The Phoney Lift: Using Accelerometers to Identify People

Makaram, Yashaswini

For many, smart-phones have become an integral part of daily life. This study develops a user-friendly, robust, and secure method for authenticating users on smart-phones. The proposed method utilizes the accelerations involved in the motion used to lift the phone to identify and authenticate the user. A previous study developed a biometric identification algorithm that could reliably and consistently identify individuals by the way they lift a phone. This study extends the previous work to explore the impact of targeted attacks on the reliability of the biometric identification. Baseline biometric information in the form of the accelerometer and gyroscope data was collected for each lift. Test subjects were also filmed while lifting phones. The baseline algorithm, which is a binary classifier, was tuned using an ROC curve to identify the optimum operating point. Then, half of the participants assumed the role of attackers, while the other half were the targets. Using the videos as a guide, each attacker attempted to forge the lift of three of the targets. This was in order to fool the biometric identification algorithm into accepting them as the target. The data was put through the biometric identification algorithm to determine if the attack was successful. The results from the forging attempts were compared to the baseline control data. For the chosen classifier, the baseline data yielded 85% true positives and 7% false positives averaged across all experiments. The attack data 5% averaged across all trials, which is relatively the same as the baseline. This shows that the lift based biometric identification is robust against random attacks and that motion signatures cannot be forged.

Awards Won:

Third Award of $1,000

American Statistical Association: Second Award of $500

Oracle Academy: Award of $5,000 for outstanding project in the systems software category.