

中文摘要

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台灣位於環太平洋地震帶板塊交界處，地震發生頻繁，造成民眾生命財產巨大的威脅。而目前 IoT 與 AI 技術日趨成熟，建築物結構安全監測方式也逐步邁入應用階段。故本研究希望能結合 IoT 與 AI 技術，自動蒐集分析建築物在地震前後的結構相關數據，保障民眾生命財產安全。

本研究計畫經由收集國內外 AIoT 技術進行建築物結構安全監測之資料，了解目前可行的建築結構監測與分析方式，並探討 AI 智慧及 IoT 技術結合結構監測與分析之應用範疇，減少監測時所需的人力。此外，本研究遴選一處場域進行建築結構監測分析的實證，分別以長期監測與微振量測兩種方式進行，透過實際監測與數據蒐集，證明以 AI 分析建物結構狀態之可行性，並建立長期監測及微振量測之作業流程。此外，本研究亦藉由法規政策及宣導推廣等面向探討，提出 AIoT 應用於建築結構結構監測的可能推動方式，期待降低未來推動時的阻力。

本研究結合 AIoT 相關技術，自動蒐集建築物在地震前後的結構相關數

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據，同時快速評估可能發生問題的建物，協助用戶或管理單位進行事前準備、災後快速反應及復原措施的參考，藉由智慧化的技術保障人民生命財產安全，打造安居樂業的智慧城市。

ABSTRACT

Keywords : AI 、 IoT 、 Structural safety monitoring

Taiwan is located on the Circum-Pacific belt and at a compressive tectonic boundary, so frequent earthquakes often pose a threat to people's lives and property. As the technologies of IoT and AI have matured over time, applying them to the structural safety monitoring system is increasingly being put into practice. Therefore, this research aims to combine IoT and AI technologies to collect and analyze relevant data of buildings' structure before and after an earthquake, to help better protect people's lives and property.

By collecting structural safety monitoring data gathered and evaluated by AIoT technologies at home and abroad, the research aims to understand current feasible methods for structural safety monitoring and analysis, and to discuss a range of applications of combining AI and IoT technologies for structural monitoring and analyzing, in order to reduce the manpower required for monitoring. In addition, by using long-term monitoring and ambient vibration measurements, the research selects a field to serve as evidence for evaluating structural safety monitoring. Through real-time monitoring and data collection, the research seeks to prove the feasibility of applying AI to analyzing the structural status of buildings, and to establish operational processes for long-term monitoring and ambient vibration measurement. Moreover, by discussing laws and policies as well as dissemination, the research proposes possible ways to promote the application of AIoT to monitor structural safety and hopes to reduce future resistance to adoption of these technologies.

This research adopts relevant AIoT technologies to collect related structural data of buildings before and after an earthquake automatically. Meanwhile, it immediately identifies potential problems in a building to assist the owners and management entities in doing advance preparation, and also serves as a reference for emergency response and restoration measures after accidents. Make use of smart technologies to protect people's lives and property, and to build a smart city so people may enjoy a good and prosperous life.