The paper proposes a novel algorithm for indoor human activity recognition using data from a single thigh-mounted inertial measurement unit (IMU). The algorithm aims to detect common indoor activities such as sitting, standing, and walking with minimal computational demands, making it suitable for implementation on low-cost microcontrollers.

The algorithm uses simple signal processing techniques on the thigh angle computed from IMU accelerometer and gyroscope data. These techniques include peak detection, zero crossing detection, and timers. Activities are identified based on analyzing features of the thigh angle envelope over time, such as whether the angle remains below 20 degrees for standing or exceeds 70 degrees for sitting. Step detection is also used to confirm walking activity.

An initial experiment was conducted with 4 subjects performing sits, stands, and walks captured with a thigh-mounted IMU. Preliminary results show the algorithm achieved over 78% accuracy for standing detection, over 92% for walking, and no errors for sitting. These promising accuracies were obtained while maintaining the aim of low computational complexity.

Future work involves implementing the algorithm on an embedded platform to evaluate performance without wireless transmission losses. The algorithm will also be expanded to identify additional indoor navigation activities such as traversing stairs, escalators, travelators, and elevators. It is hypothesized that pressure sensor data combined with the thigh angle analysis may help detect these activities. Further experiments are needed to validate this and refine the algorithm for robust real-time indoor navigation assistance.