Biometric-based Security for Data Authentication in Wireless Body Area Network (WBAN)

Sofia Najwa Ramli¹, Rabiah Ahmad², Mohd Faizal Abdollah³, Eryk Dutkiewicz⁴

¹,²,³ Center for Advanced Computing Technology, Faculty of Information Technology and Communication, Universiti Teknikal Malaysia Melaka, Malaysia
⁴ Department of Electrical Engineering, Macquarie University, Australia

sofia_najwa@yahoo.co.uk, rabiah@utem.edu.my, eryk.dutkiewicz@mq.edu.au

Abstract—The empowerment in wireless communication technologies and sensors have developed the Wireless Body Area Network (WBAN). In the past few years, many researchers have been focusing on building system architecture of health monitoring to improve the technical requirement specifically designed for WBAN. Less research was found in providing the strong security system. As part of communication medium, WBAN faced various security issues such as loss of data, authentication and access control. Implementing high security system leads to inconsistency in computational performance. It is recommended that the security system for WBAN must be implemented with low computational complexity and high power efficiency. None of previous researches successfully identified solution to the above problem. This study explores the use of biometric characteristics in securing data communication within WBAN and reducing computational complexity as well as power efficiency. Hybrid authentication model is used as a conceptual framework for the system. Precisely, the proposed framework requires a unique feature of human body regarded as the authentication identity, while the other techniques use hardware and software to achieve the same purpose. In addition, an authentication process is provided by using this unique feature of the body as a key to develop a security system under the resource-constrained of WBAN sensor challenges.

Keyword—Wireless Body Area Network (WBAN), Heart Rate Variability (HRV), biometric, authentication, security

Sofia Najwa Ramli was born in Hospital Daerah Batu Pahat, Johor, Malaysia on 17th September 1986. She received the B. Eng degree in biomedical engineering and the M. Eng degree in electrical-electronics and telecommunications from Universiti Teknologi Malaysia (UTM), Skudai, Johor, Malaysia in 2009 and 2011 respectively. She is pursuing the Ph.D degree at the Faculty of Information Technology and Communication, Universiti Teknikal Malaysia Melaka, Melaka, Malaysia. Currently, Ministry of Higher Education Malaysia (MOHE) funds her Ph.D degree under MyPhD program and the research under the Exploratory Research Grant Scheme (ERGS). Her current research interests are in the field of biometric authentication and the lightweight security system of Wireless Body Area Network (WBAN).

Rabiah Ahmad was born on 20th Ogos 1974 in Melaka, Malaysia. She received her Ph.D in Health Informatics at University of Sheffield (UK) and Master of Science in Information Security from Royal Holloway University of London (UK). She is currently as senior lecturer (Associate Professor) with Universiti Teknikal Malaysia Melaka (UTeM). In the same time she is representing Malaysia for member of World Standard in Information Security Technique Working Group (Identity Management). She also certified as members of MyCC Scheme Certification Committee organized by Cyber Security Malaysia. In addition, she is appointed as high committee members of Malaysia Society of Cryptology Research.