AI Builds the Future: Smart Solutions Revolutionize Construction Sites

人工智能建構未來：
智慧方案革新建築工地

Transcendence Company Limited | 海宏技術有限公司

Introduction

In recent years, Artificial Intelligence (AI) has been making significant progress and transforming various industries. One sector where this change is particularly noticeable is the world of communications, including broadcasting and telecommunications. The introduction of the C-SMART Safety Solution in Hong Kong is a prime example of how AI advancements are being applied to practical construction site safety management.
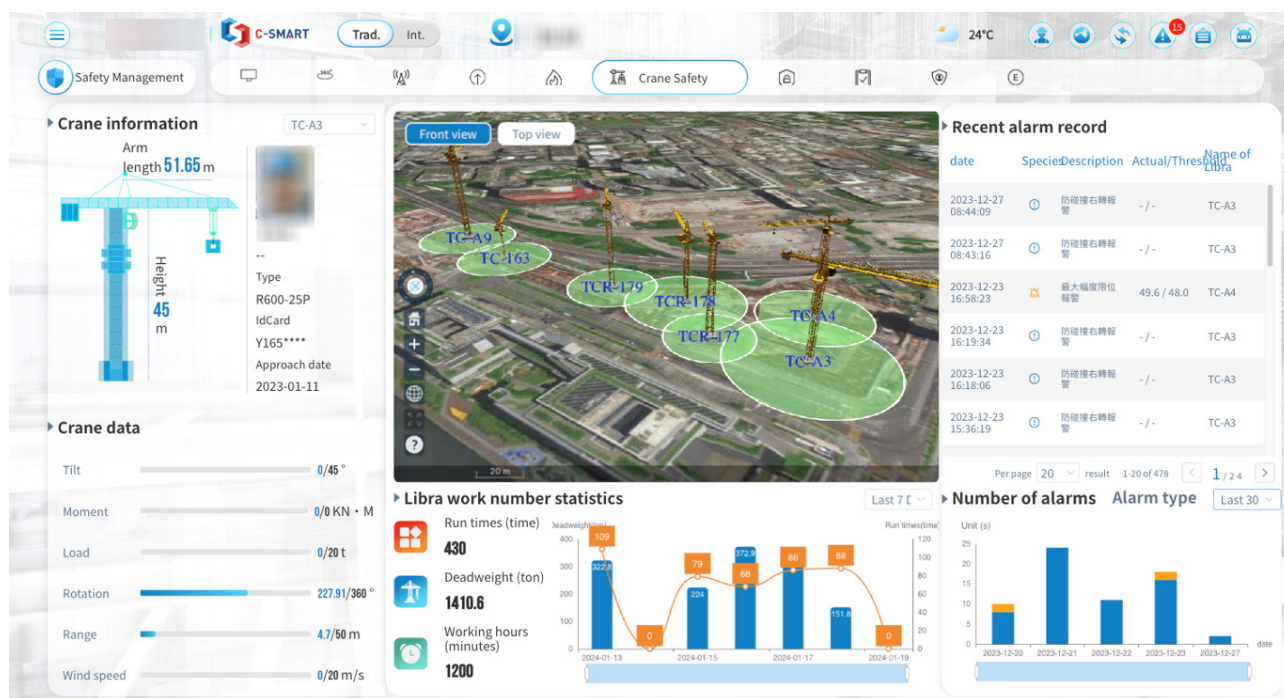
The C-SMART Safety Solution for Construction Sites offers an innovative way to elevate safety standards in Hong Kong. By utilizing AI technologies like machine learning and cloud computing, this cutting-edge solution can effectively pinpoint and tackle safety risks on construction sites. These safety features cater to industrial common concerns such as irregular operational methods that could lead to safety hazards or even tragic accidents. Additionally, by integrating hardware components like wireless alarms with AI technology, the system not only boosts safety measures but also streamlines construction management processes. By consolidating data on the platform, thorough analysis can continuously optimize safety protocols, resulting in improved operational efficiency and safety in construction environments. This inclusive approach, which integrates AI, customized

介紹

近年來，人工智能（AI）在各行各業都取得顯著進展並推動通訊領域，包括廣播和電訊業變革。C-SMART 安全解決方案就是其中一個例子，展示如何將 AI 技術應用於實際的工地安全管理。

