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**ABSTRACT**

TerraDefender IPB (Intelligent Processing and Building) is an innovative geospatial analysis platform designed to enhance situational awareness and decision-making in diverse operational scenarios. This system integrates advanced techniques in terrain analysis, building layout extraction, and road network detection, using high-resolution aerial and satellite imagery. The platform's core capability lies in its sophisticated pixel wise classification model, which generates translucent overlays to differentiate between terrain types such as grassy, marshy, rocky, and sandy regions. This enables precise mapping and analysis of various environments. In addition to terrain analysis, TerraDefender includes powerful building extraction and road detection algorithms. These features leverage deep learning models like U- Net to accurately identify and delineate structures and pathways within complex landscapes. The system’s flexibility is further enhanced by its Rover Control and Video Processing module, which provides real-time ground-level analysis, and a mobile app that supports field operations. To ensure data security, TerraDefender incorporates advanced encryption and decryption protocols, protecting sensitive information throughout its processing pipeline. The basic structure of the platform also enables further additions and connections of all kinds of data inputs and analytical functions, the platform may be used in related military applications, urban and regional planning, emergency services, and ecology. When integrated with terrain analysis and accurate feature extraction, TerraDefender IPB provides a full and efficient real-time geospatial analysis framework which immensely enhances advantages for reconnaissance operations and strategic planning in tactical terrains.

