


# Soundsquatting

## Uncovering the use of homophones in domain squatting

*Nick Nikiforakis, Marco Balduzzi, Lieven Desmet, Frank Piessens, and Wouter Joosen*

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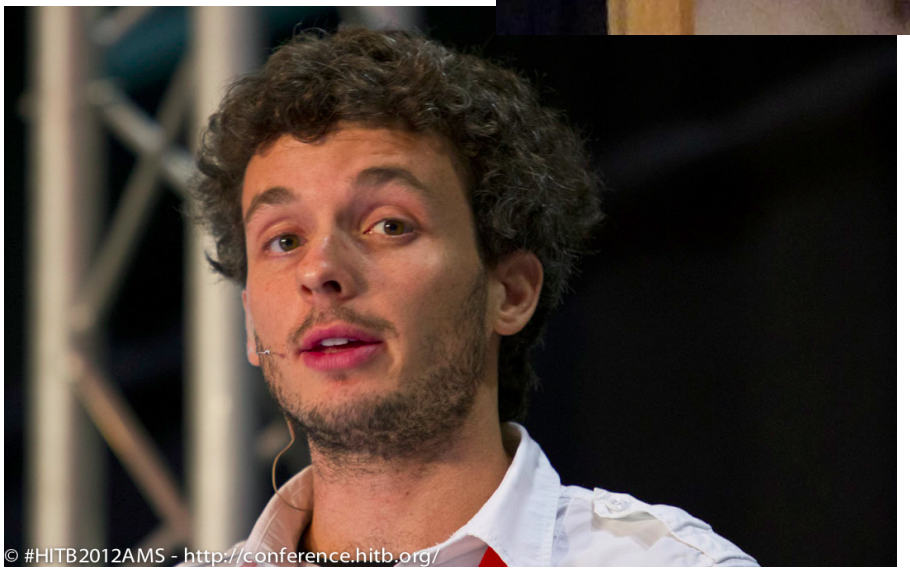
OWASP

# Who am I?

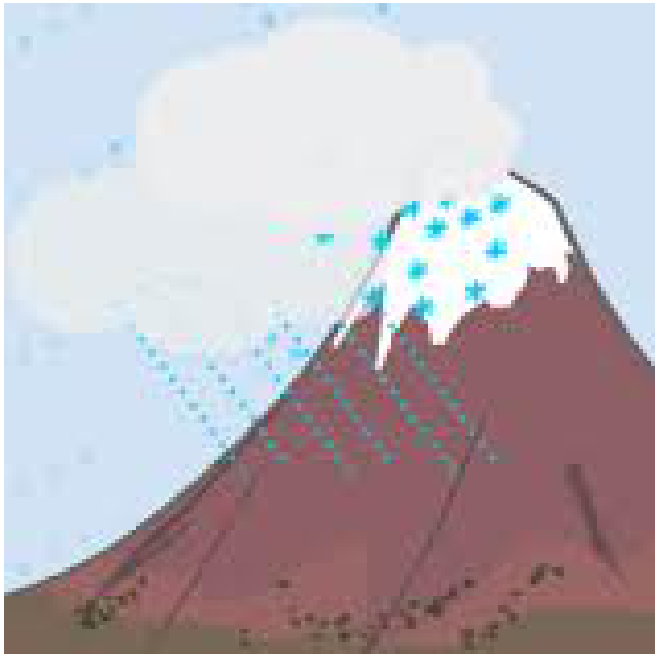
- M.Sc., Ph.D.
- 13 yrs experience
- Sr. Research Scientist @ Trend Micro
- http://iseclab.org/people/embyte/index.html

# Soundsquatting

- Homophone-based squatting
- Homophones: words that have the same pronunciation, but are spelled differently
- Same meaning:
  - guarantee = guaranty
- Different meaning:
  - weather (clime)
  - whether (conj.)
  - wether (male sheep – 'montone')

