

The Home InfoPanel

More than a digital picture frame

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Outline

- The Idea
- Hardware
- Software
- Panel Applications
- Running it
- Conculsions

The Original Idea

- I wanted to build a digital picture frame
 - Reuse parts from my old Thinkpad
- Many people already have done this
 - Plenty of "good" howtos (see references)
 - Just following a howto is kinda lame
- So what features can we add?
 - Many, but I want it to be "interactive"

The New Idea

- Digital picture frame with a touchscreen
 - Change what is currently displayed
- Go beyond displaying pictures
 - Display information (news)
 - Interactive applications
- Do stuff automatically
 - Switch on in the morning...
- I call it the **Home InfoPanel**

Next Steps

- Select hardware and software components
- Design the UI (user interface)
- Write applications

Hardware Overview

- Display / Touchscreen
- Computer
- Case (a lot of work as we will see)
- Network
- Gadgets
 - Sound, (Web)cam, Bluetooth

Display & Touchscreen

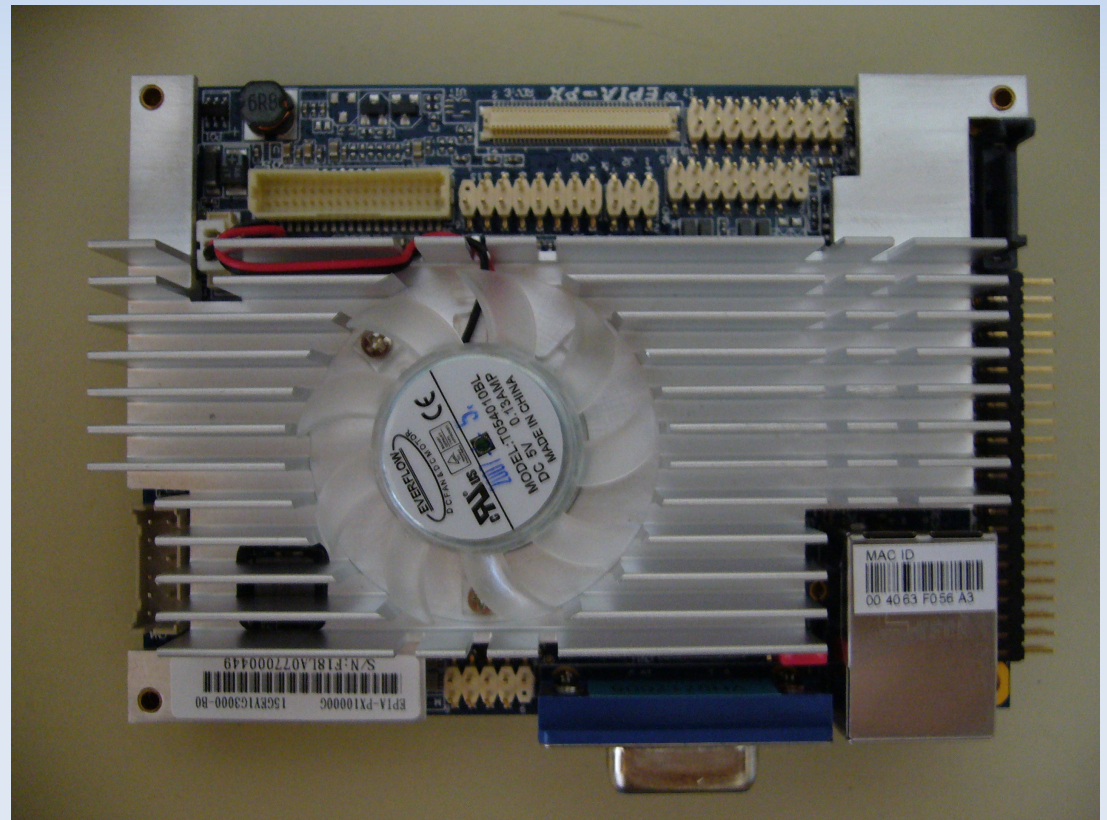
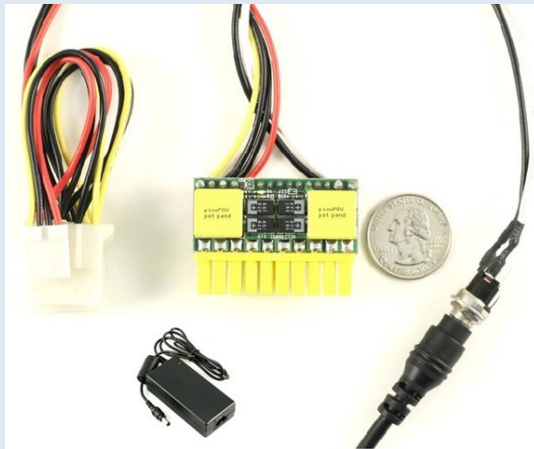
- 17" TFT with integrated touchscreen
 - About 330 Euro (eBay)
- Self made alternative
 - Buy TFT and touch sensor seperately
 - TFT is cheap
 - Touch sensor is expensive

Computer

- Small board + CPU combination
 - Doesn't need to be super fast (not too slow either)
 - Passively cooled or maybe very silent fan
- We will need some ports
 - VGA/DVI, USB (many ports), ethernet, audio in/out
- Small power supply without fan
 - We don't want a huge box and no noise

Computer

- (VIA) PICO-ITX design 1Gz VIAC7 (300 Euro)
 - 10x7cm
- Pico PSU (power)



Other Hardware

- Mini webcam module (USB)
- Sound adapter (USB)
- Bluetooth (USB)
- USB hub
- USB cable to build an external connector
- Power switch

Software Components

- System
 - Linux and X11
- Libraries and support applications
 - MozEmbed (Mozilla browser component)
 - Matchbox-keyboard
- The panel applications
 - Written in Python/GTK

System Setup

- Default Ubuntu desktop installation
 - Use auto login on boot
- NFS vs. USB stick
 - Putting a HDD in the panel was never an option
 - Currently: Boot Kernel from USB root on NFS
 - Future: USB stick only (NFS root sucks)

Basic User Interface Design

- Make the UI (user interface) invisible
 - Keep it small
 - Hide it when it is not used
 - Fullscreen apps rock you know!
- Finger on touchscreen is not very accurate
 - Big UI elements, make them easy to "click"

Application Design

- Simple Python GTK framework (OO)
 - Make everything reusable
 - PanelWindow, PanelButton, ... classes
- Use XEMBED
 - Embedd other apps into the panel software
- Flash apps from the web
 - Make them run in fullscreen mode
 - My favorite source: Chumby (chumby.com)

Chumby(.com)

- Internet "alarm clock" (plays flash content)
 - Touchscreen, network, sound
- Very similar to my InfoPanel
 - Copied some cool flash apps for my InfoPanel



Network

- Can't run second cable out of the box
 - Ugly! Want to be independent from ethernet outlet
- First try: Wifi
 - Nfsroot over Wifi, worked OK but could be better
- Second try: Ethernet over power
 - Nfs root works well, is fast enough (could be faster)
 - This is the current setup (likely the final setup)

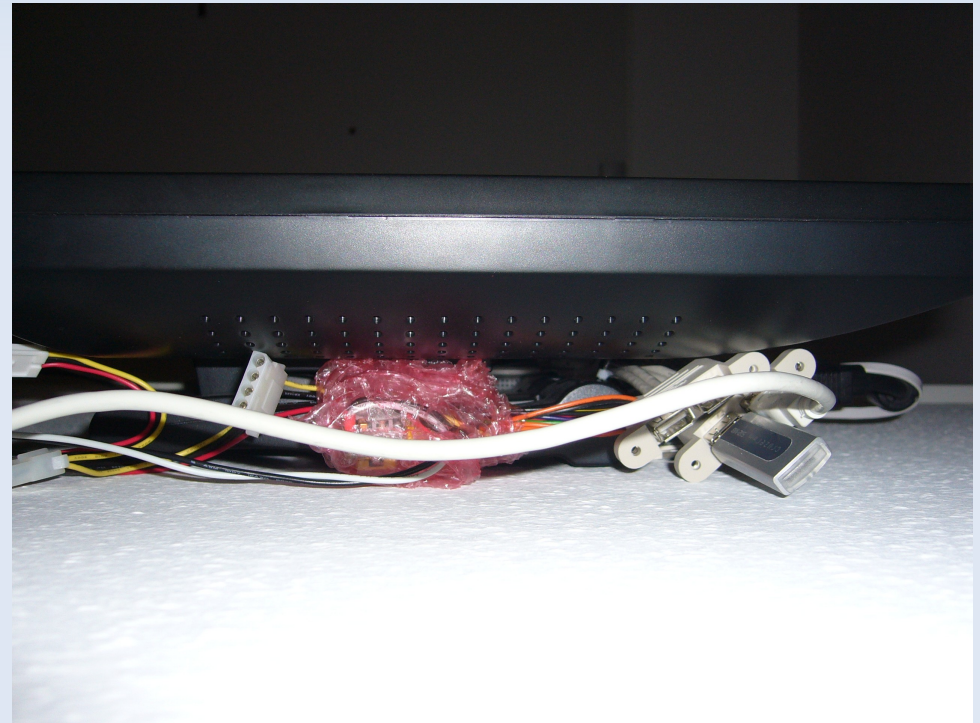
First Steps

- aka what is that on your wall?



