This project presents a fall detection algorithm designed for elderly people living alone, integrating ARKit, YOLOv5, OpenPose, and Vision Pro. By combining ARKit's spatial perception, YOLOv5's fast object detection, and OpenPose's precise human pose estimation, 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. 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; OpenPose performs pose estimation; the fall detection logic integrates all results to determine risk and issue alerts. The algorithm demonstrates strong potential for real-world applications in home-based elderly care. Future improvements include optimizing model performance, enhancing robustness in complex environments, and increasing scalability for diverse scenarios. 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..