

# 高精地圖標準及智能移動測繪技術發展工作案 (109-110)

## High Definition Map Standard and Intelligent Mobile Mapping Technology Development Project (109-110)

主管單位：內政部地政司

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### 摘要

測繪與空間資訊相關應用領域，由於移動測繪系統的機動性、多元感測資訊以及對數位影像處理與蒐集的能力，可以明顯節省過去傳統測量所需要的人力及時間。故除了傳統的空間資訊與測繪應用以外，隨著移動裝置的普及、無人載具的發展與自駕車技術的研究，預期結合現有移動測繪技術、室內圖資建置技術、物聯網空間資訊應用將有效支撐適地性服務急速擴張的需求，這對深化空間資訊領域產業的發展有正面的助益。另一方面，隨著智慧型運輸系統的發展，自動駕駛汽車成為未來全新的交通方式。自駕車用地圖在自駕車運行具有不可或缺之地位，提供自駕車決策系統輔助，降低技術門檻及所需經費，並且提升安全性。國內已累積多年發展與應用車載移動製圖技術之經驗，並具備成熟的資料處理技術，惟對於產製自駕車用高精地圖並無統一標準製作程序、精度規範與地圖格式，恐會造成廠商格式不相符無法流通，導致重複資源投入並衍生行車安全與國安議題。

本團隊在內政部支持下持續推動高精地圖標準及智能移動測繪技術發展，並獲致相當之成果，於本案能夠在既有成果上持續更進一步探討，並往應用面推廣，本案於過去二年中如實如質與如期完成包含下列與新一代測繪技術相關之議題。建立高精地圖標準及指引項目中，持續修正高精地圖圖資內容標準、製圖作業指引及驗證流程指引並發布作業指引英文版，建立自駕車用動態地圖之圖資內容標準(草案)、作業指引(草案)及更新驗證指引(草案)，並將草案內容提送臺灣資通產業標準協會。發展高精地圖自動化生產及群眾外包製圖技術項目中，發展高精地圖自動化生產技術，開發自動化工具，針對路面邊緣、車道線、車道中心線、交通號誌與特定交通標誌圖徵進行特徵提取，建立自駕車群眾外包之高精地圖製圖(含自駕車平臺)系統及流程，完成針對特定交通號誌與交通標誌的變異偵測與更新，並確定製圖系統符合動態更新使用。發展移動裝置室內外智慧製圖技術項目中，研發應用人工智慧技術之室內外影像匹配輔助行人慣性導航定位技

術，提出誤差修正算法，最佳的角度分群法可以使得位置誤差下降約 20%。高精地圖國際事務推動項目中，參與國際自駕車相關組織活動與國際學術研討會，持續研提或協助引進國外產製高精地圖之多平臺製圖技術，推廣我國高精地圖相關事宜。

**關鍵詞：**移動測繪系統、高精地圖、群眾外包、行人慣導定位、人工智慧

### **Abstract**

In the application related to surveying and mapping, the mobile mapping systems can significantly save the workforce and time required. Based on hardware improvements, mobile sensors are becoming more diverse, smaller, and cheaper, while the accuracy is improving. On the other hand, with intelligent transportation systems, autonomous vehicles have become a new way of transportation in the future. The map for autonomous vehicles is indispensable in the operation of autonomous vehicles. It assists in autonomous vehicle decision-making systems and lowers the technical threshold. High-definition maps (HD maps) for autonomous vehicles mainly rely on the onboard sensors to obtain point clouds and images and is produced through feature extraction and manual assistance methods. However, if there is no unified standard production process, specification, and map formats for producing HD maps for autonomous vehicles, it may cause inconsistent format issues, resulting in unnecessary resource investment and safety issues of autonomous vehicles.

This team has promoted the development of HD map standards and mobile mapping technology with the Ministry of the Interior's support and has achieved significant results. It is expected that this project can continue to explore the existing results further and promote them to the application side, including the following and new issues related to the next generation of surveying and mapping technology. In establishing HD map standards and guidance projects, continue to revise the high-precision map standards, mapping guidelines, and verification process guidelines and publish the English version standards and guidelines. Meanwhile, the drafts of dynamic map standards, production guidelines for dynamic maps, and the verification and update guidelines of dynamic maps for autonomous vehicles will be proposed in this project. They were all submitted to TAICS for reviewing and publishing procedure. In developing automated HD map production and crowdsourcing mapping technology projects, develop automated HD map production technology, develop automated mapping tools to extract the features, such as road edges, road lines, road center lines, traffic signs and specific traffic signs. In establish certified crowdsourcing of HD map updates systems and procedures, complete changing detection and update for specific traffic signs and traffic signs. In developing indoor and outdoor intelligent mapping technology for mobile devices, research and development of indoor and outdoor image matching assisted pedestrian inertial navigation technology using artificial intelligence technology, and propose an enhancement algorithm, which can reduce the position error by 20%. In the HD map international affairs promotion project, participate in international self-driving-related

organizations, attending virtual international academic conferences, continue to research or assist in introducing international HD map technology, and promoting Taiwan's HD map developments.

**Keywords : Mobile mapping system, High definition map, Crowdsourcing, Pedestrian inertial navigation indoor positioning, Artificial intelligence**