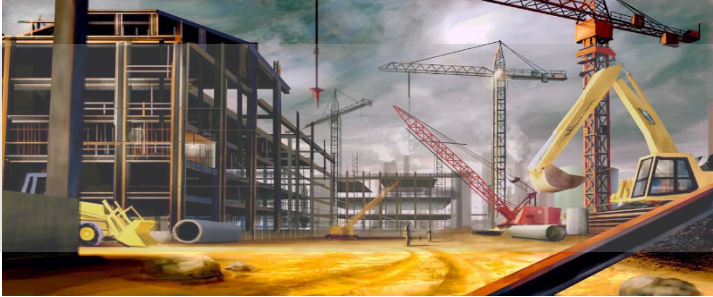
KARTA-X
TECHNOLOGIES

Karta-X AI Assisted Construction
Safety Analytic
(KACSA)

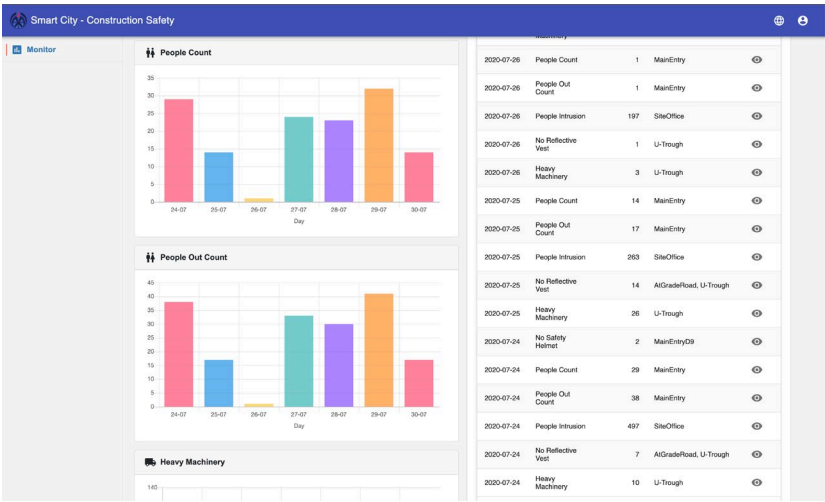
July 29th, 2020



PRODUCTION PRESENTATION



- **Application Name:** Karta-X Technologies Limited
- **Product Name:** Construction Safety Analytics (CSA) – Smart Construction Surveillance System
- **Specification:**
 - CSA is a one-stop smart construction site platform, including video analytics, AI, IoT, low power wireless, data analysis and device management, for construction worker safety management, primary designed for site safety teams.
 - The platform currently consists of several modules that allow site staff to determine what worker behaviors to be alerted on and allow all AI algorithms and warning devices to centrally submit alerts for central storage of all necessary records.
- **Core Functions:**
 - AI software and hardware-based construction safety data collection and analysis
- **Technology Used:**
 - Video analytics, AI algorithm, IoT, Low power wireless, device management and data analysis
- **Construction Process involved:**
 - Site entrance and Machine operation area
 - Data collection and analysis
- **Key Improvement in Construction Process:** Safety
- **Job Reference:**
 - NE/2017/08 – Cross Bay Link, Tseung Kwan O Road D9 and Associated Works, Adoption, 2019
 - Crawler crane trial site - Pat Heung , Trial, 2019



INNOVATIVE FEATURES



- **Core Technology:**
 - AI software and hardware-based construction safety data collection and analysis
- **Comparison with current practice models & Competitors:**
 - **Current practice models:**
 - Custom construction worker clothing detection (eg: some projects do not use orange reflective vest)
 - **Competitors**
 - One of the first software + hardware-based platforms in Hong Kong that has a horizontally integrated set of functions designed specifically for site safety teams.
 - Most solutions we have found is focused on either data analysis + software AI, or hardware AI or low power wireless.
 - **Our model:**
 - Technology: AI algorithm
 - Specification:
 - a) Edge AI engine - AI analysis doesn't not require internet connection
 - b) Web based UI for data analytics, alerts, daily data export, incident video clipping review
 - c) Worker in/out counting for worker walk-path enforcement
 - d) No orange worker reflective vest detection (Enforce workers in a specific zone has correct PPE)
 - e) No safety helmet (Enforce workers are wearing PPE upon entry to construction site)
 - f) Mobile apps for real-time alerts with photo snapshot of non-compliant event
 - Benefits including cost benefits
 - a) Increase in Workers' general safety awareness.
 - b) Assist site safety team to enforce safety programs.
 - c) Assist site project manager and safety team to manage overall site safety.
- **Product Launch Date:**
 - First Launch Date: 06/2019 in Hong Kong
 - Product latest version update: 03/2020



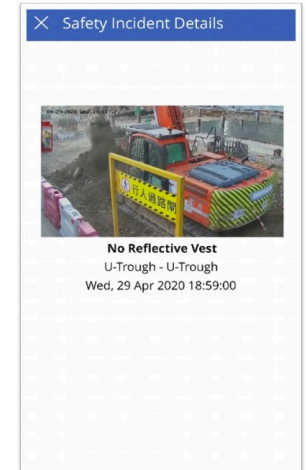
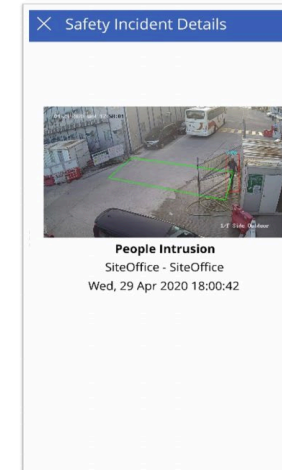
ADOPTION EXAMPLE



