# Self Introduction

**Juho Vähä-Herttua**
Student

Helsinki University of Technology
Beijing University of Posts and Telecommunications

2008-09-15

# Personal Information (Family and Educational)

- Born in 1984 in Karkkila, a small 9000 people town in Finland
- Parents both work for the city as a plumber and a nurse, very middle class family background with interest in technology
- One younger sister and one younger brother, two older step-brothers
- Elementary school, junior high school and senior high school all studied in the same town, no programming courses available there
- Every summer spent in the countryside with family and relatives

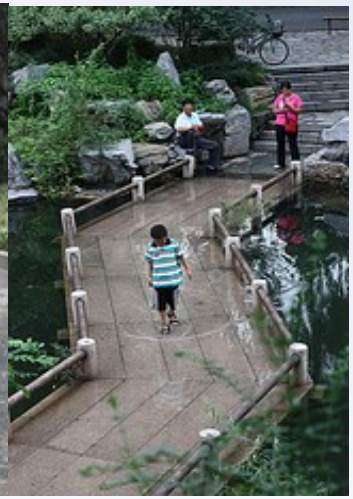

# Personal Information (Computer Experience)

- Started using computers with VIC-20 around 1988
- First touch with programming around 1990 with Commodore BASIC with the help of big brother
- Experiments with 6502 assembly towards the end of 90s
- Website on the Internet since 1998 with self-written HTML
- Learned Java in 1999 and C/C++ around 2002
- Active Free Software developer since 2002

# Personal Information (Freetime and Hobbies)

- Played basketball actively for 10 years starting from 7 years old in a local team, medals from several tournaments
- Other hobbies include swimming, reading, movies, photography and traveling whenever there's a chance
- Don't have time to do all the hobbies at once, but should always have some thing to concentrate on in addition to the computers
- Free Software projects main computer related hobby



# Awards and Achievements

- Datatähti 2002 programming competition finalist in high school (algorithm design)
- Spent one week in computer science training camp in 2002 mainly organized to select BOI and IOI competitors
- Won Assembly 2003 Mobile demo competition with TI-86 entry together with Matias Rantanen
- Won Assembly 2007 Game development competition with multiplatform C/OpenGL space shooter as the lead programmer in a 3 people team


# Online Basketball Scoreboard Project (2001)

- Programmed with Java using Swing for GUI
- Takes user input and generates a HTML page using a template by filling the correct data into fields
- Integrated FTP client transfers the generated HTML page automatically to the FTP server for users to see in real time
- Used actively by a Finnish national basketball league team until 2007 when it was replaced by a nationwide system
- First on-line scoreboard of basketball games in Finland and largely appraised by its users who were able to follow the games in other cities even when they were not able to go to watch them
- Full localization support and support for saving team information into files to be able to re-use it later