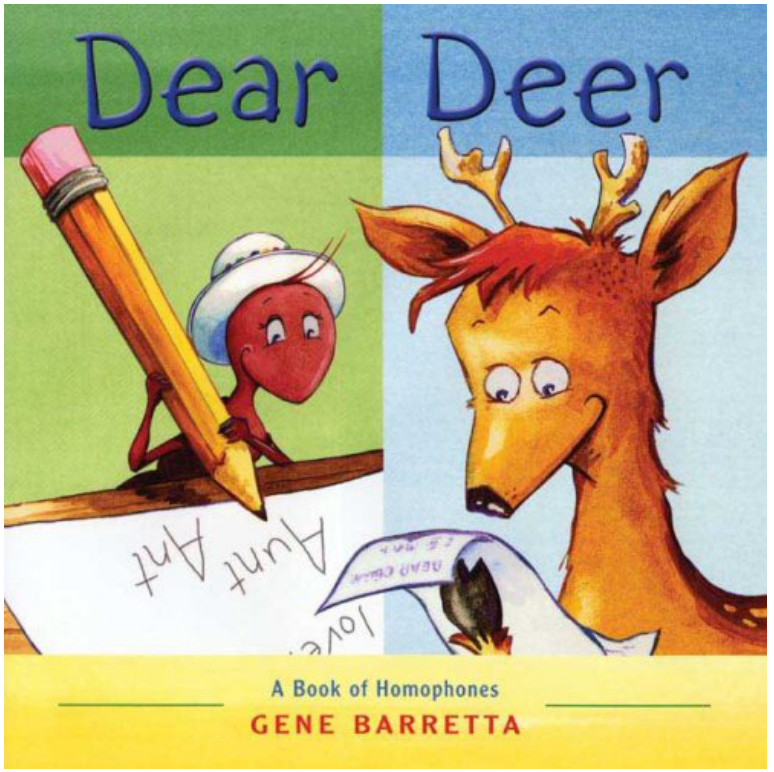
# Example #1



– weatherportal

– wetherportal

# Example #2



# Attack Scenario

- Attacker registers a soundquatting version of a targeted domain *(authoritative domain*),
  - e.g. youtube → yewtube.com (type of wood)
- Leverage the homophone-confusion of users
- Monetizes the hits in different forms:
  - Advertising, malvertising
  - Affiliate programs
  - Scams (e.g., fake lotteries)
  - Phishing, steal credentials
  - Propagate malware (e.g., drive-by)