First Steps a Close-up

- Stuffed everything behind the screen
 - Used wireless AP in client mode (Fonera)



The Case

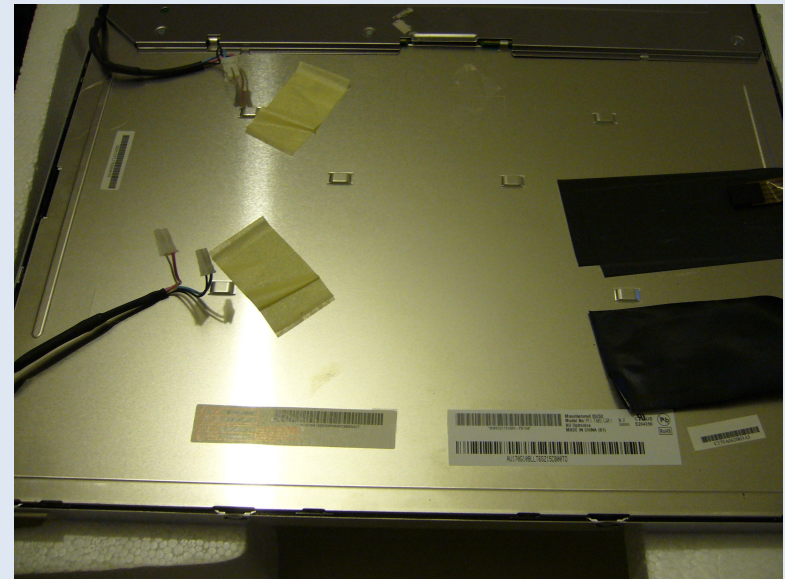
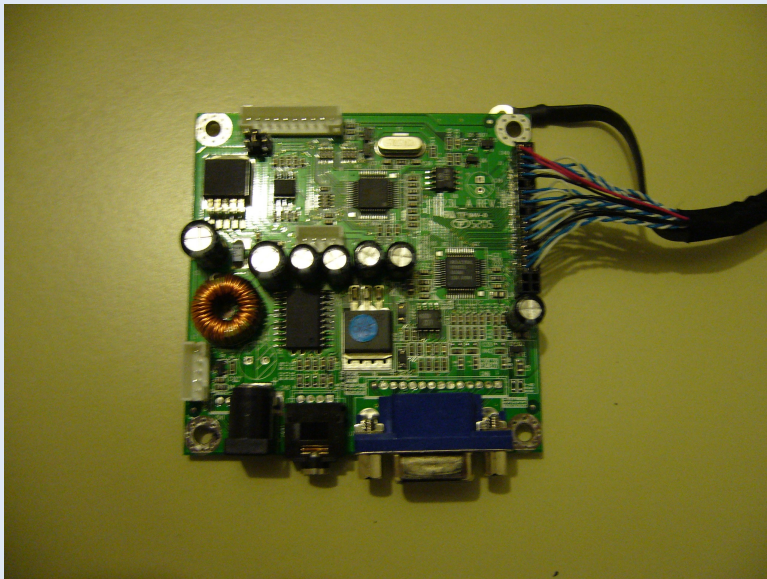
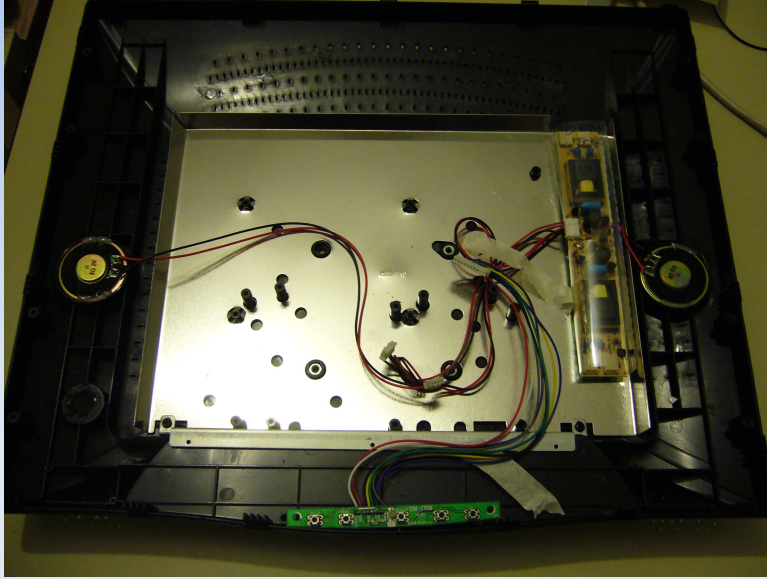
- Want a nice looking case for the living room
 - Needs to be and look girlfriend "compatible"
- Buying a case is no option (\$\$\$)
- Build your own case out of wood



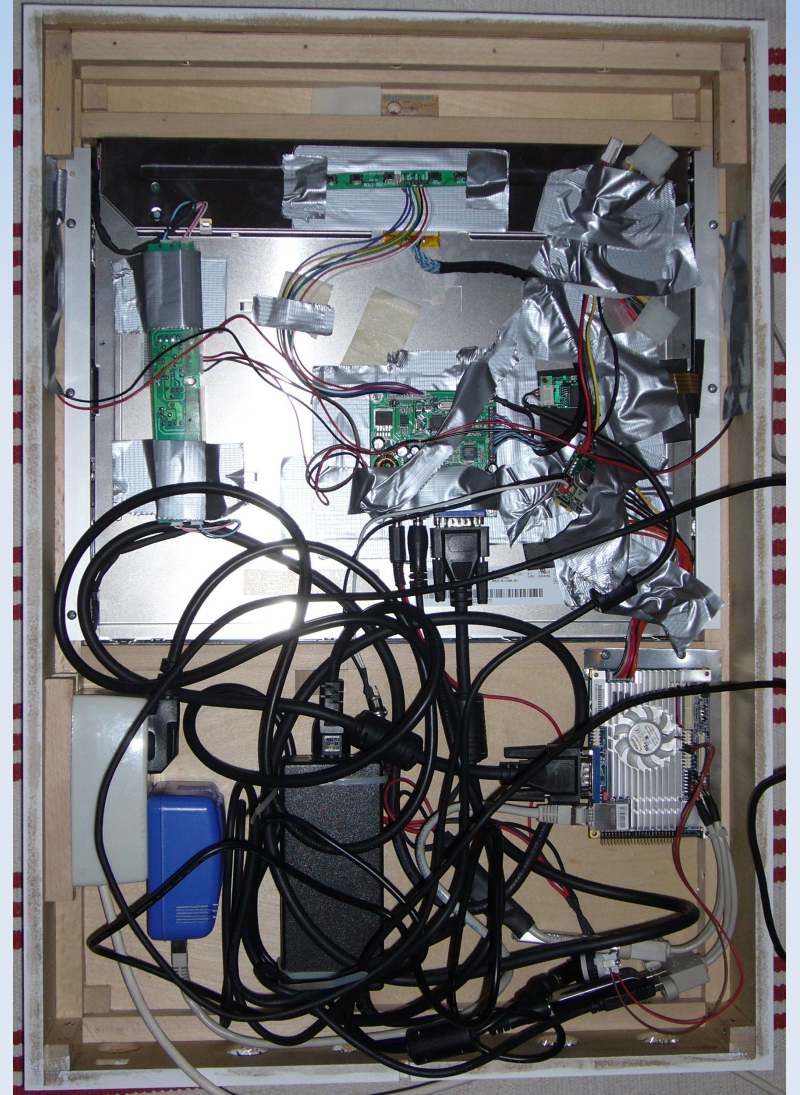
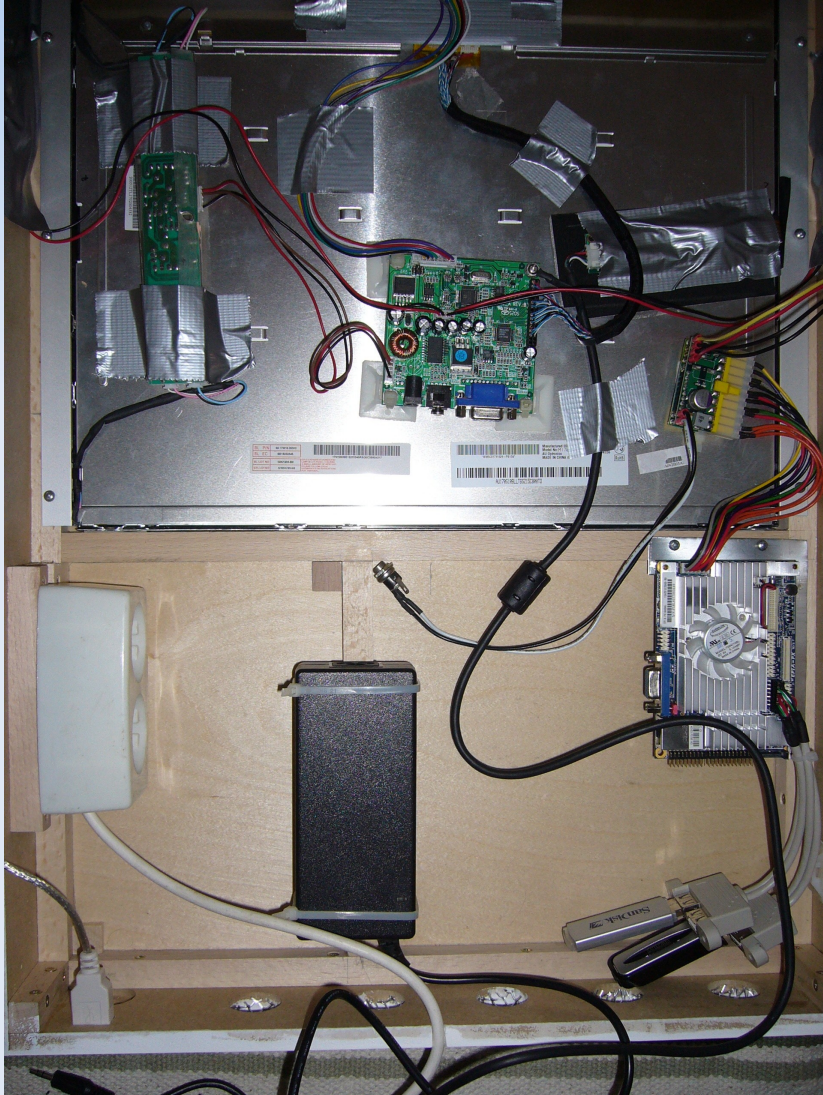
Designing the Case

