Demo: OptAuth: Optical Wireless Authentication for Smart Devices Using an Onboard Ambient Light Sensor

Kaustubh Dhondge, Baek-Young Choi, Sejun Song and Hyungbae Park
University of Missouri - Kansas City
{kaustubh.dhondge, choiby, songsej, hpark}@umkc.edu

ABSTRACT

As recent smartphone technologies of software and hardware keep on improving, many smartphone users envision to perform various mission critical applications on their smartphones that were previously accomplished by using PCs. Hence, smartphone authentication has become one of the most critical security issues. Due to the relatively small smartphone form factor, the traditional user id and password typed authentication is considered as an inconvenient and time-taking approach. Additionally, there is a growing traction amongst the experts in the security field that days of simple password based systems are over [1], since it is easily guessed, cracked, and stolen. Taking advantage of various sensor technologies of smartphones, alternative authentication methods such as pattern, gesture, finger print, and face recognition have been actively researched [2]. However, those authentication methods still pose the issues of usability as well as speed or reliability [3]. They are especially not suitable for the users in rugged conditions or with physical challenges.

We propose an ambient light sensor based authentication for smartphones. We have designed and prototyped a challenge-based programmable Fast, Inexpensive, Reliable, and Easy-to-use (FIRE) hardware authentication token. FIRE token uses an onboard LED to transmit passwords via an Optical Wireless Signal (OWS) to the smartphone that captures, and interprets it via its ambient light sensor [4]. FIRE token can be used as a part of a multi-factor authentication for the mission critical smartphone applications.

Categories and Subject Descriptors

H.4.0 [**Information Systems Applications**]: General

Keywords

Smartphone; Optical wireless communication; Authentication; Visible Light Communication; VLC

DEMONSTRATION

In this demo, we will showcase the OptAuth authentication mechanism to authenticate users on Android powered smartphones. We will use the FIRE prototype we have built as the hardware security token to transmit a user password with OWS to the smartphone via its onboard ambient light sensor. We have built this FIRE prototype with off-the-shelf components as shown in Figure 1. The light encoder hardware is powered by the ultra-low power microcontroller ATmega328P by Atmel [6]. The ATmega328P microcontroller was programmed using the Arduino Uno Revision 3 [5] microcontroller board. We have studied the capabilities of the ambient light sensors on modern smartphones in detail, and used our analysis to design modulation techniques at the physical layer to ensure maximum reliability and speed with which the OWS can be transmitted for the use-case under consideration.

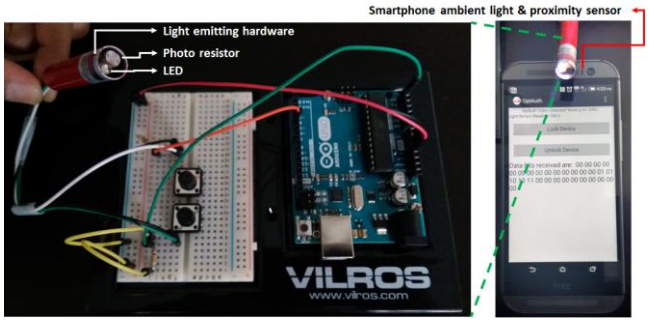

Fig. 1. FIRE token operation & hardware setup

Visitors will be explained these research methodologies developed by us in detail apart from the experimental demonstration. Infrastructure wise, we will need power and wired/wireless network connection for a laptop computer. The experimental setup itself is battery powered which we will bring along.

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