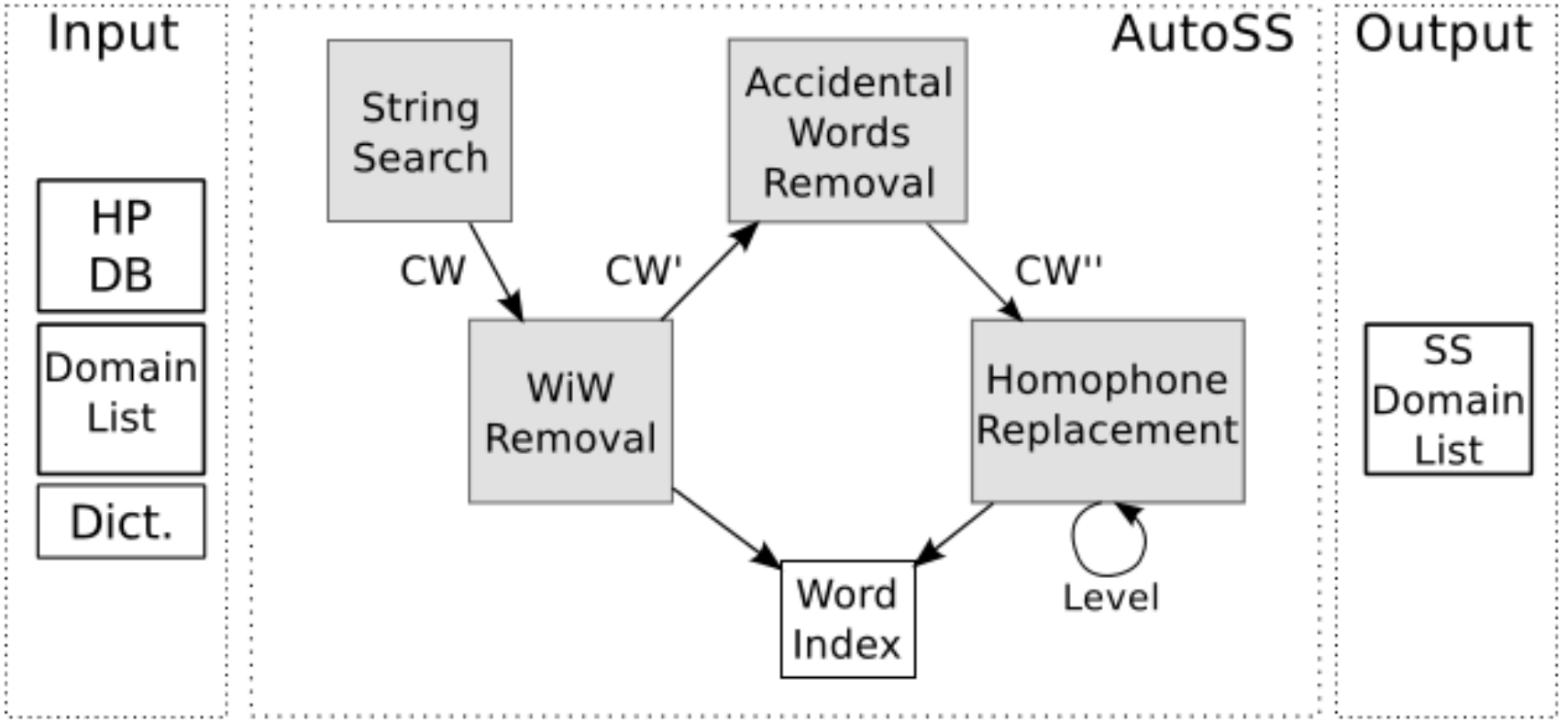
# Differences with Typosquatting

- Both being domain squatting attacks, but
- Soundsquatting leverages homophone-confusion
- Typosquatting leverage “typos” (misspelling), i.e.:
  - missing dot: wwwexample.com
  - character omission: www.exmple.com
  - character insertion: www.exaample.com
  - character permutation: www.examlpe.com
  - character replacement: www.ezample.com

[27] Y.-M. Wang, D. Beck, J. Wang, C. Verbowski, and B. Daniels. Strider typo-patrol: discovery and analysis of systematic typo-squatting. SRUTI’06, 2006.

# Generating soundsquatting domains

- `AutoSS` (AutoSoundSquatter)
  - `WiW:` linkedin (in, ~~ink, inked, ked, link,~~ linked)
  - `AWR:` leaseweb (lease, ~~sew~~, web)



# Uncover Soundsquatting

- Large-scale experiment: Alexa Top 10K
- Homophone databases (1,337 sets)
- 8,476 generated soundsquatting domains

| # Homophones | % of Domains |
|---|---|
| 0 | 67.30% |
| 1 | 15.70% |
| 2 | 8.46% |
| 3 | 5.27% |
| $\geq 4$ | 3.27% |

| Homophone set | # Times Utilized |
|---|---|
| {*2, two, to, too*} | 735 |
| {*1, one, won*} | 300 |
| {*ere, air, aire, are, ayr,ayre, err, eyre, heir*} | 278 |
| {*four, 4, for, fore*} | 250 |
| {*bi, buy, by, bye*} | 223 |
| {*do, dew, due, doe, dough*} | 208 |
| {*whirled, whorled, world*} | 156 |
| {*yew, you, ewe, u*} | 150 |
| {*cite, sight, site*} | 134 |
| {*0, zero, -xero*} | 134 |

# Categorization

- 1) Identify already-registered domains
  - IP and WHOIS lookups
  - Verification against known registrants
  - *1,823 soundsquatting domains online*
- 2) Crawler based on PhantomJS (agent-less)
  - 10 seconds visit
  - Screenshot, HTML and URL chain dumps
- 3) Semi-automated analysis
  - Parked, offline (404), under-construction
  - Use of signatures, the rest *(417 sites)* manually


HA!
HA!
I JUST REGISTERED YOUR BUSINESS NAME
IN EVERY DOMAIN EXTENSION

# 155 Authoritative-owned domains

- Benign. 301/302 HTTP redirection

# Malicious. Best forms of monetizing

- Parked/Ads/For Sale domains
  - 954 cases, 52.3%
  - Ads constructed on demand
  - Use of domain-parking agencies
- Affiliate-abusing domains
  - 32 cases
  - Use of affiliate programs
  - Commission every time the use visit the soundsquatted domain of an authoritative site, e.g.
    - `mybrowsercache.com →`
      `http://www.mybrowsercash.com/index.php?refid=312044`

# Hit Stealing (competitors)

- 22 Cases
- Redirect the traffic to a competitor site
- Most targeted business categories: adult, online shopping and travel
- Example:
  - online gaming site game5.com: soundsquatted as gamefive.com (parked → gaming site)
  - transvestite-oriented porn site ashemaletube.com: soundsquatted as ashemailtube.com which redirects to trannydates.com