- **Project for Illustration:**
 - Name: Construction Safety Analytics (CSA) – Smart Construction Surveillance System
 - Location: Cross Bay Link, Tseung Kwan O – Road D9 and Associated Works
 - Time: May 16th , 2019 to May 20th , 2020
- **Work Process Involved:**
 - Site entrance and Machine operation area
 - Data collection and analysis
- **Use/Function in Project:**
 - For site entrance:
 - In/Out head-counting
 - Non wear safety helmet alert
 - Non wear safety reflective vest alert
 - For machine operating area:
 - Fixed safety zone alert
 - Data collection and analysis
 - AI software and hardware-based: Edge AI engine, no internet connection requirement
 - Web based UI and Mobile apps for data analysis, alerts, daily data export and incident video clipping review

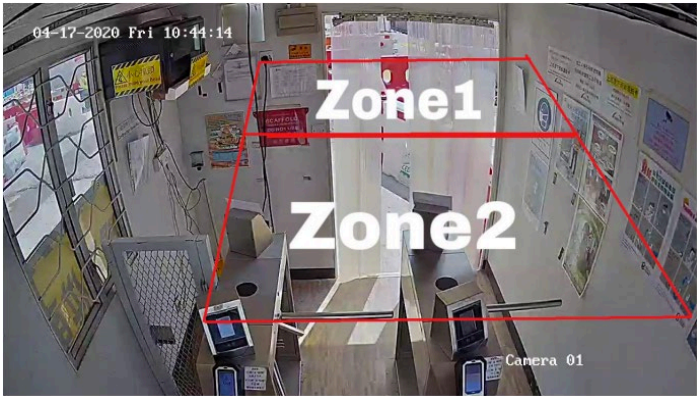
People Intrusion	>
Site Office-Site Office	
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People Intrusion	>
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People Intrusion	>
Site Office-Site Office	
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No Reflective Vest	>
U-Trough-U-Trough	
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U-Trough-U-Trough	
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No Reflective Vest	>
U-Trough-U-Trough	
Wed, 29 Apr 2020 18:44:34	

Refresh



Mobile app for alert:
Reach of safety instance alert & Access alert details via smartphones

ADOPTION PHOTO



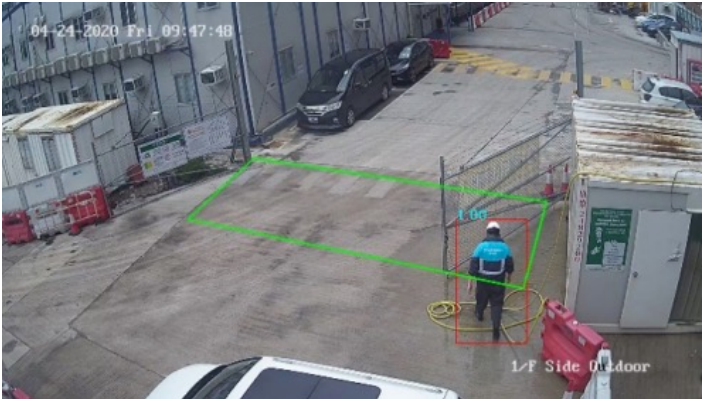
People In/Out Count



Demo of non-wear yellow reflective vest detection



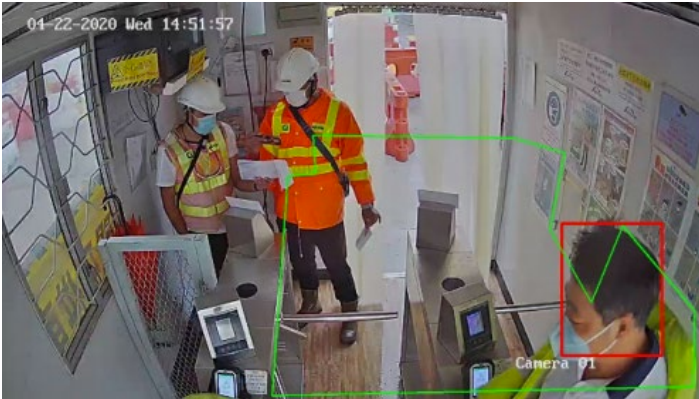
Demo of person with yellow and without yellow vest



People Intrusion



Heavy Machine



No safety Helmet

BENEFITS – IMPROVE SITE SAFETY DURING THE CONSTRUCTION PROCESS



Improve Safety by:

- **Recognition of reflective vest, safety helmet by labelling displayed.**
 - To raise workers' awareness to meet all Personal Protective Equipment (PPE) requirements in work sites.
- **Heavy machinery detection**
 - To ensure the safety of workers when working with heavy machines, alert message is sent if they are locating very near to moving motor vehicles or cranes.
- **Detection result with image proof is saved on the cloud and video clip is saved on site.**
 - To reduce the patrol time of the safety officers, who can review the situation on site by occurrence. When unsafe incident detected by the system, system fires alert message to notify the designated officer for corrective action.
- **Unsafe alert history tracking**
 - To help the safety team to analyze improvement issues to rectify current insufficiency.
- **Suspicious person detection**
 - To identify non-company person by the system.

Aspect for Assessment	Quantitative Performance		Improvement in Performance	
	Our product	Traditional Method	Absolute Value	Percentage
Increase in data points	7 hours/day	15 minutes/day		
Improvement in response time	Alerts are delivered in seconds.	During safety review meetings		
Improvement in PPE compliance rate			200+ events/day to 10 events/day in 09/2019	95%