- As small/thin as possible
 - Just make componets fit (measure before building)
 - Disassemble touchscreen and take only the screen
- Size 42x60x7 cm
 - Display and power adapter/connectors are the keys
- Color will be white (make it a "part" of the wall)
- (Sorry no pictures of the actual build process)

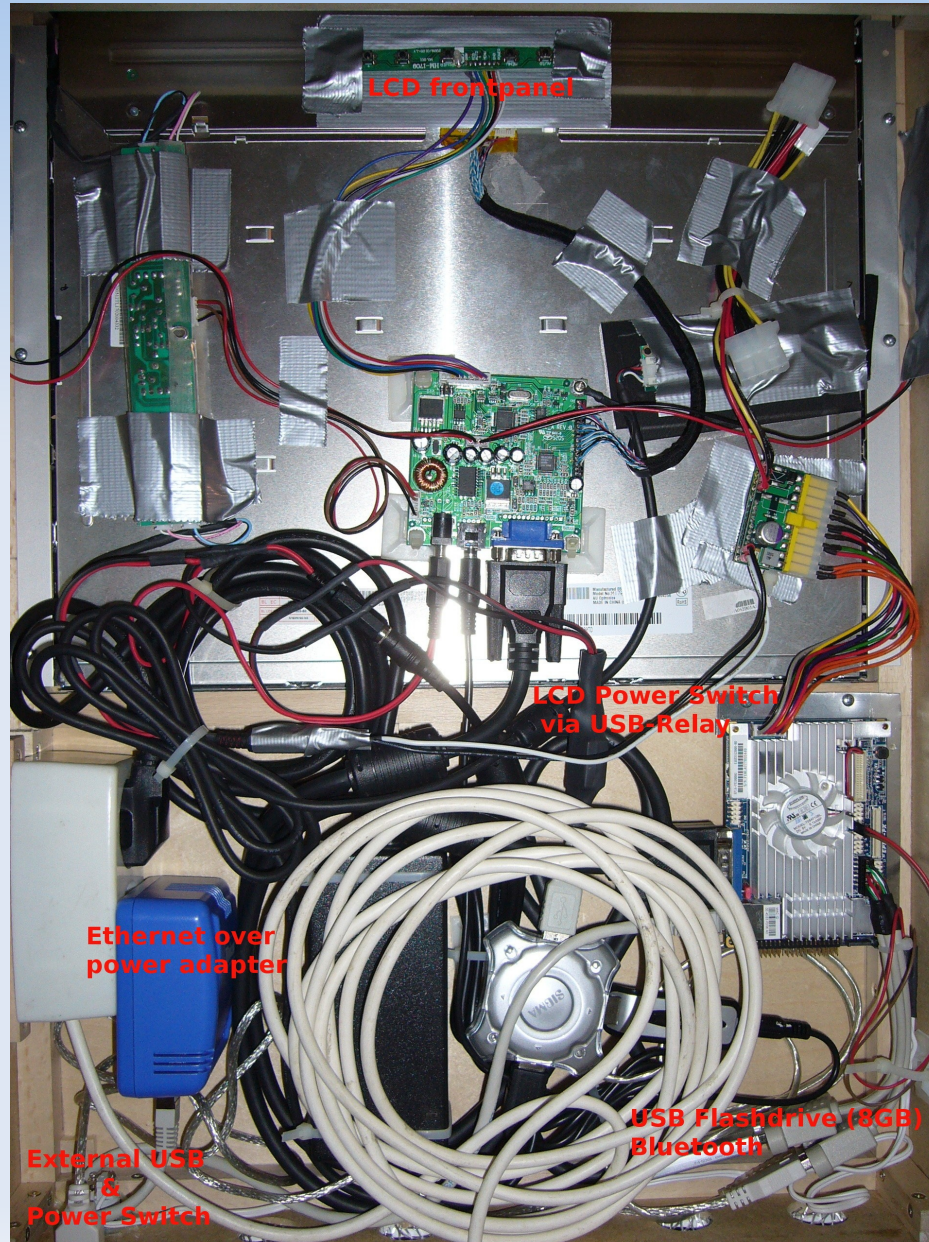
Disassemble the TFT



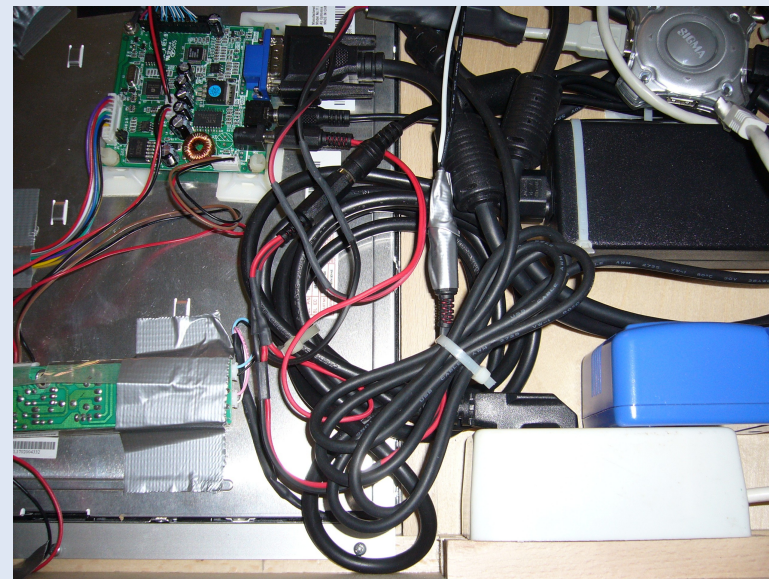
First Try, will it all fit?



Yes it does!