# Scams

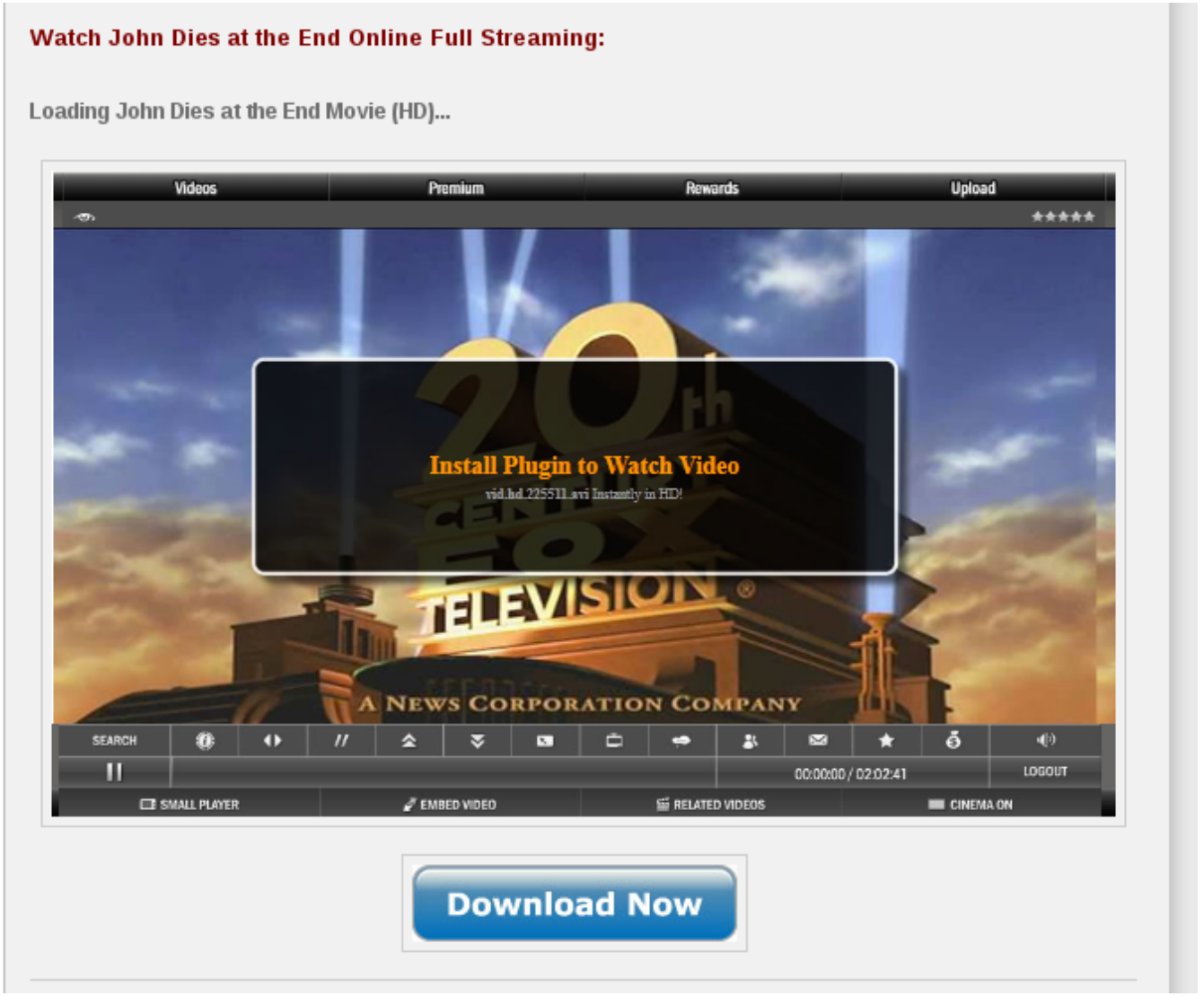
- 16 domains
- Lure visitors into subscribing to fake lotteries and surveys
- `vhone.com, soundquatting version of vh1.com`
  - Electronic business
  - “Survey-scam” promising techie prizes in change of private information
  - Names, email addresses, mobile phone numbers

# Propagate Malware

- `utube.com ss_for YouTube`
  - Videos to social-engineer the users
  - Divulging personal information
  - Installing malicious browser extensions

- `movreal.com ss_for movreel.com`
  - Free of charge video-streaming provider
  - Hosts malicious content

