

Secret Agent: Behavioral-Biometric Continuous Authentication Summer 2021

What does your keypress rhythm say about you?

Team Members



Jarek Brown

Faith Coslett

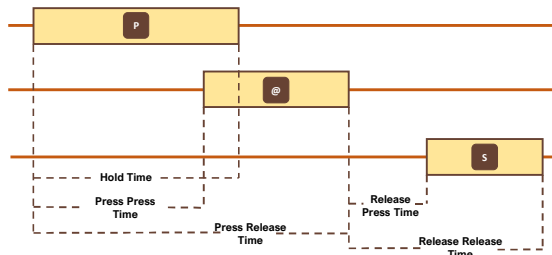
Adeline Reichert



Learn more about us!

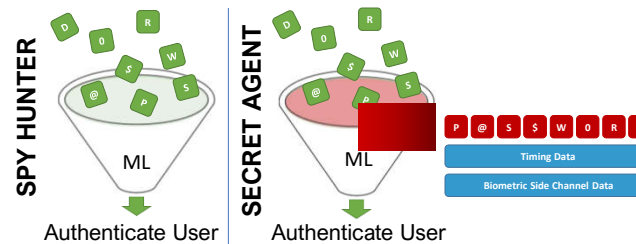
Background

The work in Secret Agent is based on a previous CEDAR project, Spy Hunter. Spy Hunter authenticates users based on typing patterns. This type of continuous authentication is useful for the purpose of being able to protect an unlocked system.



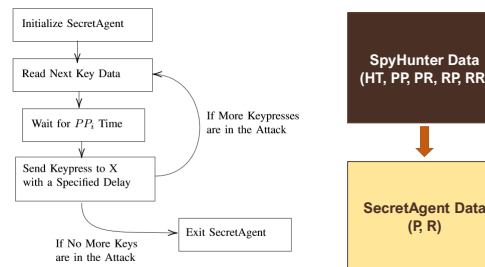
Problem Statement

- Exposes vulnerabilities in the keystroke-based authentication mechanism proposed in Spy Hunter.
- Discretely siphons keystroke timing data from a user and then uses that data to spoof the Spy Hunter authenticator.



Methods

Each of our classifiers works by analyzing five timing values for each keypress combination (see Background figure). Secret Agent attempts to use the recovered information to build a spoofer that releases keypresses at specific intervals.



Results

Spy Hunter Issue:

- Users evaluated differently if they were genuine or not, falsely boosting Spy Hunter's accuracy.
- Required updates to Spy Hunter before it could be spoofed

New Attempts:

- One-Class SVM
- Elliptic Envelope
- Isolation Forest

Best Results:

- FAR 13%, FRR 15%,
- Rejects adversaries in 53 keystrokes



Challenges & Future Work

Challenges include:

- Updating the Spy Hunter code to ensure the authentication code can be separated from the cross-validation code.
- Running a key logger in virtualized environments and ensuring secure testing.
- Making sure spoofed timing data passes Spy Hunter's low-level security checks.

$$\begin{aligned}
 1) \quad PR_i &= HT_i + HT_{i-1} + RP_i \\
 2) \quad PP_i &= PR_i - HT_i \\
 3) \quad RR_i &= RP_i + PR_i - PP_i
 \end{aligned}$$

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