More of the Inside



Case : Front & First Startup

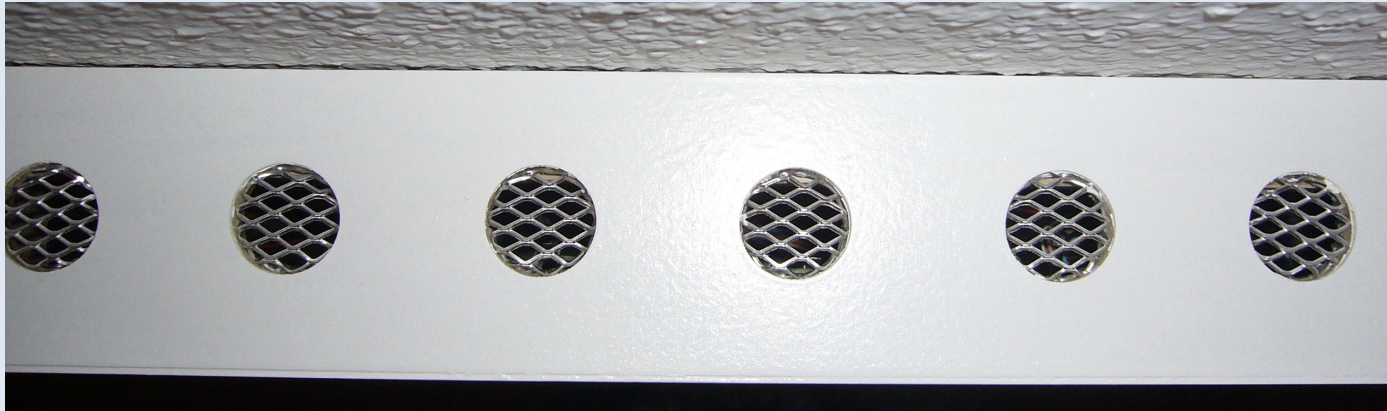


Panel mounted on the Wall



Case : Top and Side

- Ventilation on top
- Speakers on each side



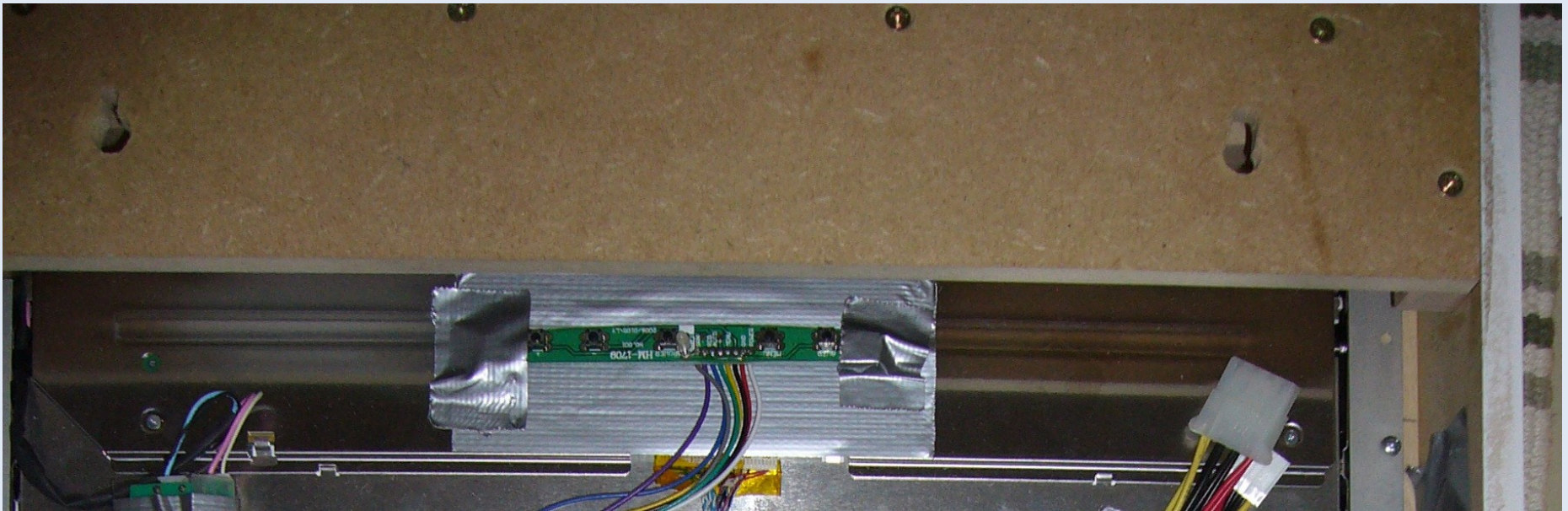
Case : Bottom

- Ventilation
- Power button and USB (RIGHT)
- Power cable



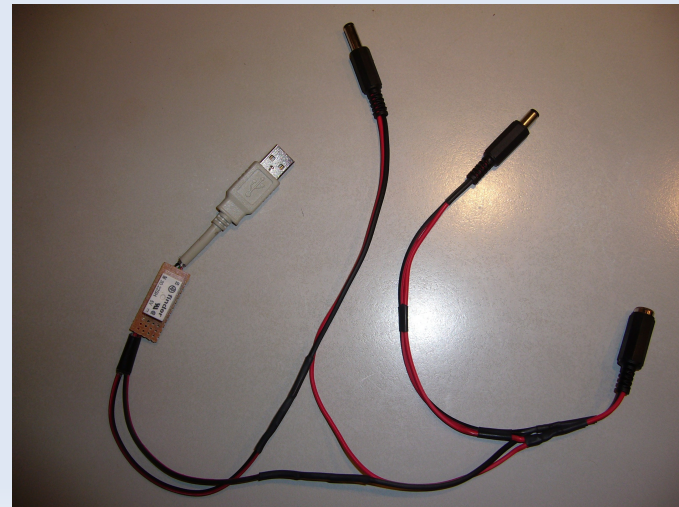
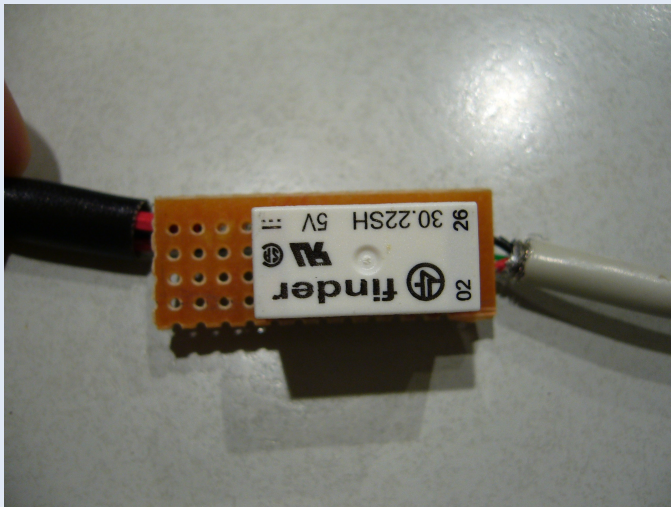
Mounting the Panel on the Wall

- Just two screws
 - Put keyholes in the backside of the panel



Monitor Switch

- Display shouldn't be on standby all day
- Make display switch on when computer is on
- ⇒ 5V relay switch hooked to USB
 - Switches display on when computer is powered up



WebCam

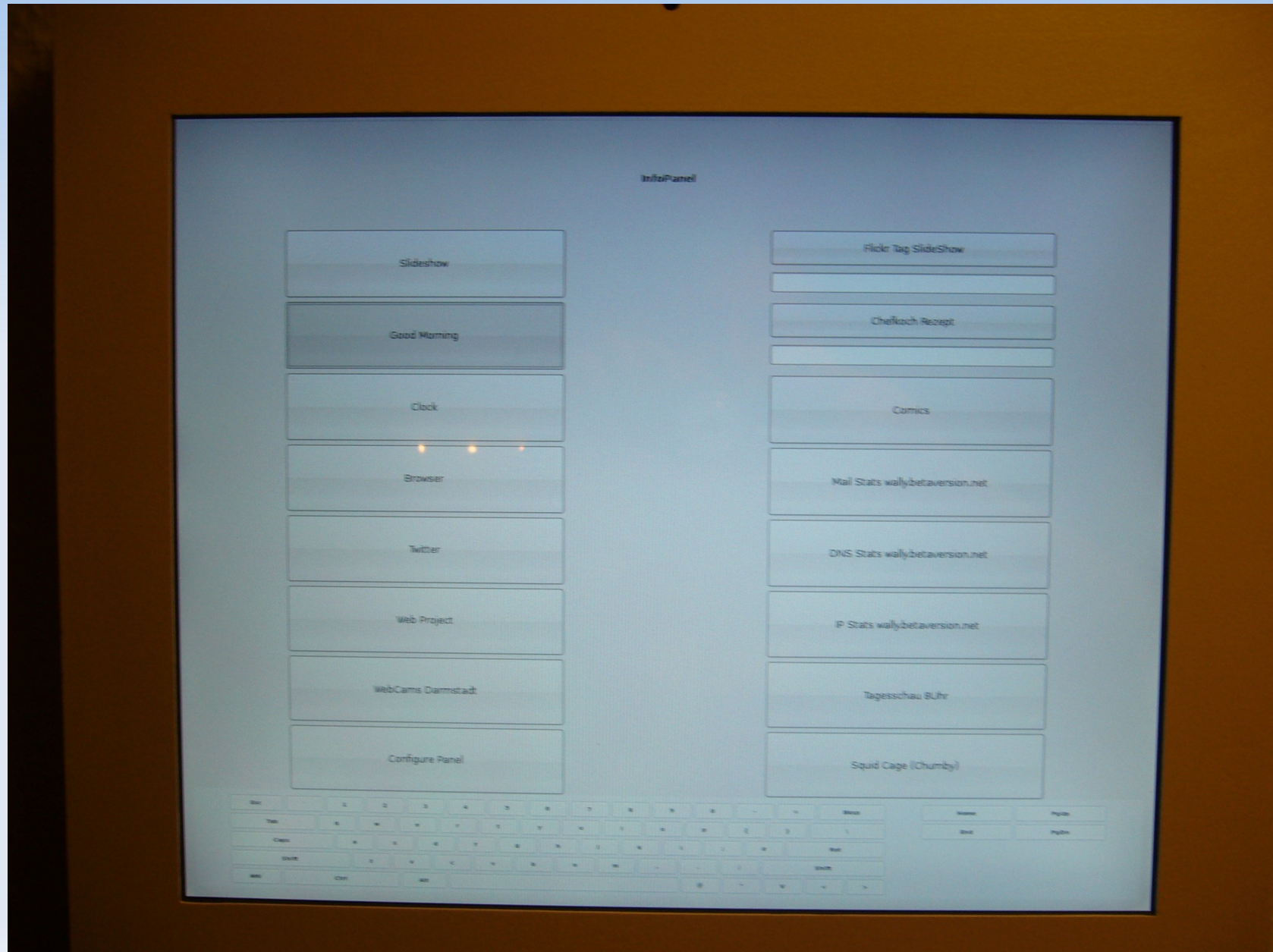
- Driver still doesn't work :((
- Plan was to run stuff like Skype video calling



The Panel Applications

- Foto Slide Show (digital picture frame)
 - Web Comic
- Web Browser based Flash apps
 - Clock, Flickr, Squid Cage, Twittter, ...
- Web Apps
 - Webcam grabber, train time table, ...

