對抗高溫高濕環境的工地預警系統

Early Heat Stress Warning System for Site Work in Hot and Humid Environment

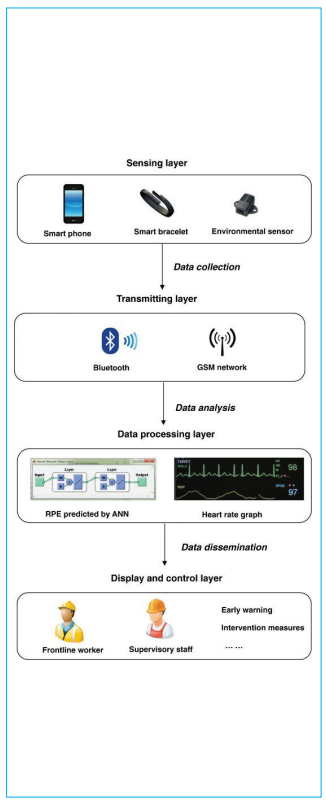
能夠提升建築工人安全、健康及效率的人工智能綜合管理系統

An AI-based integrated management system for enhancing safety, health and efficiency of construction workers

熱應力增加事故發生率，甚至威脅工人的性命安危，是建造業常見的職業健康危害。為保障工人的健康，理大開發了一套預警系統來實時監察工人的熱應力水平。

系統具備多個自動感應設備（例如環境傳感器、智能手機等）和人工智能熱應力計算引擎，可量度工作需求、現場環境條件和工人的生理因素，並綜合它們於熱應力風險上的相互影響。系統可以預測工人在炎熱潮濕環境中的熱應力水平，當觸發特定界限後，系統會實時發送健康警報及相應的預防措施建議到個別工人的智能手機，以防止和減少暴露於高溫環境的有害影響。

監測工人的生理參數
Monitoring physiological parameters of workers



預警系統的架構
Architecture of the early-warning system

Heat stress is a common occupational health hazard in the construction industry which increases incident rates and even threatens life. To safeguard the wellbeing of workers, an early warning system has been developed to evaluate and monitor workers' heat strain level in real time.

Incorporating several automated sensing devices (e.g. environmental sensors, smartphone) and a heat stress artificial intelligence engine, the system measures work demands, on-site environmental conditions and the physiological factors of workers, and correlates their combined effects with the risk of heat stress. The system can predict a worker's heat strain level, and identify proper precautions against the hazards and risks in a hot and humid environment in real time. Once certain thresholds are triggered, health alert messages with suggestions of corresponding intervention measures will be sent to individual workers' smartphones to prevent and reduce the harmful effects of heat exposure.

Principal Investigator
Prof. Albert P.C. CHAN
Department of Building and Real Estate
Contact Details
Institute for Entrepreneurship
Tel: (852) 3400 2929 Fax: (852) 2333 2410 Email: pdadmin@polyu.edu.hk

Access More info via mobile
Note: Subject to data charges by mobile operators

特色與優點

- 結合智能傳感、位置追蹤及信息通信技術，以測量工作環境參數、監測工人的生理因素，並自動將實時健康警報發送給員工
- 融合人工智能熱應力計算引擎，按人工神經網絡模型進行深度學習計算，以發出不同級別的健康警報
- 向工人發出健康警報及相應的預防措施建議，以保障他們的健康
- 協助加強現場預防措施，在緊急情況中作出應變，並制定解決問題的方案

應　用

- 用作保障前線工人安全與健康的監測措施
- 支援風險分析
- 可因應不同國家、工作環境及行業需求以設計適用的系統

獎　項

香港建造業議會創新獎 — 建造安全組第一名 (2019年12月)

在建築工地進行中期評估
Taking interim assessment on construction sites

Special Features and Advantages

- Integrates smart sensing, location tracking and information communication technologies to measure working environmental parameters, monitor workers' physiological factors, and automatically send early warnings to workers
- Incorporates the heat stress artificial intelligence engine which performs deep learning computation with the artificial neural networks model to prompt different levels of warnings
- Prompts health alert messages with suggestions of corresponding intervention measures to workers to safeguard their wellbeing
- Helps strengthen on-site precautionary measures, instantly respond to emergency and formulate post-incident solutions

Applications

- A surveillance measure for safeguarding the health and safety of frontline workers
- Support for risk analysis
- Applications in other industries, working environments and countries

Award

Construction Safety 1st Prize of the CIC Construction Innovation Award 2019 (Dec 2019)

2_BRE_06_0620