Falls are a leading cause of injury and hospitalization among the elderly, particularly those who live alone without immediate access to assistance. This project addresses this urgent concern by developing a real-time fall detection system tailored for elderly individuals living independently. The system integrates ARKit, YOLOv5, and Vision Pro. By combining ARKit's spatial perception with YOLOv5's fast object detection, the system effectively identifies fall events in real time. The algorithm is developed within the iOS environment using Swift, Objective-C++, and Python, and utilizes Apple Vision Pro as a high-performance input device to capture rich spatial and motion data, enhancing scene understanding and detection accuracy. Comparative experiments show that the system offers higher accuracy and faster response than traditional methods. Findings reveal the system is especially effective in detecting slow or unstable movements preceding a fall, allowing for earlier intervention. A system architecture diagram is provided to illustrate the interaction among components: Vision Pro captures the real-world environment and streams data to ARKit for spatial mapping; YOLOv5 processes the visual frames to detect people and objects; the fall detection logic integrates all results to determine risk and issue alerts.This work not only advances fall detection technology but also offers a practical, socially impactful solution for enhancing the safety and independence of elderly people living alone. The algorithm demonstrates strong potential for real-world applications in home-based elderly care. Future improvements include optimizing model performance, enhancing robustness in complex and dynamic environments, and increasing scalability across various living settings. The project is conducted as part of the Computer Science CS 5588 Data Science Capstone course at the University of Missouri–Kansas City under the guidance of Professor Yugyung Lee, Ph.D.