

**ICT Virtual Organization of ASEAN Institutes and NICT**  
**ASEAN IVO Forum 2016**  
**Call for Presentations**

**Submission and Registration Form**

**I. Title**—Title of presentation:

ONLINE RISK ASSESSMENT USING HAND GRIP STRENGTH MEASUREMENT

**II. Author(s)**—Full name (First name family name):

Mohd Noor, Norliza

Mohd Aris, Siti Armiza

Abd. Jalil, Siti Zura

Abdullah, Haslaile

Syed Abdul Rahaman, Sharipah Alwiah

Ishak, Ruzana

**III. Organization(s):**

Universiti Teknologi Malaysia, Malaysia

**IV. Topic selection:**

Smart Society : ICT Applications for community and environment

Sub topic : Smart Community

**IV. Abstract:**

Handgrip strength is a general indicator of muscle strength and linked with premature mortality. Several studies [1-9] have been conducted in investigating the relationship between human grip and pinch strength with multiple chronic diseases. For example, people with rheumatic disease will have severe gripping difficulty due to their hand deformation. Common diseases that have direct relationship with hand grip strength are such as chronic kidney disease [3-4], osteoarthritis [5-6], malnutrition [7], coronary artery disease after-surgery [8] and De Quervain Tenosynovitis [9] as well as predicting a decline in function in old age [10]. In all investigations, it has been concluded that hand grip strength can be an independent predictor in assessing multiple chronic disease of a patient. There is also close correlation made between grip strength and pinch strength [2]. A study by [3] shows that pinch strength can be an alternative assessment to hand grip strength in hemodialysis patients. Although many data can be derived from western population, it is not applicable to ASEAN population due to western population having larger mean grip strength (1.5 times) than ASEAN population [11]. It is important that a comprehensive database on the relationship between hand grip/pinch strength and multiple chronic diseases in ASEAN population is established as an early disease detection tool and as a reliable reference for medical practitioner in diagnosing their patient.

Therefore, the purpose of this project is to develop a user-friendly online health risk assessment system (e-health system) served to improve the level of awareness of ASEAN population in practicing healthy lifestyle. The objectives of this project are to study the relationship between hand grip strength and ASEAN population of different countries and culture, to study the relationship between hand grip strength and multiple chronic diseases in ASEAN population as well as to develop a user-friendly software with implementation of data collection from the hand grip/pinch strength tests among ASEAN population.

This study will be conducted in ASEAN adults aged between 18 and 65 years old with known chronic disease such as diabetes, arthritis, kidney disease, post stroke patients and many more. Anthropometric measurements such as weight, height, body mass and hand length will be

measured from the subjects. For hand grip strength and pinch strength, a Digital Pinch / Grip Analyser from MIE Ltd will be used throughout the data collection [12]. This analyser is a precision instrument specifically designed to measure accurately the strength and endurance of the hand and individual fingers. This allows the accurate monitoring and assessment of hand function throughout physiotherapy, drug treatment or surgical management. The analysis of finger and hand function can be conducted by utilizing CAS Software implemented in the analyser. The system will be developed based on hand grip measurement of the patient. The system will be able to record medical data without disclosing the identity of the patient such as personal information, medical history, genetic information, medical examination information (BMI, Blood pressure, heart rate, cholesterol level, blood sugar level and hand/pinch grip strength measurement), anthropometric information as well as daily life style. The system will then calculate the risk based on information given and generate medical report for further examination if required.

A study on the relationship between hand grip and multiple chronic diseases in Malaysia population is currently on-going. The data collected from this study can be incorporated in the database for worldwide use. At the end of this project, a comprehensive database on the relationship between hand grip/pinch strength and multiple chronic diseases in ASEAN population is expected to be developed. The goal of the database software is to lessen the different sources of error and variability and to standardize the methodology of evaluation. At the same time the database software will be accessible to all medical practitioner while disclosing the identity and personal information of the patients. This database can be used as an early disease detection tool and as a reliable reference for hand therapists, manufacturer of hand prostheses and medical practitioner in their diagnosis. The system can be accessed by anyone without any additional cost as an early screening tool for health risk assessment.