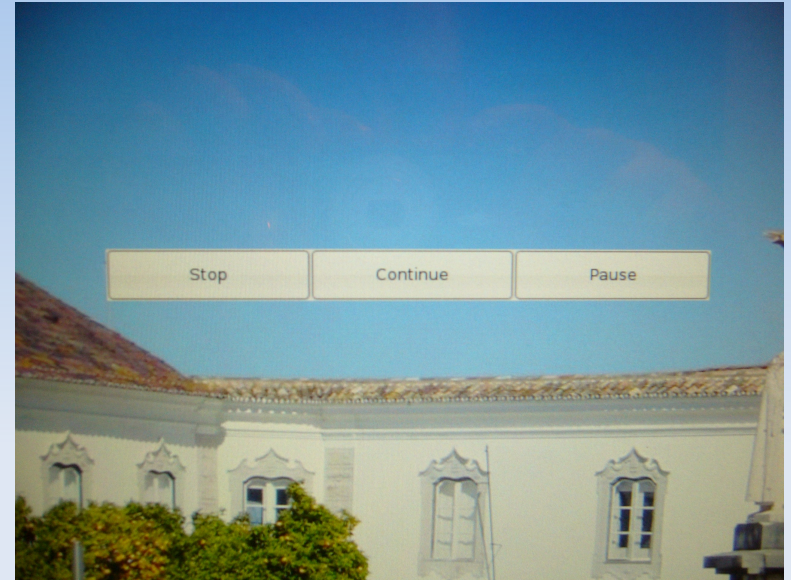
Applications : Main Menu



Applications : Foto Slide Show

- Images are faded in/out
- Scale to display size (keeps aspect ratio)
- Auto rotation (reads EXIF)
- Support for pause and continue
 - Stop slide show, run other app, continue slide show

Applications : Foto Slide Show



Applications : Web Comics

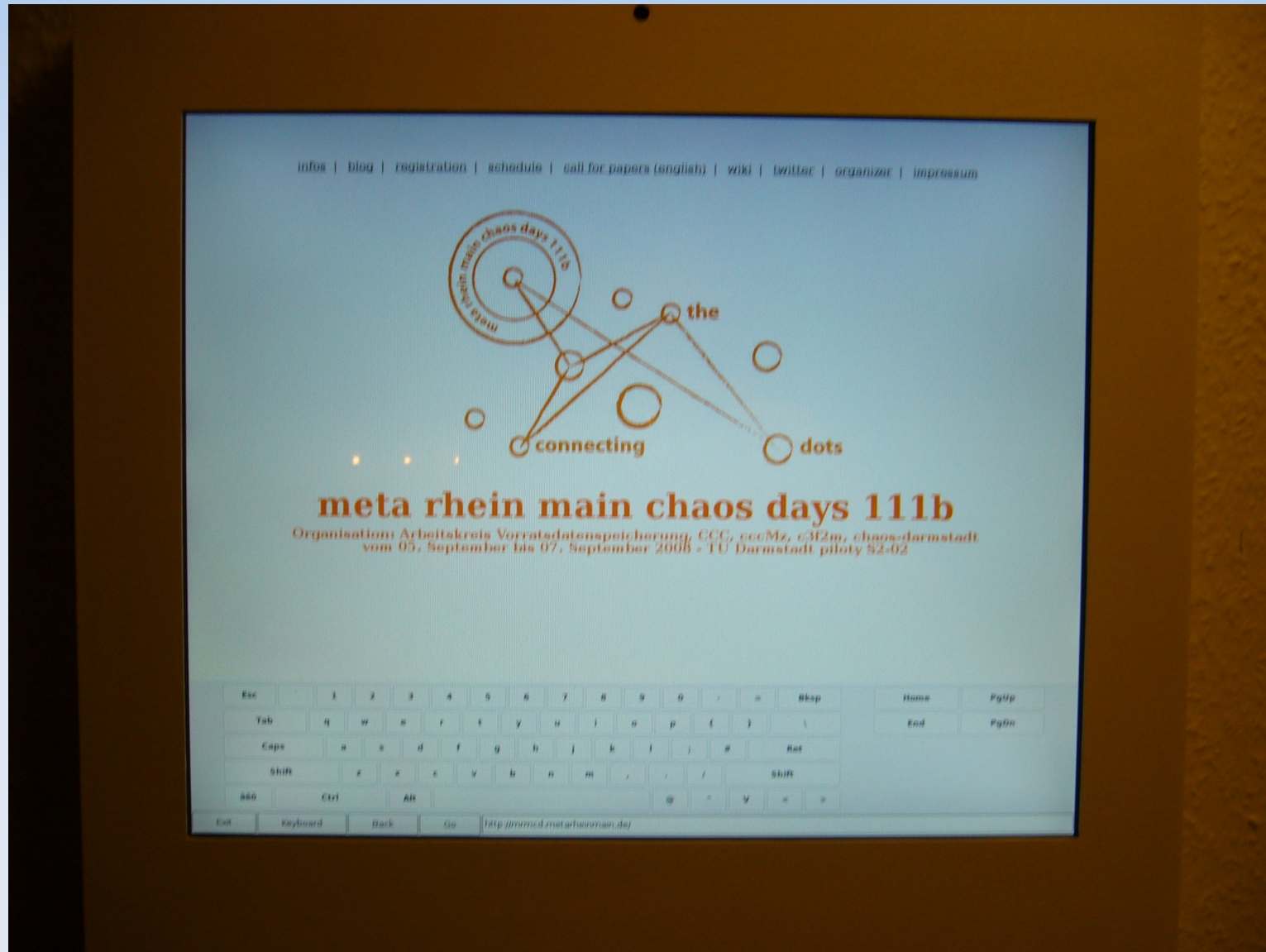
- Simple aggregator for web comics
- Uses **foto slide show** app to display images



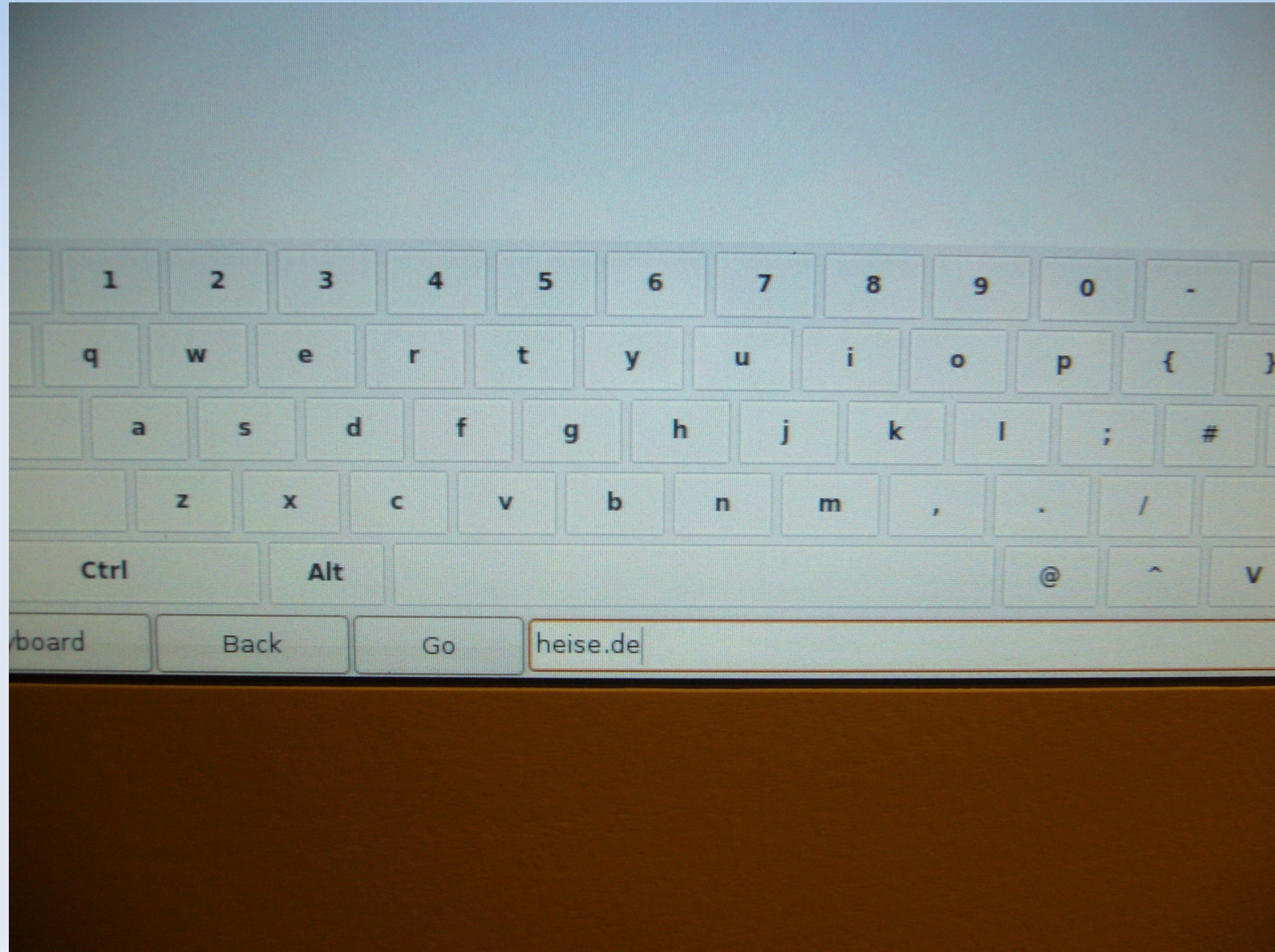
Web Browser

- PyMozEmbed + Matchbox-keyboard
- Few controls (on a simple button bar)
 - back,go,reload, exit,keyboard
- Button bar fades out if not used for some time
 - Fullscreen browser (besides scrollbar)
- Controls (buttons) and keyboard can be switched on/off per application
 - Don't want a keyboard in some apps

