The Home InfoPanel

More then a digital picture frame

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Outline

- The Idea
- Hardware
- Software
- Panel Applications
- Running it
- Conclusions
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
  - Embed 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 components 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
- \( \Rightarrow \) 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
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)

Tim Pritlove said
38 minutes ago:

Just took a look at Google's new browser "Chrome": a project that totally makes sense, has some interesting approaches. Love the UI concept.

From: Berlin, Germany
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
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 :-)
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!
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