

# MoodyBoard

A physical keyboard indicating  
security and privacy problems

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# Outline

## 1 What...erm, Why? – Introduction

- Motivation
- Approach

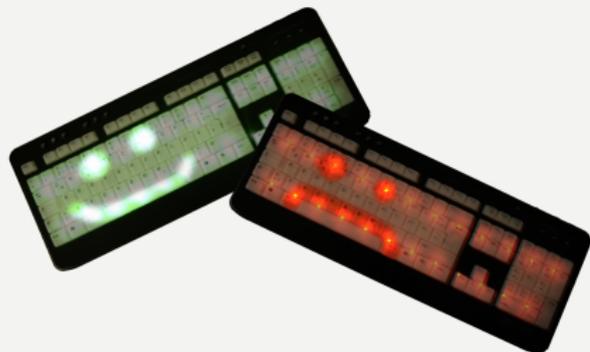
## 2 What Was – Work So Far

- Focus Group
- Final Concept

## 3 What Is – Prototype

- Hardware
- Software

## 4 What Will Be – Evaluation



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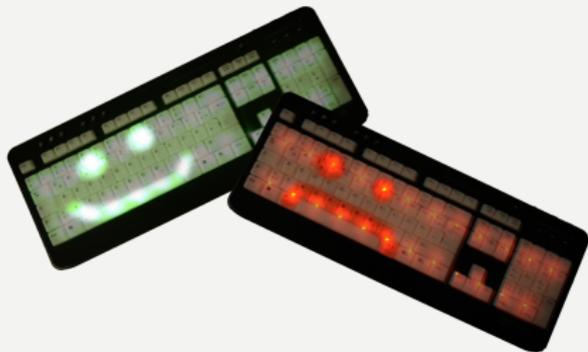
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# Why yet another security visualization?

- Online threats are manifold and increasingly frequent and tricky
- Security warnings are either blocking...
  - and therefore interruptive
  - prone to habituation
- ... or peripheral
  - easily missed (since they are by definition not in the center of attention)
  - often ignored if the page “looks right”

# And why is yours better?

The Solution (we think): use the keyboard for ambient visualization

- keyboard is already available  $\Rightarrow$  no additional space required
- keyboard is always in the users' field of view
- color and lightness changes are still eye-catching in peripheral sight area

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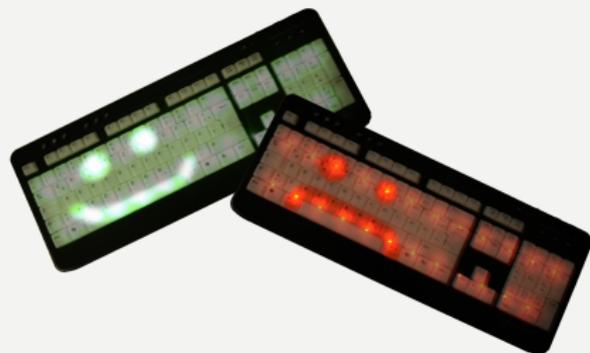
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# Focus Group

- 8 participants, all frequent Internet users (recruitment criterion)
- two introductory questions about familiarity with Internet security/privacy risks and countermeasures in browsers  
⇒ mainly Phishing and MITM-attacks
- after being briefed on the concept of the MoodyBoard, participants were asked some questions about its potential use, influence, and improvement
  - browser security warnings should be augmented, not replaced
  - alternative channels of information transportation were suggested, like vibration and lighting or blocking single keys (but: “no sound!”)
  - several usability related extensions were proposed, like special keys for software firewalls, using color to display password strength, etc.