# Social-engineering to spread malware



# “Provides” Solimba

- Adware campaign
- Installer for other malware

| | | |
|---|---|---|
| Rising | - | 20130104 |
| Sophos | Solimba Installer | 20130107 |
| SUPERAntiSpyware | Trojan.Agent/Gen-Solimba | 20130107 |
| Symantec | - | 20130107 |
| TheHacker | - | 20130107 |
| TotalDefense | - | 20130107 |
| TrendMicro | - | 20130107 |
| TrendMicro-HouseCall | TROJ_GEN.RCBH1LT | 20130107 |
| VBA32 | - | 20130105 |
| VIPRE | - | 20130107 |
| ViRobot | - | 20130107 |

# Other Malicious Intents

- Phishing Cases
  - Banks (not disclosed)
  - Fake email providers
- Steals email credentials
- `innbox.lv → InBox`

# Promoting-related domains

- 7 cases of domains promoting something/someone related to the authority domains
- `teambeechbody.com ss for teambeachbody.com`
- beech (wood) VS beach (coastline)

  On-line fitness club

- Promotes a specific coach
  - working for the authoritative domain's organization

# User Characterization

- We registered 30 soundsquatting domains
  - Show blank page and log
- Understand who and why users (victims) access them

- Bot/human detection:
  - `useragentstring.com` = 716 bot signatures
  - `stopforumspam.com` = 350,000 IPs of bots

| Auth. Domain | Homophone pair | SS Domain | #Human Req. (per month) |
|---|---|---|---|
| thefreedictionary.com | {*the,thee*} | theefreedictionary.com | 283 (39.86%) |
| fc2.com | {*2, too*} | fctoo.com | 165 (44.84%) |
| jimdo.com | {*do, doe*} | jimdoe.com | 150 (38.27%) |
| turbobit.net | {*bit, bitt*} | turbobitt.net | 132 (36.07%) |
| leboncoin.fr | {*coin, quoin*} | lebonquoin.fr | 110 (74.32%) |
| adserverplus.com | {*ad, add*} | addserverplus.com | 98 (60.49%) |
| profitclicking.com | {*profit, prophet*} | prophetclicking.com | 56 (48.28%) |
| hostgator.com | {*gator, gaiter*} | hostgaiter.com | 45 (45.92%) |
| sitesell.com | {*sell, cel*} | sitecel.com | 44 (40.00%) |
| discuz.net | {*disc, disk*} | diskuz.net | 43 (40.19%) |
| tube8.com | {*8, ait*} | tubeait.com | 42 (43.30%) |
| clixsense.com | {*sense, scents*} | clixscents.com | 40 (44.44%) |
| a8.net | {*8, eight*} | aeight.net | 48 (43.24%) |
| newegg.com | {*new, gnu*} | gnuegg.com | 37 (36.63%) |
| redtubelive.com | {*red, read*} | readtubelive.com | 44 (51.76%) |
| fiverr.com | {*err, air*} | fivair.com | 33 (37.93%) |
| exoclick.com | {*click, clique*} | exoclique.com | 32 (45.71%) |
| theglobeandmail.com | {*mail, male*} | theglobeandmale.com | 35 (38.46%) |
| pastebin.com | {*bin, been*} | pastebeen.com | 35 (39.77%) |
| ku6.com | {*6, sics*} | kusics.com | 28 (33.33%) |
| ... | ... | ... | ... |
| **Total Requests per Month (30 domains):** | | | 1,718 |

# It's a real problem

- Global problem: 123 different countries
- Our soundsquatting domains received different emails related to social-networking invitations and shipment of products
- Squatting error in the SLD
  - `jimdo.com` = provider hosting personal pages
  - `jimdoe.com` reached out for `awesomegrizzlybears.jimdoe.com`, `karatedojo-oppeln.jimdoe.com` and `armaniwoe.jimdoe.com`

# Targeting Sound-dependent users

- Experiment: `youtube.com` and `yewtube.com` by email to a sound-dependent user
- Six popular readers:
  - `Win XP, Win 7, OS X (built-in functionality)`
  - `Thunder, Linux's ORCA, Android's Skyvi (220,000 users)`
- The sound is identical → no mean to distinguish a legitimate link from a malicious
- Proposed Solution: spelling mode

# Conclusions

- Uncover soundsquatting
- New type of domain squatting based on words sound-similarity, rather than typos
- We conducted ethical experiments
- Attackers abuse soundsquatting in different forms (scams, malware, ads)
- `AutoSS` as prevention strategy
  - Detect suspicious soundsquatting domains beforehand – TrendMicro

# Thanks!

Questions?

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