Slide-to-Unlock Revisited

Two New User Authentication Techniques for Touchscreen-Based Smartphones

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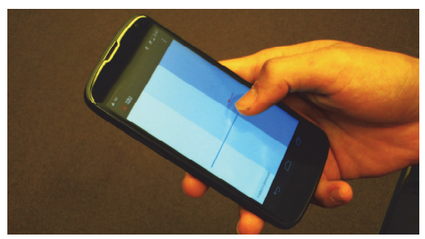
Smartphone Security

- Many mobile users do not take security measures to protect smartphone data
  - 34% in the U.S.
  - 65% in the U.K.
  - They perform ***slide-to-unlock*** gestures to unlock their devices
- Because they either
  - Find it too much of a hassle
  - Worry that they will forget the password

Motivation

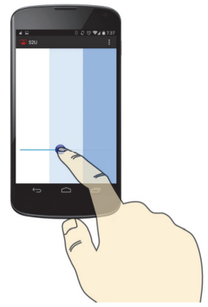
- Develop security techniques that are simple and resemble ***slide-to-unlock***, so that:
  - Reluctant users might be encouraged to start using a security approach
  - Users might move to a more secure approach when they have grown into the habit of using a simple one

Pilot Study – Performance



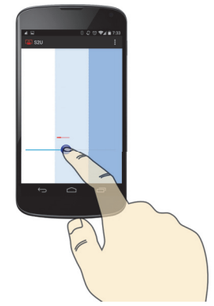
- Compared with *conventional* ***slide-to-unlock***
  8 participants
  × 3 techniques (within-subjects, counterbalanced)
  × 15 attempts = 360 attempts

Sequential-Slide-to-Unlock



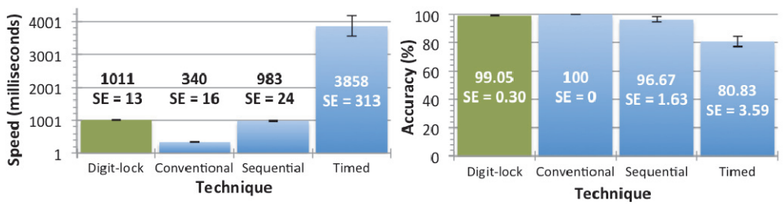
- Divides touchscreen vertically into 3 zones
- Considers each zone as a distinct touch area
- Users select a slide pattern as password
- Patterns are distinguished based on ***direction*** and ***patterns by zones***
- ***70 unique passwords***, when length < 8

Timed-Sequential-Slide-to-Unlock



- Similar to ***sequential-slide-to-unlock*** but users can pick 1 out of 3 timeframes / zone using a progress bar i.e. adds ***time***
- It appears when users hold their finger still
- It progresses forward in every 200ms (iterates itself)
- ***473,536 unique passwords***, when length < 8

Speed & Accuracy



- **Significant** effect of **technique** on **speed**
  - ***Conventional*** was the **fastest**
  - ***Timed*** was the **slowest**
- **Significant** effect of **technique** on **accuracy**
  - ***Conventional*** was the most **accurate**
  - ***Timed*** was the most **error-prone**
- No significant difference between
  - ***Conventional and sequential***

User Feedback

Property	Technique	Agree	Neutral	Disagree
More secure than slide-to-unlock	*Sequential*	100%	0%	0%
	Timed	87.5%	0%	12.5%
Relatively easy to use	*Sequential*	87.5%	0%	12.5%
	Timed	25%	25%	50%
Easy to memorize the password	*Sequential*	87.5%	0%	12.5%
	Timed	25%	25%	50%
Want to use it dominantly on mobile device	*Sequential*	75%	12.5%	12.5%
	Timed	37.5%	12.5%	50%

Summary

- ***Sequential*** perform well compared to ***slide-to-unlock***
- Both perform well compared to ***digit-lock***
- User find the new techniques secure
- Users find ***sequential*** easy to use, but divided about ***timed***