App : Web Browser

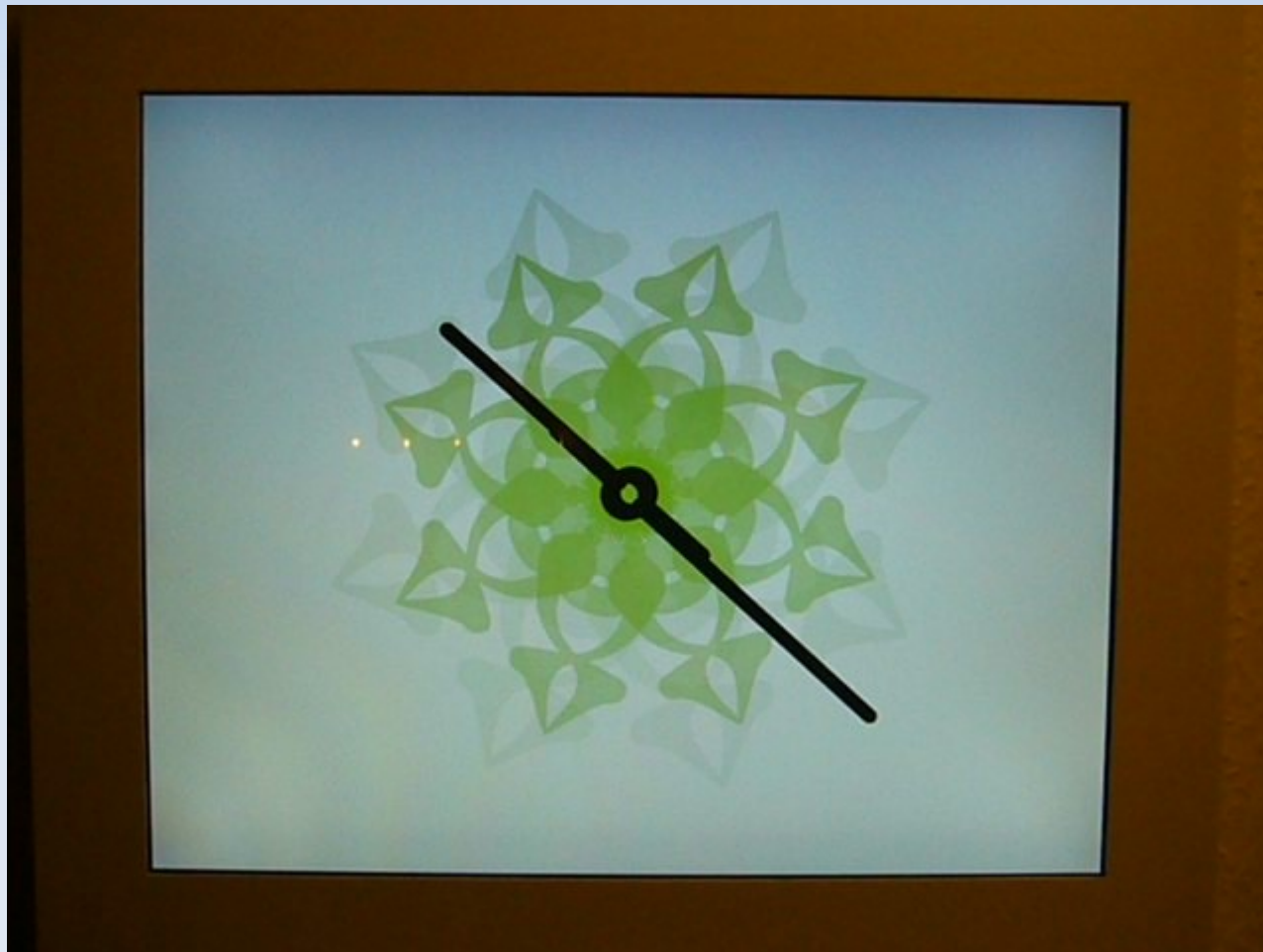


App : Web Browser + Keyboard



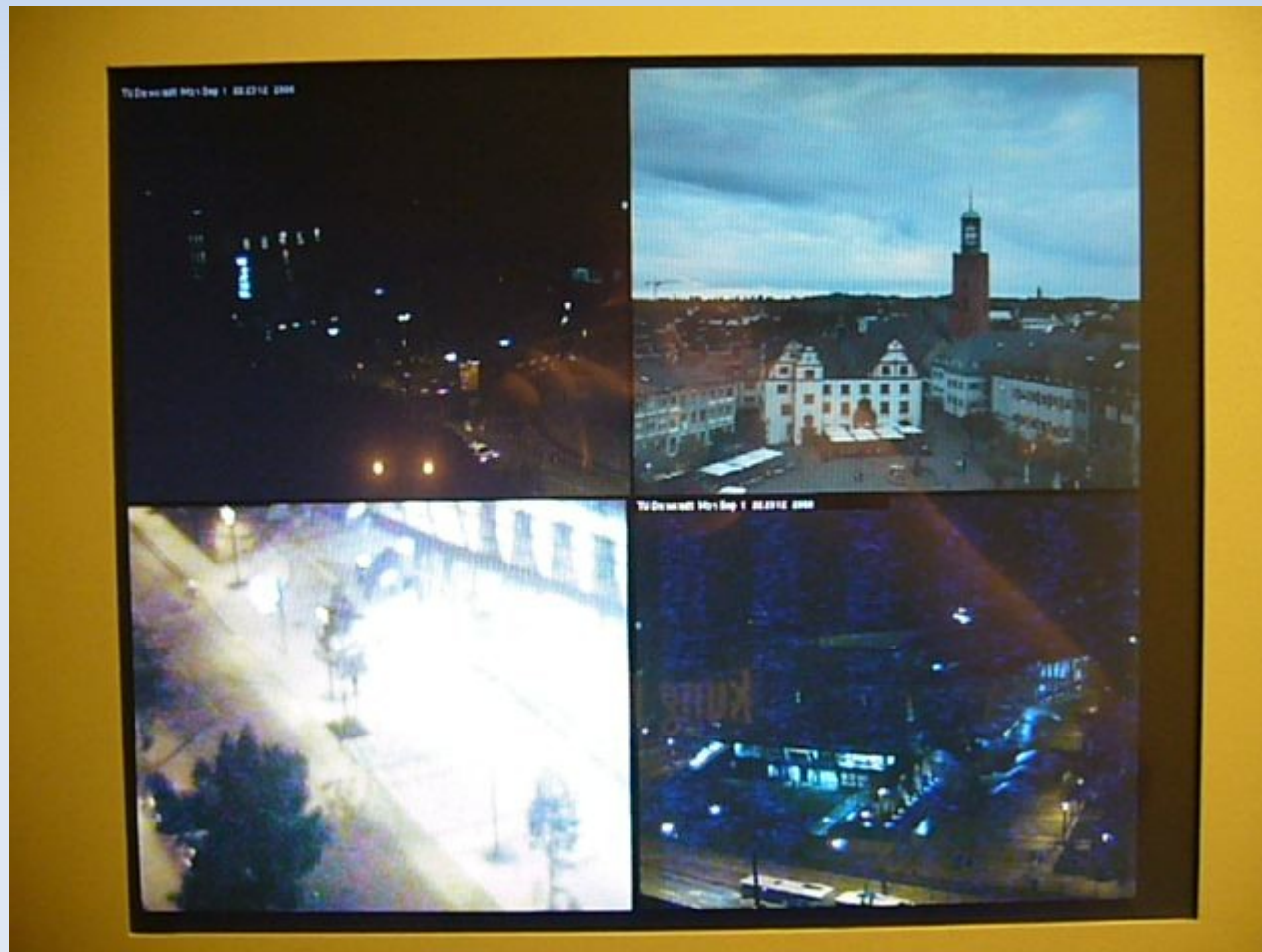
Application : Clock

- Flash clock inside web browser (Chumby clock)



