**LITERATURE SURVEY**

# ‘Smartphone and Smartwatch-Based Biometrics Using Activities of Daily Living'

# AUTHORS: Weiss, G., Yoneda, K. and Hayajneh, T:

# Smartphones and smartwatches, which include powerful sensors, provide a readily available platform for implementing and deploying mobile motion-based behavioral biometrics. However, the few studies that utilize these commercial devices for motion-based biometrics are quite limited in terms of the sensors and physical activities that they evaluate. In many such studies, only the smartwatch accelerometer is utilized and only one physical activity, walking, is investigated. In this study we consider the accelerometer and gyroscope sensor on both the smartphone and smartwatch, and determine which combination of sensors performs best. Furthermore, eighteen diverse activities of daily living are evaluated for their biometric efficacy and, unlike most other studies, biometric identification is evaluated in addition to biometric authentication. The results presented in this article show that motion-based biometrics using smartphones and/or smartwatches yield good results, and that these results hold for the eighteen activities. This suggests that zero-effort continuous biometrics based on normal activities of daily living is feasible, and also demonstrates that certain easy-to-perform activities, such as clapping, may be a viable alternative (or supplement) to gait-based biometrics.

# 2) “Sensor-Based Continuous Authentication of Smartphones' Users Using Behavioral Biometrics:,”

# AUTHORS: Abuhamad, M., Abusnaina, A., Nyang, D. and Mohaisen, D.

# Mobile devices and technologies have become increasingly popular, offering comparable storage and computational capabilities to desktop computers allowing users to store and interact with sensitive and private information. The security and protection of such personal information are becoming more and more important since mobile devices are vulnerable to unauthorized access or theft. User authentication is a task of paramount importance that grants access to legitimate users at the point-of-entry and continuously through the usage session. This task is made possible with today's smartphones' embedded sensors that enable continuous and implicit user authentication by capturing behavioral biometrics and traits. In this paper, we survey more than 140 recent behavioral biometric-based approaches for continuous user authentication, including motion-based methods (28 studies), gait-based methods (19 studies), keystroke dynamics-based methods (20 studies), touch gesture-based methods (29 studies), voice-based methods (16 studies), and multimodal-based methods (34 studies). The survey provides an overview of the current state-of-the-art approaches for continuous user authentication using behavioral biometrics captured by smartphones' embedded sensors, including insights and open challenges for adoption, usability, and performance.

# 3 A Systematic Review on Gait Based Authentication System

# AUTHORS: Divya, R. and Lavanya, R.

Bio-metric frameworks are getting to be progressively important, since they are more reliable and proficient for identity confirmation. One such biometric is gait. The pattern by which an individual walks is mentioned as gait. It's a locomotion that's achieved through the movement of a person's limb. Unlike several approaches gait is a behavioral biometric, that is taken into consideration for user authentication as it shows distinct patterns for every individual. Also, less obtrusion of user has made this biometric method to be more advantageous compared to others. During this survey we tend to concentrate on varied gait approaches, applications and various machine learning techniques which will be used for classification of gait features and its applications.

**4) “Gait Authentication and Identification Using Wearable Accelerometer Sensor”**

**AUTHORS: Gafurov, D., Snekkenes, E. and Bours, P.**

This paper describes gait recognition using a body worn sensor. An accelerometer sensor (placed in the trousers pocket) is used for collecting gait features. From the acceleration signal of the person, cycles have been detected and analysed for recognition. We have applied four different methods (absolute distance, correlation, histogram, and higher order moments) to evaluate performance of the system both in authentication and identification modes. Our data set consists of 300 gait sequences collected from 50 subjects. Absolute distance metric has shown the best performance in terms of EER, which is equal to 7.3% (recognition rate is 86.3%). Furthermore, we have also analysed recognition performance when subjects were carrying a backpack.

5) **“Identifying users of portable devices from gait pattern with accelerometers”**

**AUTHORS**: **Mantyjarvi, J., Lindholm, M., Vildjiounaite, E., Makela, S.**

Identifying users of portable devices from gait signals acquired with three-dimensional accelerometers was studied. Three approaches, correlation, frequency domain and data distribution statistics, were used. Test subjects (N=36) walked with fast, normal and slow walking speeds in enrolment and test sessions on separate days wearing the accelerometer device on their belt, at back. It was shown to be possible to identify users with this novel gait recognition method. Best equal error rate (EER=7%) was achieved with the signal correlation method, while the frequency domain method and two variations of the data distribution statistics method produced EER of 10%, 18% and 19%, respectively.