ABSTRACT

Mobility tracking has currently been an important need for many people in order to integrate different environments to work together smoothly that can be tracked in both indoor and outdoor condition. The need to track the mobility path between the origin to the destination points has found its relevance in many aspects of human life. The demand is now getting stronger in ubiquitous computing when users freely move from indoor to outdoor environments and vice versa. However, current tracking systems have been separated into two big categories: indoor and outdoor tracking. These systems cannot perform as expected when user mobility involves both indoor and outdoor environments (i.e., fine-grained mobility). The need of a model and mechanism for seamless mobility tracking becomes relevant.

Many location-based services and applications have been developed to improve indoor positioning, especially to deal with the complexity between multi-layers of location context models for geo-location and seamless mobility transition that need to provide continue service from different positions.

This research proposes a location context ontology modelling to assort different location that are linked together with multi-level of both indoor and outdoor conditions and a system which is known as location-aware computing application is presented to support a direction that works together with a smart device for integration of an indoor-outdoor environment seamlessly by combining both conditions to be in the system without any obstacle. The proposed work uses The Global Positioning System (GPS) and The Global System for Mobile Communications (GSM) for outdoor condition. Wi-Fi Fingerprint (Wi-Fi), pedometer and Bluetooth Low Energy 4.0 (BLE) beacons to measure and pinpoint user's indoor locations using received signal strength-based indoor localization based on ontology models, probabilistic and fuzzy set that use to represent and calculate the signal strength to predict and detect location. The system tracks and directs user's indoor movements using an android application and assists first-time visitors to find a particular location. The networks are comparable and can be detected using smartphones. The smartphones will detect the strongest signal from

the available networks. Wi-Fi, pedometer and BLE 4.0 beacon were able to identify the direction and location in indoor environments. The maps provided by the system based on position information have worked seamlessly together in an integrated fashion when users are travelling from their current location and destination.

The application enables seamless service in real-time operation and provides multiple pathways, guidance, and map based on Android application platform that have highlighted for indoor location. A key feature of the application is the display of distance between the user and their destination when users are approaching their destinations.

Furthermore, the technologies of indoor and outdoor work together seamlessly in terms of user's mobility. When users move through the different conditions; the system indicates the complications that arises between the indoor and outdoor locations. The transition between indoor and outdoor is less than 5 seconds switching at the overlapped area, the certainty value of the performance, in our experiment in the campus building, the results demonstrated 98.4% accuracy for outdoor to indoor movement and 97.7% accuracy for the opposite movement. Moreover, the seamless location system is beneficial for the users, particularly in discovering new feature in the system, and obtaining directional maps and pathways from their existing locations.