

User-Device Physical Unclonable Functions (PUFs) based on Mobile Device Touchscreen Pressure

Timothy M. Dee
Electrical & Computer
Engineering
Iowa State University
Ames, IA, USA
deetimothy33@gmail.com

Ian T. Richardson
Electrical & Computer
Engineering
Iowa State University
Ames, IA, USA
ian.t.rich@gmail.com

Akhilesh Tyagi
Electrical & Computer
Engineering
Iowa State University
Ames, IA, USA
tyagi@iastate.edu

ABSTRACT

A physical unclonable function utilizing the variability derived from the pressure with which users interact with their mobile device touchscreens.

1. INTRODUCTION

Mobile devices are ubiquitous in the modern world. These devices are becoming progressively more important for many applications with security sensitive data. Securing mobile devices poses unique challenges and opportunities compared to traditional data security where it is difficult for an attacker to access the physical device on which the data is stored or from which the sensitive data may be accessed. The reality that an attacker may be able to gain access to a physical device makes securing any data stored on or accessed by a mobile device significantly more challenging. Traditional physical unclonable functions (PUFs) which can be used to uniquely to a given hardware device are no longer sufficient to guarantee the authenticity of a user. This motivates an extension of the traditional PUF known as a user-device physical unclonable function (UD-PUF). This UD-PUF entangles the physical characteristics of the user in combination with the device to enable a more secure authentication scheme.

2. TOUCHSCREEN PRESSURE

current at sides of phone.

3. MODELING A USER-DEVICE PAIR

Interactions between users and devices are complex. To interpret these actions in a meaningful way, in order to perform an authentication for example, it is necessary to simplify these interactions. The chosen model must provide sufficient entropy such that a model generated with a given user-device pair is not consistently reproducible by another user or on a different device. The modeling method must also be easily reproducible by the original user on the ori-

ginal device. A model having the necessary characteristics required for this application is a Markov Chain. Markov Chains are well known. Historically the Markov Chain has found applications in many areas. Upon identification of an appropriate model the next step is to discover an optimal way in which it may be applied to the current problem. The goal is

4. TOUCH PRESSURE MODELING

5. RESULTS

6. CONCLUSIONS

7. FUTURE WORK