Application : Webcams

- Aggregate city webcams, show in grid

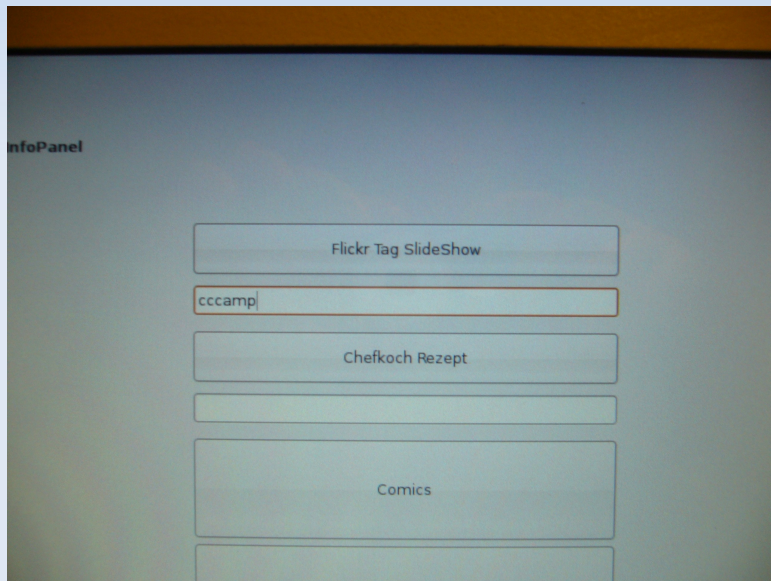


App : Webcam Fullscreen



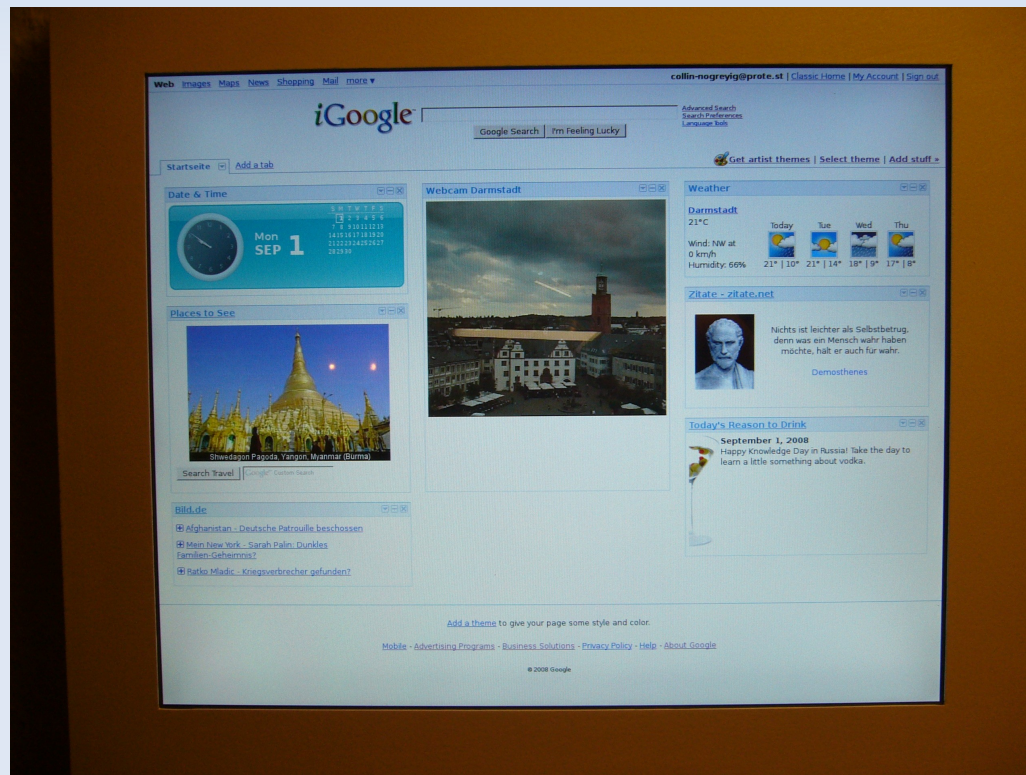
App : Flickr Search Slide Show

- Uses web browser app



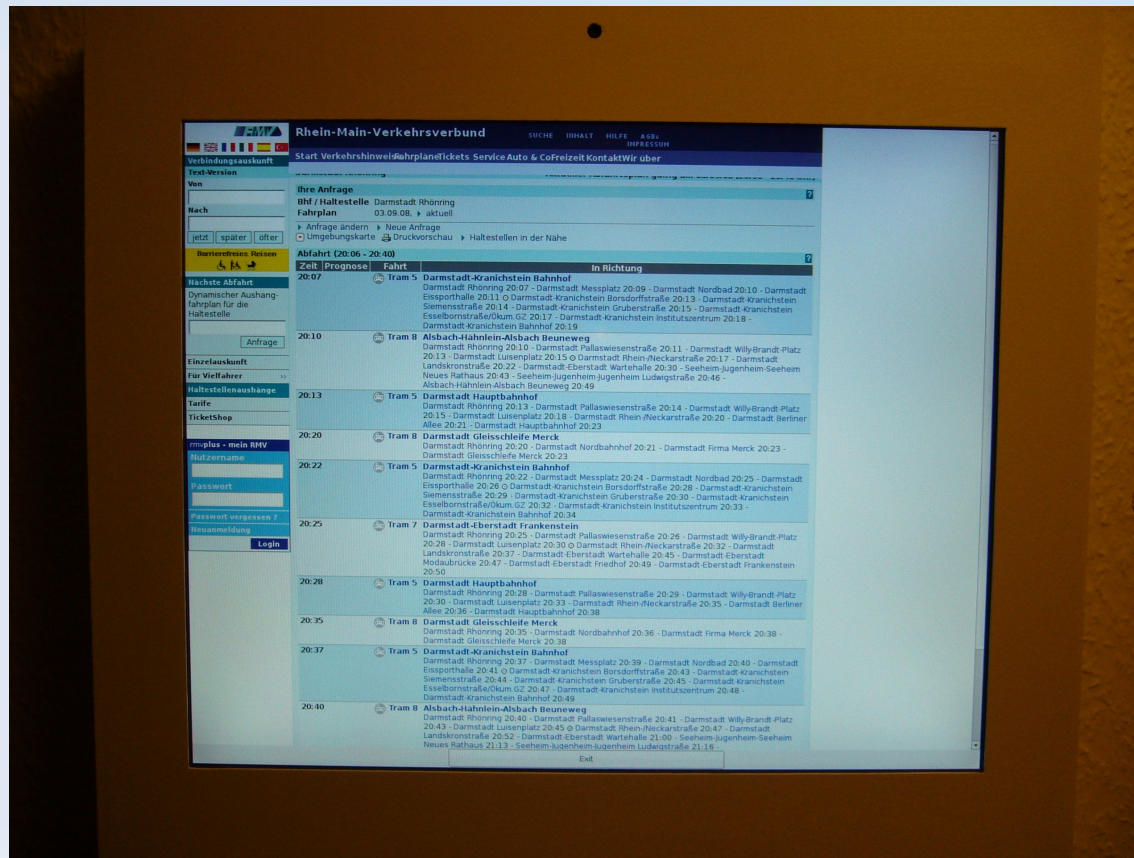
App : iGoogle / GoodMorning

- Customized iGoogle
 - Automatically started on boot up in the morning



App : Tram Timetable

- Shows next trains for station at my house
 - Uses web browser



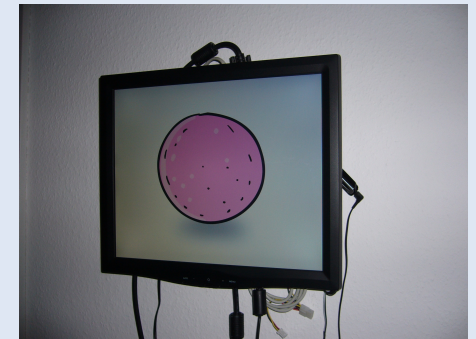
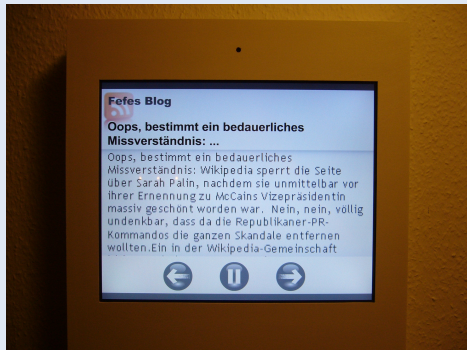
App : Video Player

- Generic video player (mplayer controller)
 - Setup to play 8 o'clock Tagesschau



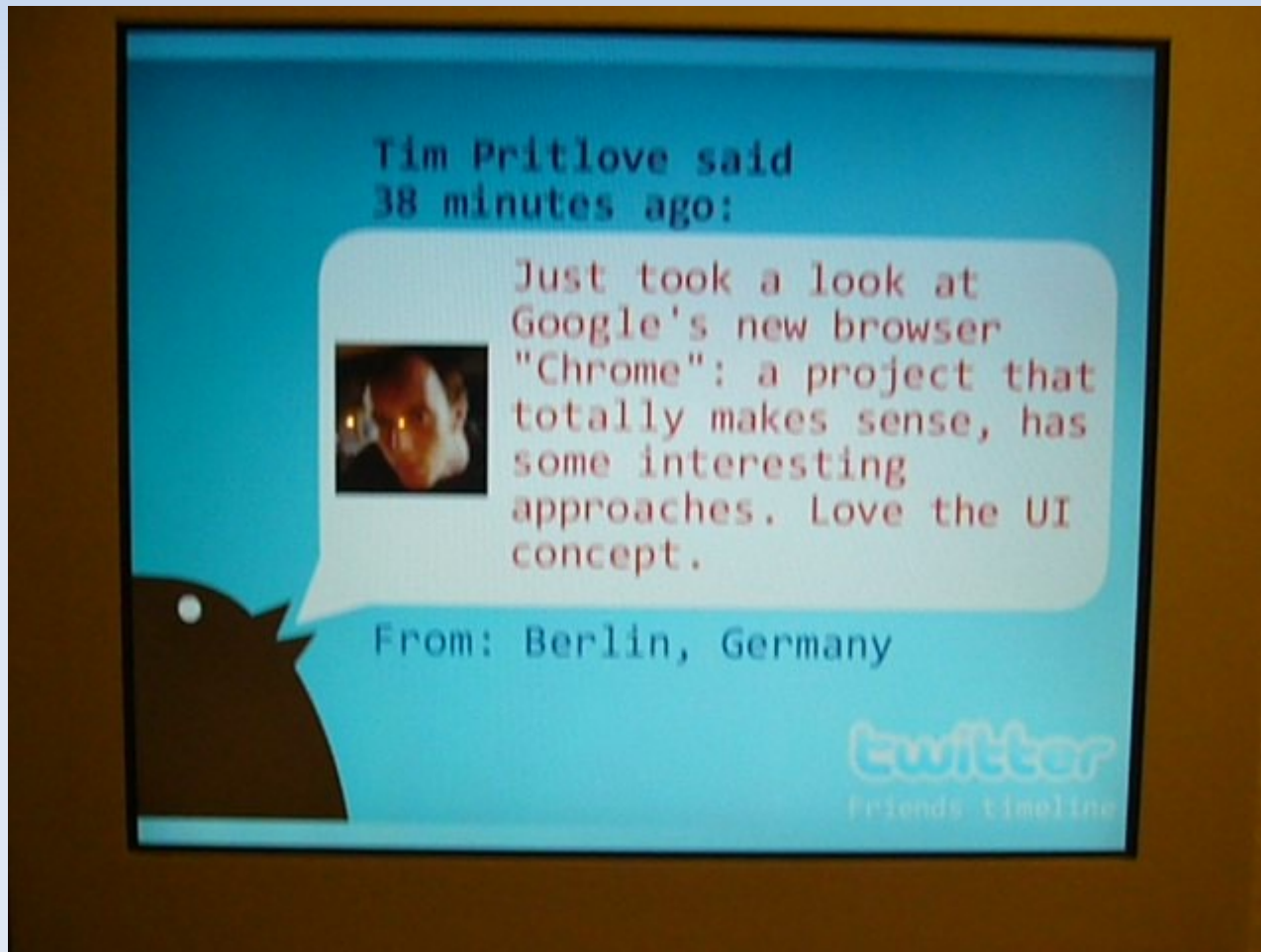
App : Squid Cage aka Chumby

- It's a Chumby simulator
 - Gets the XML feed for my Chumby account
 - Displays flash apps like the Chumby would do