## References

- [1] Cheung CL, Nguyen US, Au E, Tan KC, Kung AW., Association Of Handgrip Strength With Chronic Diseases And Multimorbidity: A Cross-Sectional Study. *Epub*, 35(3), pp. 929-41, 2013
- [2] Laxman U. S. Nayak, Januaria M. Queiroga, Pinch Grip, Power Grip And Wrist Twisting Strengths Of Healthy Older Adults, *Journal of Gerontechnology*, 3(2), 2012
- [3] El-Katab S, Omichi Y, Srivareerat M, Davenport A., Pinch Grip Strength As An Alternative Assessment To Hand Grip Strength For Assessing Muscle Strength In Patients With Chronic Kidney Disease Treated By Haemodialysis: A Prospective Audit, *J Hum Nutr Diet*. 2015 Aug 7.
- [4]. Chang YT, Wu HL, Guo HR, Cheng YY, Tseng CC, Wang MC, Lin CY, Sung JM., Handgrip Strength Is An Independent Predictor Of Renal Outcomes In Patients With Chronic Kidney Diseases, *Nephrol Dial Transplant*, 26(11), pp. 3588-95, 2011
- [5] Paula Martins Nunes, Diana Guimarães de Oliveira, Alexander S. Aruin, Marcio José dos Santos, Relationship Between Hand Function And Grip Force Control In Women With Hand Osteoarthritis, *JRRD*, 49 (6), pp. 855–866, 2012
- [6] Meryem Dedeoğlu, Ümit Gafuroğlu, Özlem Yilmaz, Hatice Bodur, The Relationship Between Hand Grip and Pinch Strengths and Disease Activity, Articular Damage, Pain, and Disability in Patients with Rheumatoid Arthritis, *Turkish Journal of Rheumatology*, 28(2), pp. 069-077, 2013
- [7] Flood A, Chung A, Parker H, Kearns V, O'Sullivan TA, The Use Of Hand Grip Strength As A Predictor Of Nutrition Status In Hospital Patients, *Clin Nutr*. *Epub*, 33(1), pp.106-14, 2014
- [8] Sokran SN, Mohan V, Kamaruddin K, Sulaiman MD, Awang Y, Othman IR, Victor SJ., Hand Grip Strength and Myocardial Oxygen Consumption Index among Coronary Artery Bypass Grafting Patients, *Iran J Med Sci.*, 40(4), pp. 335-40, 2015
- [9] Nor Shazrini Ahmad, Smily Jesu Priya Victor Paulraj and Jayachandran Vetrayan , Pinch and Grip Strength in Adults with De Quervain Tenosynovitis: Malaysian Population, *World Applied Sciences Journal*, 26 (11),pp. 1451-1453, 2013
- [10] Zahari Taha<sup>1</sup> and Ruhaizin Sulaiman, A Biomechanical Study of Grip and Pinch Strength among Malaysian Elderly Population, *Pertanika J. Sci. & Technol.* 19 (2), pp. 293 – 305, 2011
- [11] T Kamarul, TS Ahmad, WYC Loh, Hand grip strength in the adult Malaysian population, *Journal of Orthopaedic Surgery*, 14(2), pp.172-7, 2006
- [12] Digital Analyser - Pinch/Grip Instruction Manual, MIE Medical Research Ltd

## V. Speaker information:

Full name: Bani, Nurul Aini

Institute: Universiti Teknologi Malaysia

Address: UTM Razak School of Engineering and Advanced Technology, UTM Kuala Lumpur, Jalan Sultan Yahya Petra, 54100 Kuala Lumpur, Malaysia.

Telephone: +60192821389

E-mail: nurulaini.kl@utm.my

**VI. Support for speaker**—circle or underline any that you wish to request:

- Round trip fare at discount economy class
- Accommodation