## Initial plans merged with results from Focus Group:

- whole keyboard can be lit in an arbitrary color
- Return key can be seperately lit
- vibration alert
- Help Key to display additional information about the current warning



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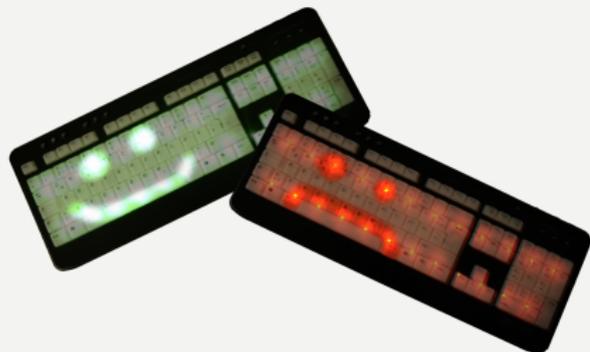
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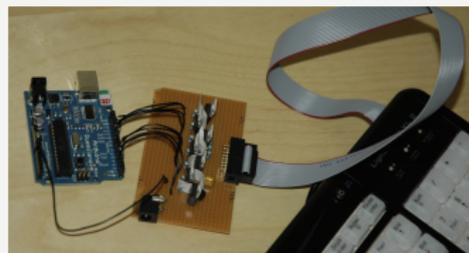
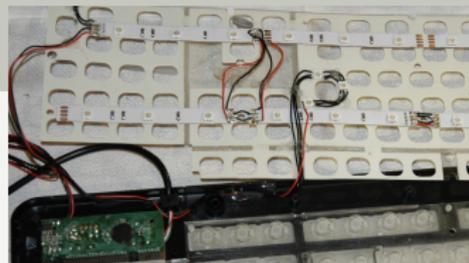
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# The Moody Hardware

- based on a “Revoltec Lightboard XL2”
- electroluminescent foil deactivated, serves as a substrate for LEDs:
  - two rows of flexible LED strips for the main light
  - three single RGB LEDs for the Return key
- small motor with eccentric (unbalanced) weight positioned in the wrist rest
- connected via a ribbon cable to an external circuit soldered onto a stripboard (which in turn is connected to an Arduino)
- (has been quite moody so far)



# The Moody Software

- Arduino Firmware, provides a simple (humanly “readable”) protocol for:
  - color fades (“fade from red to reddish and back once per second”)
  - vibration patterns (“vibrate  
brrrrrr-brrrrrr-brrrrrr-br-br-br-brrrrrr-brrrrrr-brrrrrr”)
  - button presses
- Connector Service
  - written in Python (cross-platform, successfully tested on Linux, MacOS and Windows)
  - connects to the Arduino on its virtual serial port
  - exposes a minimalistic HTTP based API
  - handy to use from Firefox extensions and similar via XMLHttpRequests



mozilla  
**Firefox**

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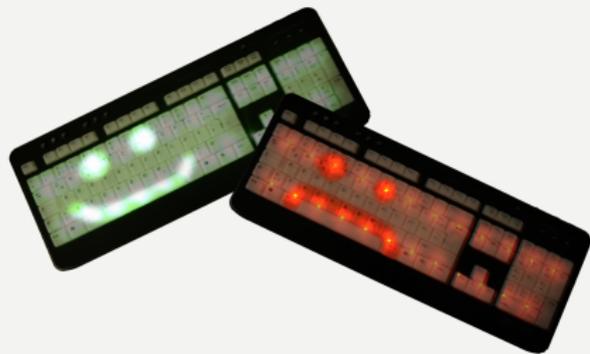
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# Evaluation – Plan A?

- difficult to evaluate (“100% of the users noticed the keyboard lighting up”)
- long-term evaluation is most promising, but:
  - limited time: should be at least several weeks, diploma thesis lasts only six months (two down, four to go).
  - limited resources: more than one prototype would be needed, which are somewhat costly (~70 EUR, +30 EUR for the Arduino) and time-intensive to build
  - even if two more prototypes would be built, studies would still have to be carried out in series to reach a satisfying number of participants, which would increase the needed time even more

# Evaluation – Plan B!

- Qualitative Pre-Study
  - participants are presented with some fictional scenarios in which the MoodyBoard might be used (e.g. filling out a web form)
  - certain actions trigger visualizations (e.g. focusing the credit card field)
  - users will be asked what they associate with those visualizations
- Quantitative User Study
  - based on “Keyword Based Security Awareness Warnings” by Florian Müller
  - different combinations of text color and keyboard color will be compared regarding their effectiveness to prevent users from falling for fake websites

# See you in fall ;)

Thanks for listening and enjoy the world cup!



Disclaimer: actual MoodyBoard can't actually do that ;)

Neither can it smile or frown, for that matter