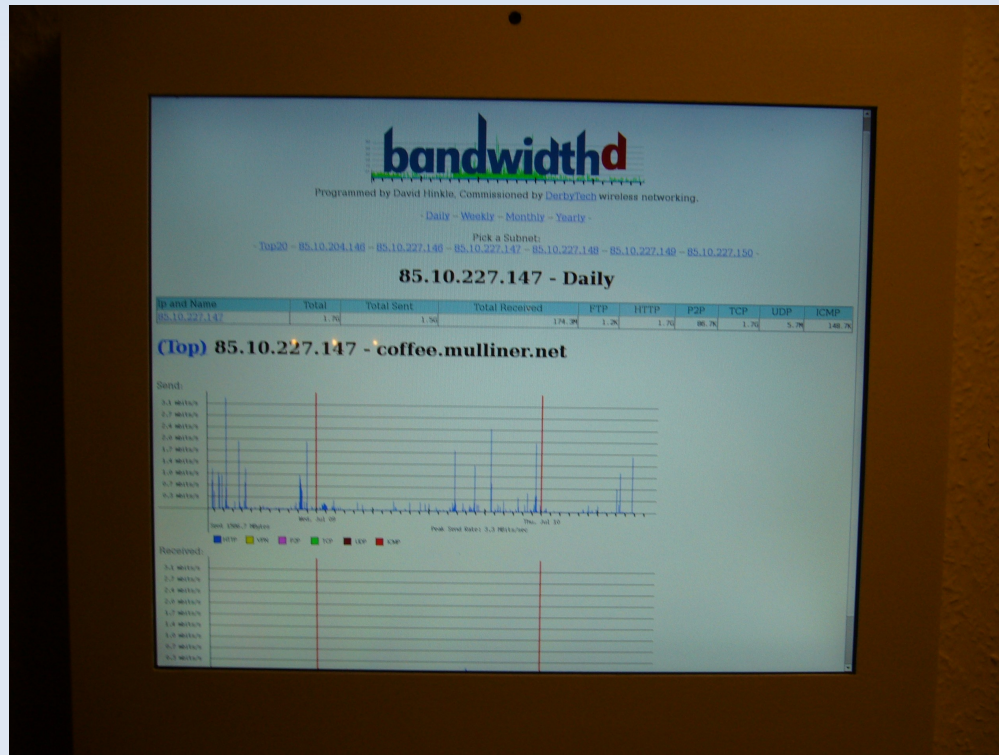
App : Twitter

- Web browser + flash (flash is from Chumby)



App : <SOME> Stats

- Stats: Network, SMTP, DNS, ...
 - Uses the web browser



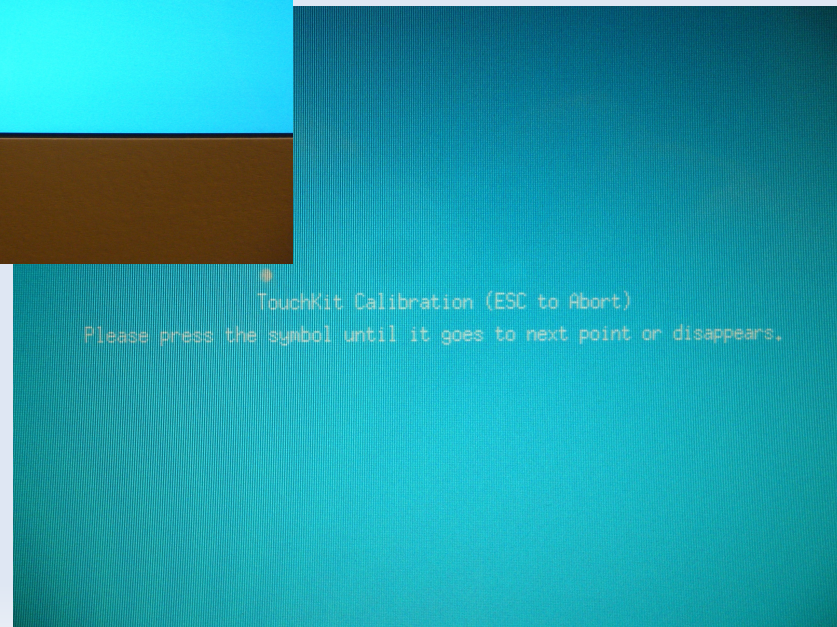
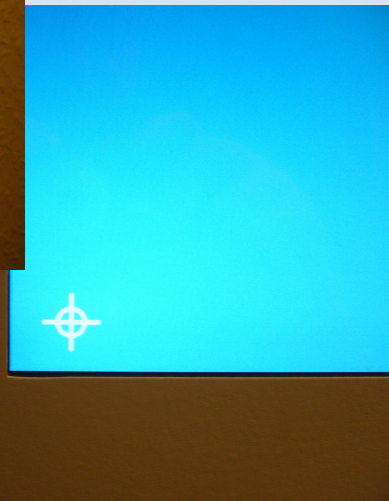
Panel Config Screen

- Touchscreen tool calibrate and test TS
- Restart panel menu application
- Configure Chumby
 - Just starts web browser with URL of my Chumby account

Calibrating the Touchscreen

- Touchscreens sometimes need to be calibrated
 - Can't start calibration app if TS is all messed up
- ⇒ Hardware button starts calibration app
 - Only button is the power button (bottom of screen)
- ⇒ First press starts calibration app
- ⇒ Second press shuts down panel
 - If calibration app is still running

Calibration



Running the InfoPanel

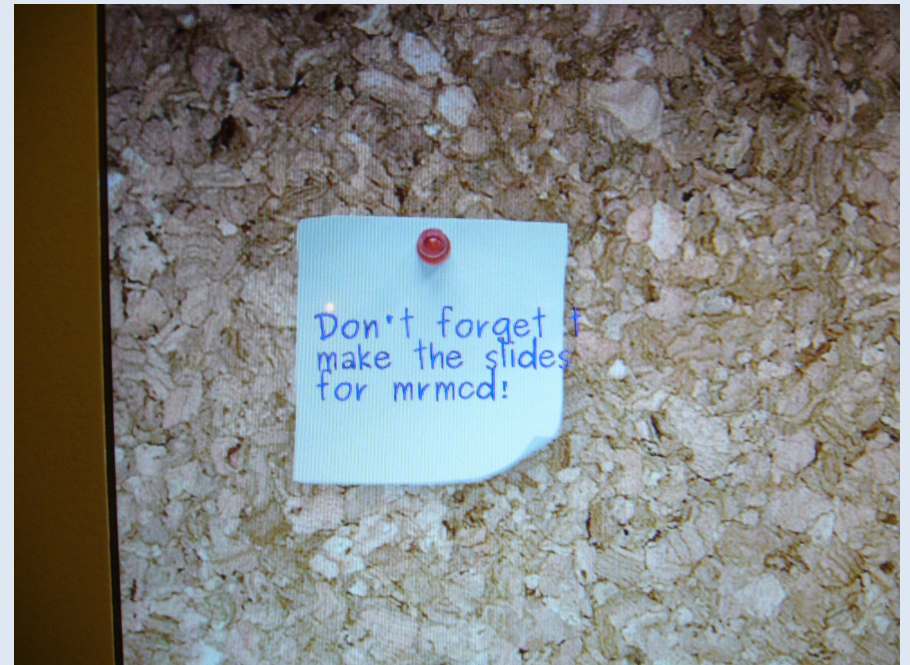
- Switch off panel during night and work (day)
- Power on in the morning
 - 7:15 during the week, 9:15 on the weekend
- ⇒ Power on using Wake on Lan
 - Done by NFS server (or use your dsl router)
- ⇒ or use the Power button :-)

Next Generation Software

- Control entire panel via dbus
 - dbus = simple IPC (inter process communication)
 - Every application is a dbus service
- Define scripts
 - No user interaction for some time: start slide show
 - Every 15 minutes: show clock

Future App : Blackboard

- Virtual blackboard to leave notes
- Prototype just looks pretty, doesn't work yet



Conclusions

- Was and is a super fun project!
 - Project will never be over, always something new you want to try out
- No "super" special skills needed
 - Can be done by almost anybody
- Building the case seemed to be the most work
 - Writing all the software is more work :-)
 - My dad did most of the wood work, THANKS!
 - My girlfriend did the painting, THANKS!

Conclusions cont.

- I and my girlfriend use the panel everyday
- iGoogle and the train time table in the morning
- We use clock app as our living room clock
 - I know that this is kind of a wast :-)
- The picture slide show is a nice thing for the evenings or if your parents come to visit you

The End

Any Questions?

Links

- <http://www.mulliner.org/infopanel/>
- <http://www.chumby.com>
- <http://likelysoft.com/hacks/pictureframes.shtml>