

# 13<sup>th</sup> GOLDEN SILICON AWARDS

## A13-200

Heart circle - Real-time 360 degree panoramic mall service system

行星環一貼心即時 360 度環景商場服務系統

### 隊伍名稱

我還有點餓 / Still hungry

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### 作品摘要

本作品為可應用於商場及旅遊景點等環境之創新即時360度商場環景系統，其核心技術包含360度環景接合、動態接縫處理、魚眼校正與頻寬偵測傳輸技術，消費者可以藉由本系統於家中電腦、隨身智慧型裝置，取得遠方商場及旅遊景點的即時視訊和優惠訊息。在商場透過此360度環景技術，消費者可以先行了解各項商品之擺放位置、商品區域規劃與分類實際位置，再點選畫面中的商品，進一步了解其商品之特惠訊息並決定是否線上購物。而在旅遊景點應用時，可先行觀看景點附近環境及天氣，並提供景點區域的活動訊息及門票訂購。

採取多鏡頭接合360度環景影像系統面臨諸多挑戰：(1) 多支鏡頭間特性不同與影像來源不同而導致視訊接合不自然；(2) 移動物體經過影像接合處所造成之鬼影與不連續；(3) 整體畫面平滑自然的嚴謹要求；(4) 整體即時系統高複雜度與高記憶體頻寬需求等。本作品在即時360度環景影片接合技術上採用多支魚眼攝影機來拍攝不同視角之影片，接合為360度環景影片，此技術包含七項子技術，包含魚眼校正 (Correction of Fisheye)、色差調整 (Color Adjustment)、影像對齊 (Image Alignment)、柱狀投影 (Cylindrical Projection)、尋找最佳縫線 (Finding Optimal Seam)、移除飄移效應 (Remove Drift Problem) 與影像補色 (Image Repairing & Blending) 等，本作品逐一克服這些困難，完成行星環系統雛形與即時展示。

資訊爆炸的時代，人們需要的資訊更多，180度或更小的角度視訊已不能滿足人類的需求，360度視訊系統將會是未來人們生活中相當重要的一環，讓人們對於生活周遭的一切更加敏銳而不錯過每個細節。本作品結合360度環景接合技術與網路傳輸技術，透過多媒體處理技術與網路技術的合作，讓360度環景訊息即時完整地傳遞。本作品具有潛在市場應用性，可延伸至許多智慧應用領域，包含智慧型車輛環景、360度環景觀光景點、360度環景安全監控、360度即時街景等，提供人們全視角之視訊全新體驗。

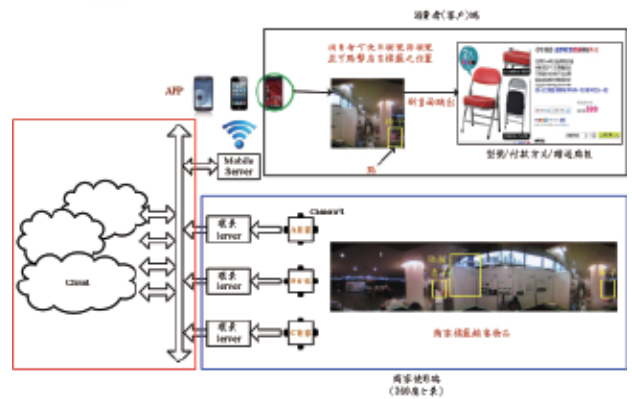


圖1 > 360即時賣場架構圖

**指導教授****郭峻因 / 交通大學電子工程學系及電子研究所**

1985-1993 年取得交通大學電子研究所博士。目前擔任交通大學電子工程學系教授兼電子研究所所長（2012/8- 迄今），並同時擔任智慧電子國家型計畫分項召集人（2011/1- 迄今）。1996-1999 年曾任聯合技術學院電子工程系系主任，並陸續擔任旺宏電子（1996-1999 年）、唯典科技（2000-2004 年）、凌華科技（2002-2004 年）顧問一職。2005-2008 年，擔任中正大學 SOC 研究中心主任，2009-2011 年為中正大學特聘教授兼系主任。

**研究領域**

VLSI Design, Digital Signal Processing, Digital IP and SoC Design, Intelligent Vision Processing System.

**Abstract**

Real-time 360 degree panoramic mall service system, which contains 360 degree panoramic video stitching, optimal seam finding, fisheye correction, and transmission with bandwidth detection techniques, can be used in mall service, tourism service systems, and other emerging intelligent vision systems. Consumers could get real-time video and discount information of remote malls and scenic spots by using PC or portable smart handheld devices. With real-time 360 degree panoramic mall service systems, consumers know where commodities are and how the shop space is planned at first, then clicking the item on screen to get detail information and decide to buy it or not. When applying this work to panoramic tourism service systems, consumers can realize the actual environment and the weather around scenic spots. Moreover, they can also purchase tickets online.

In realization, there are four challenges in developing the proposed real-time 360 degree panoramic video stitching system with multiple cameras. First, varying characteristics among cameras and different input sources make video stitching results unnatural. Second, the moving objects passing through stitching seam produces ghost image and lets juncture discontinuous. Third, high request on smooth and natural images should be considered. Fourth, the whole system suffers from both high complexity and high memory bandwidth. To solve these problems, we adopt some fish-eye cameras to obtain different view information and stitch each of those to produce a 360-degree video. The proposed algorithm is composed of seven stages: correction of fisheye, color adjustment, image alignment, cylindrical projection, finding optimal seam, remove drift problem, and image repairing & blending. We conquer those challenges mentioned above and finish our prototype system.

In the era of information explosion, people need more comprehensive information, which cannot be obtained from 180 degree or less than 180 degree video. The 360 degree video system that makes people feel more sensitive about environment surround them will play an important role in the daily life for human beings. The proposed system combines 360 degree video stitching technique and internet transmission with bandwidth detection technique, which transfers messages completely and instantly. This work possesses considerable applicability, which can be extendedly used in intelligent vehicles, sightseeing service, security surveillance system, and real-time street view. The proposed system is able to provide comprehensive information for people without dead ends.

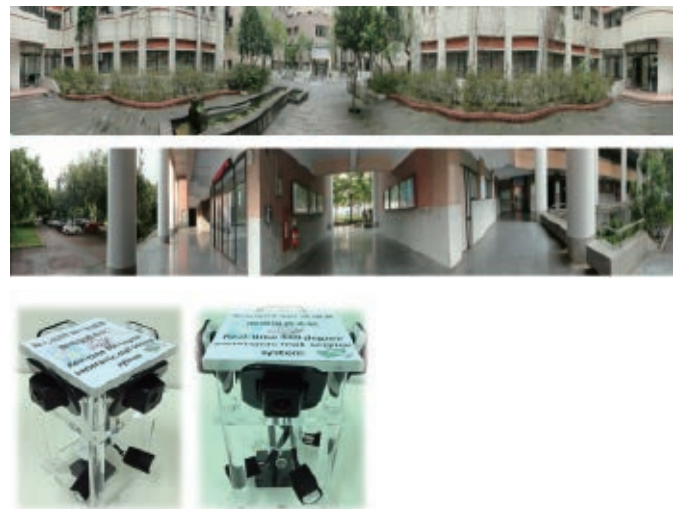


Fig.2 > 360 degree panoramic image and camera set