C-SMART 安全解決方案為香港提供安全標準的創新方法。該方案運用機器學習和雲計算等 AI 技術，有效識別和應對工地安全風險。功能有效針對業界常見的問題，系統將無線聲光警報器等硬件與 AI 技術結合，不僅加強安全，更簡化施工管理流程。通過在平台上整合數據，系統能夠進行全面分析，持續優化量度安全的標準，從而提高施工環境的運營效率。融合 AI 和硬件設備制定的安全方案，體現提升建築業安全標準的變革。

safety solutions, and hardware components, illustrates a transformative strategy aimed at enhancing safety standards within the construction industry.
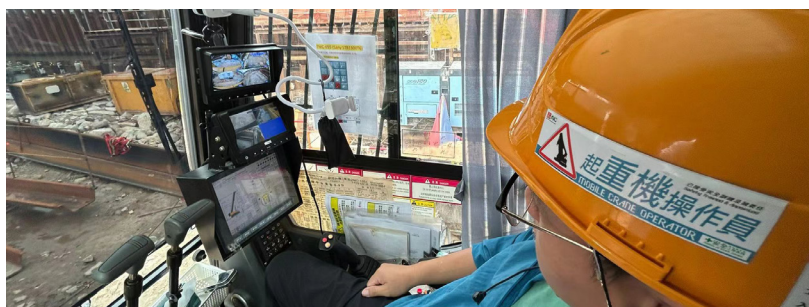

C-SMART Site Safety System

As construction projects have grown increasingly complex, AI technology is playing a crucial role in enhancing on-site safety. C-SMART's AI Safety Solution offers the following features to help construction teams improve worker safety and project efficiency:

1) AI Safety Monitoring function

Uses CCTV for analyzing unsafe behaviors, monitors common safety violations on site, tracks the number of floor workers.

2) AI Fire & Smoke Detection

Operates 24/7, utilizes AI-based detection algorithms, issues real-time alerts with GPS location, employs a combination of visible light and infrared cameras.

3) Driving Safety Management

Leverages AI and infrared cameras to monitor driver status, capture records of unsafe behaviors, implement blind spot monitoring, and provide driving assistance prompts.

