Notice of the Final Oral Examination
for the Degree of Doctor of Philosophy

of

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“Enhanced Usability, Resilience, and Accuracy in Mobile Keystroke Dynamic Biometric Authentication”

Department of Electrical and Computer Engineering

Tuesday, September 25, 2018
10:30 A.M.
Clearihue Building
Room B019

Supervisory Committee:
Dr. Issa Traore, Department of Electrical and Computer Engineering, University of Victoria (Supervisor)
Dr. Fayez Gebali, Department of Electrical and Computer Engineering, UVic (Member)
Dr. Alex Thomo, Department of Computer Science, UVic (Outside Member)
Dr. Ahmed Awad, Department of Electrical and Computer Engineering, Uvic (Additional Member)

External Examiner:
Dr. Samira Sadaoui, Department of Computer Science, University of Regina

Chair of Oral Examination:
Dr. Graham Brown, School of Business, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies
Abstract

With the progress achieved to this date in mobile computing technologies, mobile devices are increasingly being used to store sensitive data and perform security-critical transactions and services. However, the protection available on these devices is still lagging behind. The primary and often only protection mechanism in these devices is authentication using a password or a Personal Identification Number (PIN). Passwords are notoriously known to be a weak authentication mechanism, no matter how complex the underlying format is. Mobile authentication can be strengthened by extracting and analyzing keystroke dynamic biometric from supplied passwords. In this thesis, I identified gaps in the literature, and investigated new models and mechanisms to improve accuracy, usability and resilience against statistical forgeries for mobile keystroke dynamic biometric authentication. Accuracy is investigated through cost sensitive learning and sampling, and by comparing the strength of different classifiers. Usability is improved by introducing a new approach for typo handling in the authentication model. Resilience against statistical attacks is achieved by introducing a new multimodal approach combining fixed and variable keystroke dynamic biometric passwords, in which two different fusion models are studied. Experimental evaluation using several datasets, some publicly available and others collected locally, yielded encouraging performance results in terms of accuracy, usability, and resistance against statistical attacks.