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Multiple-Password Interference in the GeoPass User Authentication Scheme

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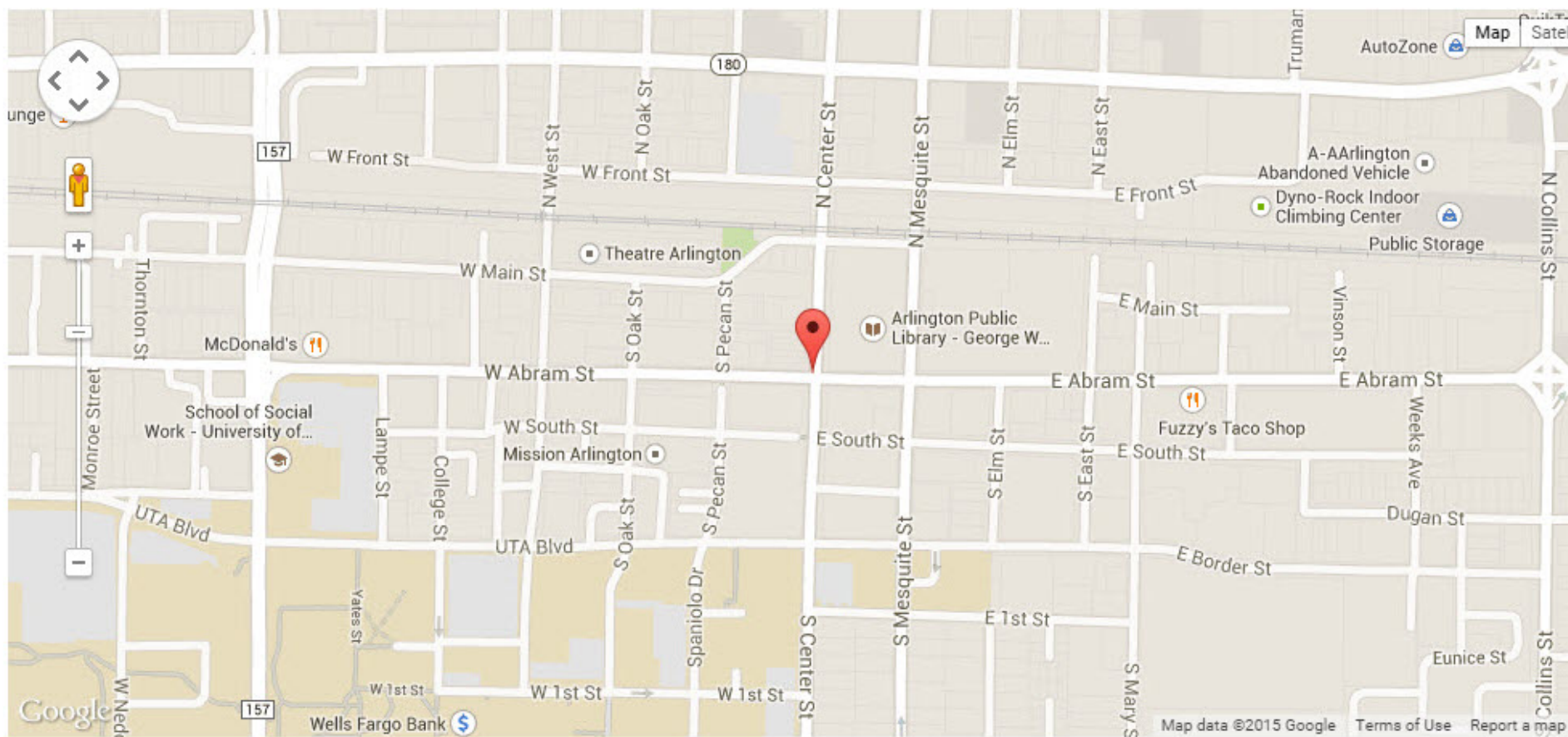
Digital Map Based Authentication:

GeoPass

Your current zoom level is 16

Please select your geo location password to complete login...

Arlington, TX, United States Go!



Digital Map Based Authentication Schemes:

➤ GeoPass*

- 1 location
- 97% login success rate
- Median login time: 30 seconds
- Theoretical password space: $2^{36.9}$

* published in SOUPS 2013





GeoPass: Research Issues

- *Memorability* for multiple location-passwords
- The impact of *interference**
- The causes of *interference*
- Solution to *interference effect*

* Password interference occurs when users confuse the password of one account with that of another account.

Our Approach:



- Study-I: Understanding the causes and effects of Interference
- Finding a solution
- Study-II: Examining the efficacy of proposed solution

Study I: A Lab Study

- 18 participants
- Procedure:
 - 4 different websites: bank, email, movie, deal
 - 3 sessions 1 week apart:
 - i) Registration, ii) Login 1, iii) Login 2

Study I: Login Performance for Multiple Geopasses

Session	Success Rate(%)	Number of Attempts		Login Time (sec.)	
		Mean	Median	Mean	Median
Login 1	58	2.8	1	59	43
Login 2	67	3.1	1	45	35

❑ Interference Effects for Multiple Geopasses

Session	Total Attempts	Success (%)	Unsuccessful Attempts (%)		
			Accurate Interference	Non-Accurate Interference	Non-Interference
Login 1	282	14.9	5	39.8	40.4
Login 2	309	15.5	1.9	36.3	46.3

❑ Causes of Interference in GeoPass

- Confusion because of geographic distances between a pair of location-passwords?



❑ Causes of Interference in GeoPass

No correlation is found between..

➤ Geographic distances (km) between the location-passwords of a pair of accounts.

AND

➤ Interference effect between those accounts.

❑ Causes of Interference in GeoPass

So, we anticipate:

Users fail to correlate between a geopass and the account it is created for.

❑ Possible Solution: *Mental Story*

- To create a meaningful correlation between a geopass and the account it is created for.

❑ Possible Solution: ***Mental Story***

Example from Study II:

✓ Location-password for Bank Account:

Bellagio Hotel at Las Vegas

Corresponding Mental Story:

“Bank -> Money -> Las Vegas -> Bellagio”

❑ **Mental Story:** More Examples from Study II

✓ Mental Story for a *bank* account's geopass:

"I had an accident here. The accident could interrupt the financial security of a family."

✓ Location-password for a *deal* account: *Old Trafford, U.K.*

Corresponding Mental Story:

"Manchester United makes[s] good deals to get skilled players in the club"

Study II: A Hybrid Study

- 37 participants
- Procedure:
 - 4 different websites: bank, email, movie, deal
 - 3 sessions 1 week apart:
 - i) Registration, ii) Login 1, iii) Login 2

Study II: Login Performance for Multiple Geopasses

Session	Success Rate(%)	Number of Attempts		Login Time (sec.)	
		Mean	Median	Mean	Median
Login 1	98	1.6	1	42	27
Login 2	99	1.8	1	36	24

❑ Interference Effects for Multiple Geopasses

Session	Total Attempts	Success (%)	Unsuccessful Attempts (%)		
			Accurate Interference	Non-Accurate Interference	Non-Interference
Login 1	249	58.2	2.4	2.4	36.9
Login 2	269	54.6	0	2.6	42.8

Summary of Findings



- ***Multiple location-passwords***: Unsatisfactory memorability.
- ***Interference effect***: A prominent reason for login failures.
- ***Reason of Interference***: Users could not correlate their location-password with the account it is created for.
- ***Mental story***: A possible solution to the interference issue in GeoPass.

*Thank
you*



Questions?