C-SMART 智慧安全方案

隨著建築項目日益複雜 AI 技術在提高工地安全方面發揮關鍵作用。C-SMART 的 AI 安全解決方案提供以下功能，幫助建築團隊提高安全和管理效率：

1) AI 安全監測功能

利用閉路電視分析不安全行為，監測現場常見安全違規情況，追蹤樓層工人數量。

2) AI 火災和煙霧檢測

全天候運作，採用以 AI 為基礎的檢測算法，發出實時警報並提供 GPS 位置，結合可見光和紅外攝像機。

3) 駕駛安全管理

利用 AI 和紅外攝像機監測駕駛員狀態，記錄不安全行為，實施盲點監測，提供駕駛輔助提示。

4) Tower Crane Safety Monitoring System

Applies AI to identify potential hazards in the lifting area, integrates sensors like wind speed sensors for continuous monitoring, triggers alarms for collision risks.
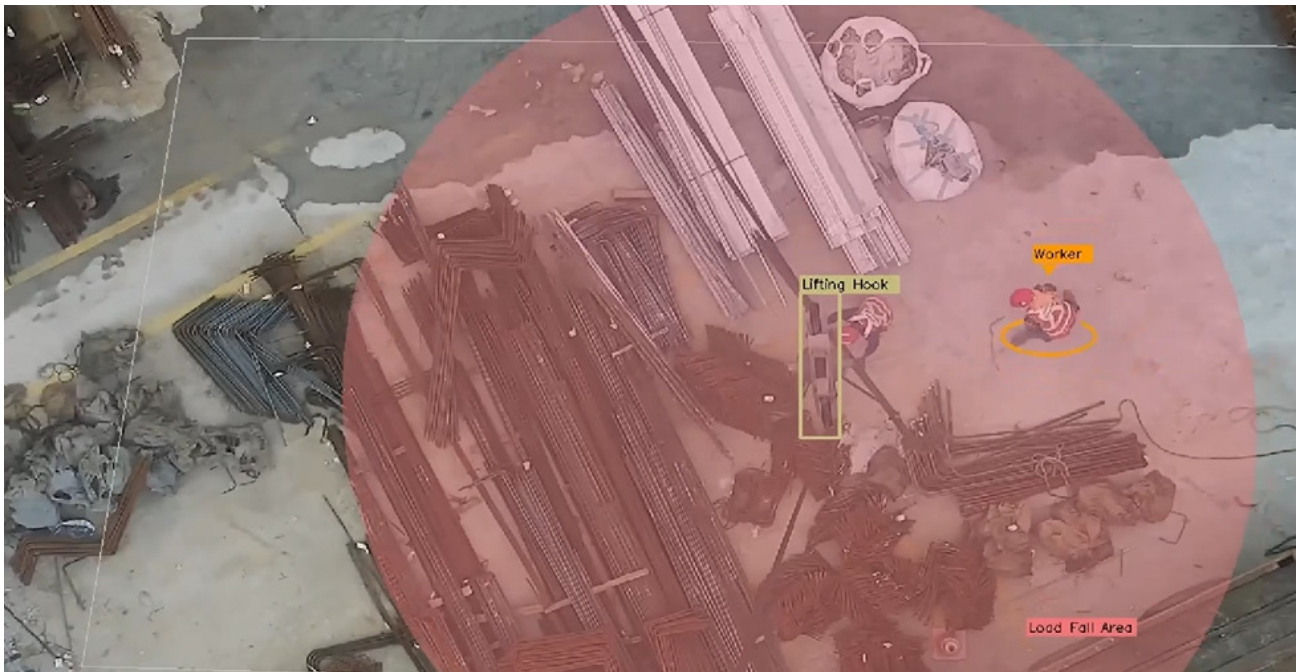
5) The 360 Anti-Collision System:

Uses a 360-degree camera on mobile machinery for real-time monitoring, employs AI to identify potential collision hazards, equips driver cabins with monitoring screens for enhanced awareness.

4) 天秤安全監測系統

應用 AI 識別起重區域潛在危險，整合風速傳感器等設備進行持續監測，對碰撞風險發出警報。

5) 360 度防碰撞系統：

在移動機械上使用360度攝像機進行實時監控，運用 AI 識別潛在碰撞危險，在駕駛室安裝監察屏幕以提高警覺性。

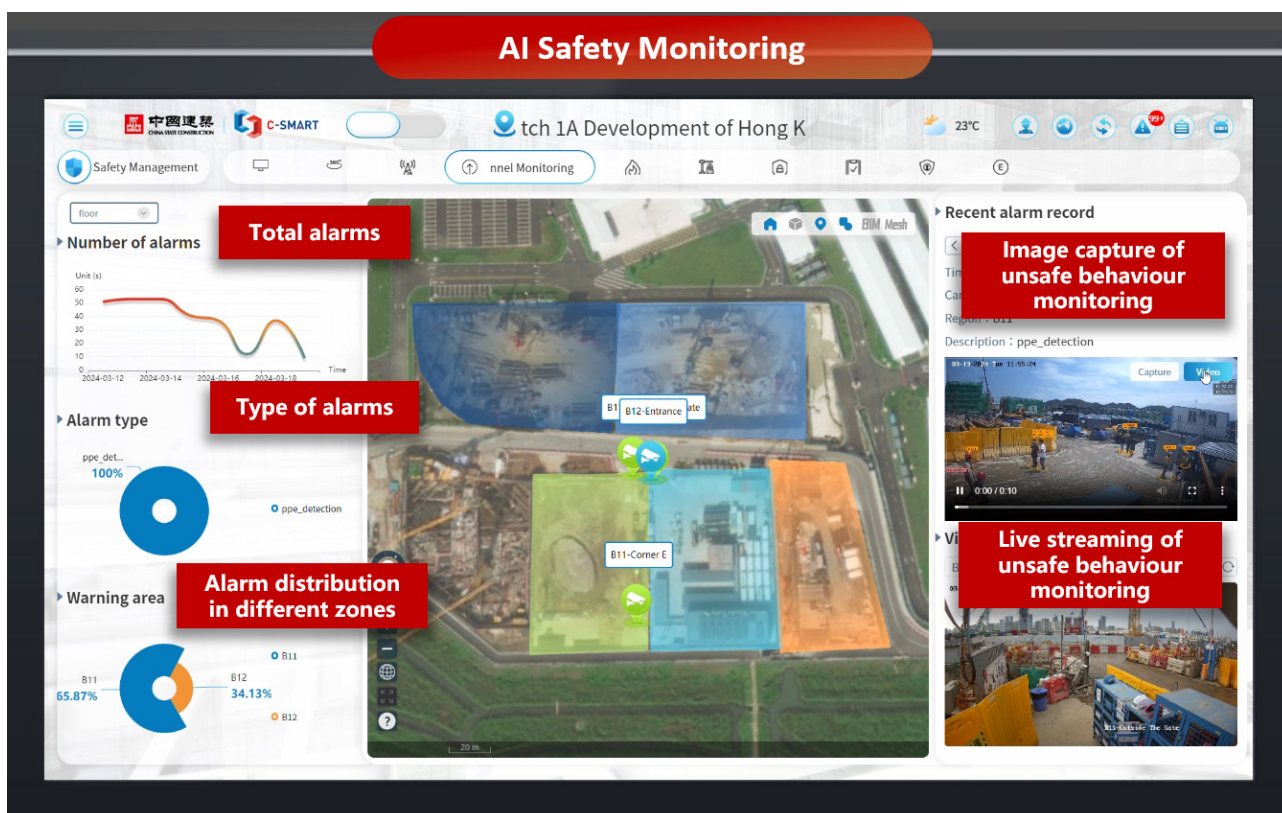## Leveraging AI to Transform Construction Site

