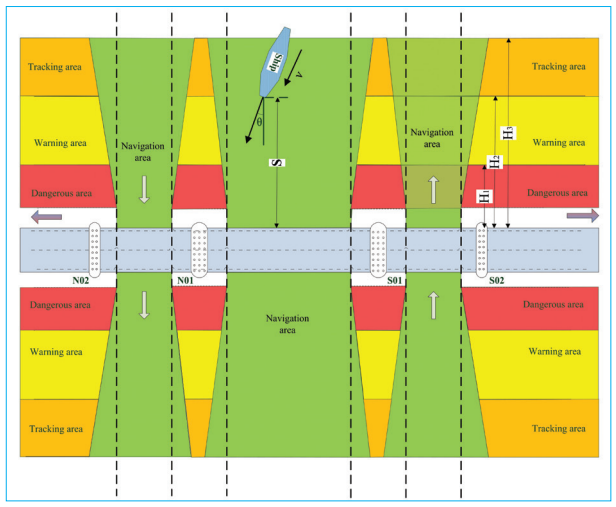
THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

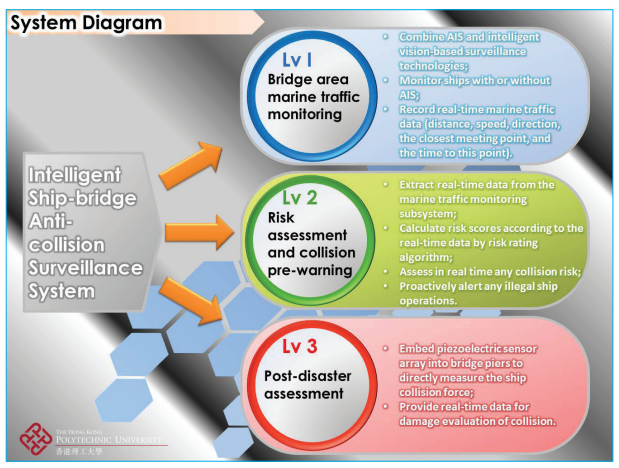
橋樑防船撞智能監控系統
Intelligent Ship-bridge Anti-collision Surveillance System

成為橋樑的「黑盒」並提供多級主動防船撞保護
Bridge's 'black box' and active multi-level collision prevention

將AIS和智能視頻監控引入橋樑工程，主動監控橋區水域船舶航行，監測船舶操作及主動預警船撞危險。發生船撞事故時，及時發出警報和疏散，避免傷亡。研究人員開發了船撞力識別新技術，採用壓電感測器直接測量船撞力，系統並會實時全程記錄船撞事故、監測船撞引起的橋樑損傷程度，作為橋樑的「黑盒」提供監測範圍內船舶活動和其對橋樑結構衝擊的全面記錄。



監控區域劃分示意圖
Schematic of Surveillance Zones



系統組成
System Diagram

This system functions as a 'black box' of the bridge to provide a full record of ship activities near the bridge area and impact to the bridge structure. Incorporating Automatic Identification System (AIS) and smart vision-based monitoring technology into the security of bridge, this system can actively monitor marine traffic, evaluate the route of ship movements and send out warning signals to the ships likely to collide with the bridge. Novel piezoelectric sensors are embedded in the bridge as well to build up a new method for impact force monitoring and damage evaluation of collision.

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Access More info via mobile
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特色與優點

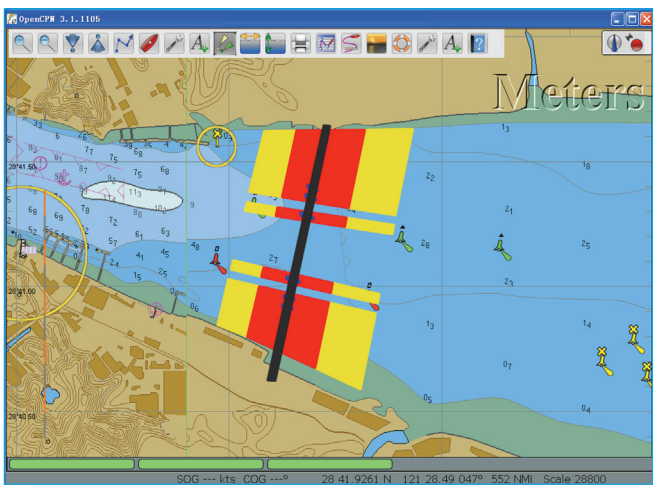
- 主動監控橋區水域船舶航行
- 在船撞事故後及時發出警報和疏散
- 提供船撞事故的全面記錄和風險評估
- 採用壓電傳感器直接測量船撞力，開發船撞力識別新技術
- 相比要求每艘船都安裝高科技導航、定位儀器，本系統更為可行、有效和經濟

應　用

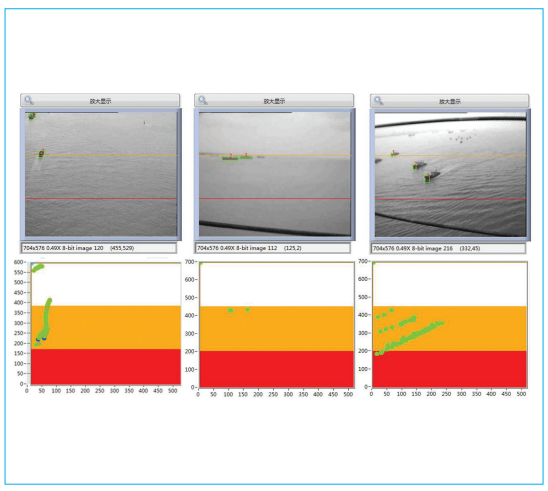
- 系統適合安裝於跨江、跨海大橋，進行主動防船撞保護
- 系統收集的數據有助專家進行船撞力及風險評估、緊急應變管理和大橋修復

獎　項

- 第15屆上海中國國際工業博覽會 - 創新獎 (2013年11月)
- 第41屆瑞士日內瓦國際發明展 - 金獎 (2013年4月)
- 摩爾多瓦知識產權局特別大獎 (2013年4月)



AIS 監控軟件介面
AIS Monitoring Program Interface



智能視頻監控軟件介面
Smart Vision-based Monitoring Program Interface

Special Features and Advantages

- Actively monitor and warn ships in the bridge area
- Enable immediate alert and evacuation in case of collision
- Provide a full record and risk assessment of collision
- Build up a new method for impact force monitoring and evaluation with application of piezoelectric sensors array
- Much more cost-effective and efficient than equipping hi-tech navigations on every single ship

Applications

- The system can be implemented in sea-crossing and river-crossing bridges to actively prevent ship-collision-to-bridge
- The data collected can be used for impact evaluation, risk assessment, emergent arrangement and bridge rehabilitation

Awards

- Creation Award – The 15th China International Industry Fair, Shanghai (November 2013)
- Gold Medal – 41st International Exhibition of Inventions of Geneva, Switzerland (April 2013)
- Prize of L'AGEPI - Special Prize of State Agency for Intellectual Property, Republic of Moldova (April 2013)

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