The implementation of the C-SMART Safety Solution in construction sites has demonstrated significant benefits and positive impacts through successful case studies. A notable demonstration of its effectiveness occurred on May 8th, 2022, at Penny's Bay Quarantine Centre, when the system successfully prevented a fire incident at the construction site using unmanned drones and round-the-clock CCTV monitoring. It has contributed to maintaining a zero-fire record for the project.

The safety solution has successfully reduced the accident rate by 20% and maintained a zero record of fatal accidents, representing a significant improvement in workplace safety and risk mitigation.

運用 AI 改變建築工地

C-SMART 安全解決方案在建築工地成功展示其效益，2022 年 5 月 8 日在竹篙灣檢疫中心，該系統成功利用無人機和閉路電視監測防止工地火災事故的潛在風險，為該項目達至零火災紀錄。

該安全解決方案成功將工地事故率降低 20%，並保持零致命事故紀錄，顯示系統有效提升工地安全。

AI Safety Monitoring

Labels within image:
- Total alarms
- Type of alarms
- Alarm distribution in different zones
- Image capture of unsafe behaviour monitoring
- Live streaming of unsafe behaviour monitoring

Achieving 93%+ Accuracy in AI-Powered Construction Site Safety

The C-SMART Safety Solution is praised for its innovative approach to safety management in the construction industry. Its success stems from the careful selection of algorithms and models tailored to meet user requirements effectively. Furthermore, the solution's effectiveness is enhanced through extensive data training, continuous adjustment of parameters, and regular validation and optimization of models. These processes have resulted in an impressive accuracy rate of over 93% for the "AI Smart Safety Solution." It offers a reliable and efficient method for managing site safety, ensuring that construction sites are well-managed and risks are minimized.

The solution exemplifies how AI can be practically applied in the communications sector, particularly in construction site safety. As the digital era continues to evolve, the potential for AI to improve the telecommunications and broadcasting sectors is extensive. This includes developing smarter, more sophisticated solutions, as well as creating safer and more responsible work environments for employees.

AI 準確率達 93% 以上

C-SMART 安全解決方案於業界備受表場,其算法和模型能夠有效滿足用戶需求。此外,通過大量數據訓練,持續調整參數以及定期驗證和優化模型,進一步提高解決方案的效果,令準確率達到 93% 以上。方案為管理工地安全提供可靠而高效的方法,確保建築工地達至有效管理,減低安全風險。

該解決方案展示 AI 如何在通訊領域,特別是在建築工地安全的實際應用。隨著數字化時代不斷發展,AI 在各個域的應用潛力巨大。這不僅包括開發更智能、更先進的解決方案,還有為員工創造更安全的工作環境。