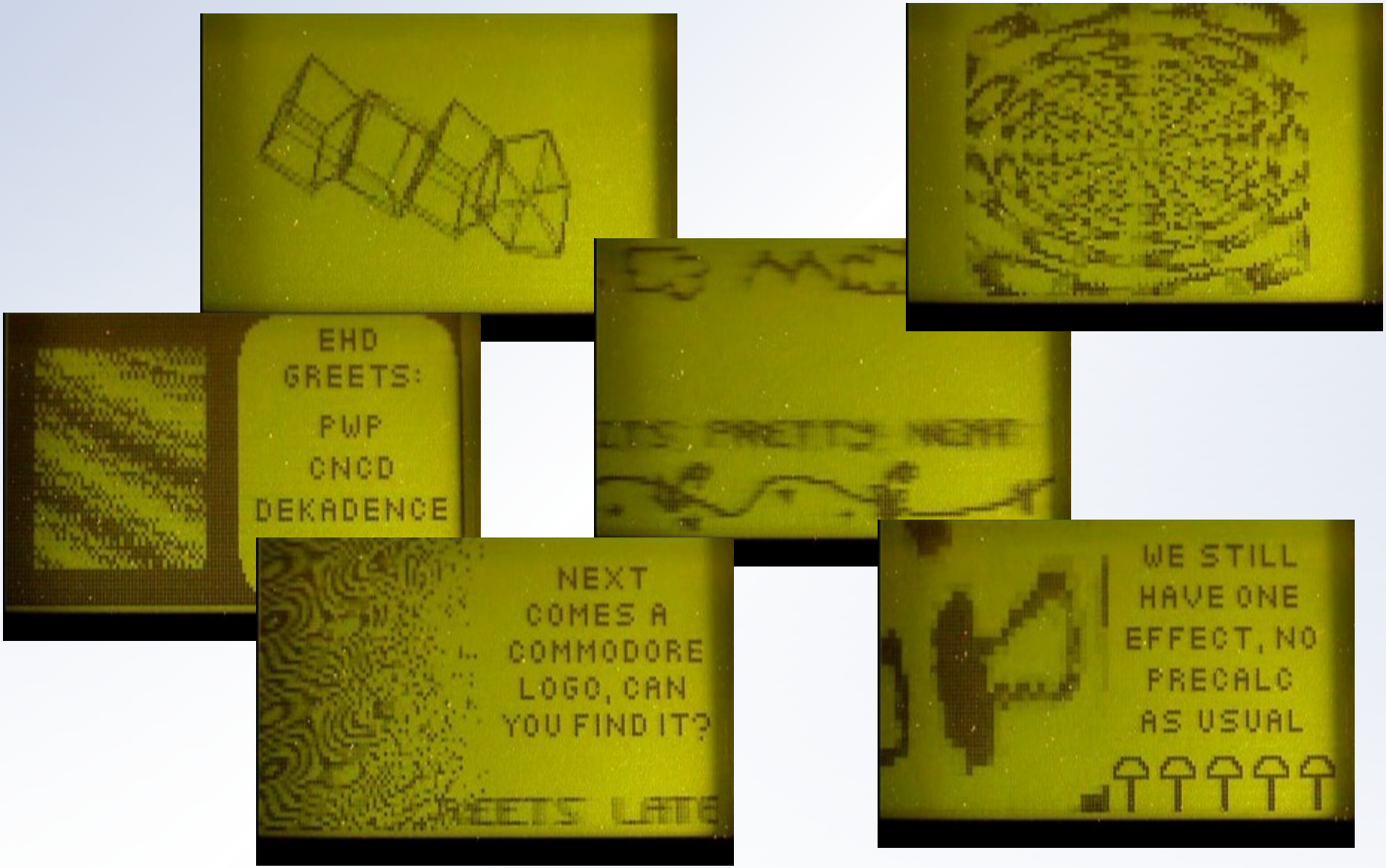
# Screenshots of Scoreboard in Action



# Demonstration of TI-86 calculator capabilities (2003)

- Technical details of the device
  - TI-86 is equipped with 6MHz Z80 processor (originally an improved version of Intel 8080 processor by Zilog)
  - 1-bit output port for data transfer that can be used for square wave audio output and also simple waveforms by switching the output bit very fast on and off and taking the impedance of the wiring into account
  - 96kB of total RAM user accessible with bank switching
  - 128x64 pixels monochrome LCD screen memory-mapped directly into the address space
- Programming languages supported
  - TI-BASIC for simple scripting of functions
  - Z80 assembly programs can run in native mode directly on the processor and are therefore very fast

# *Demonstration of TI-86 calculator capabilities (2003)*

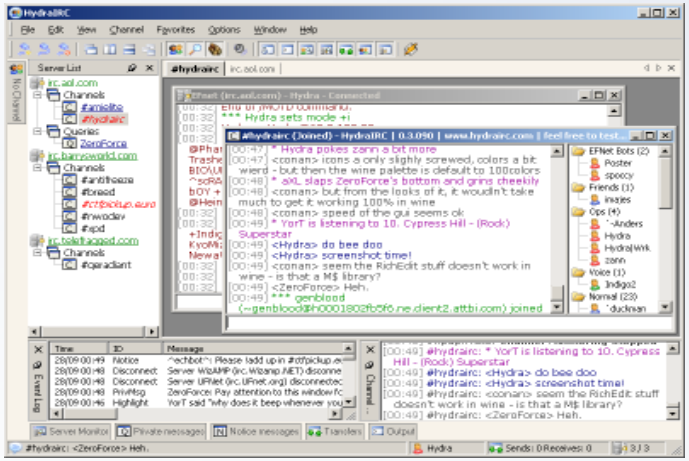


# Demonstration of TI-86 calculator capabilities (2003)

- Some details of the demo
  - 200kB of pure Z80 assembly source code including some bitmaps and comments
  - Includes a working realtime wireframe 3d engine (polygon filler dropped because of lack of time)
  - Optimized 8-bit greyscale plasma effect around 400 bytes large executable, dithers to monochrome on the fly using ordered dithering and 4x4 byte pattern
  - Rotozoomer simply rotating and zooming a monochrome bitmap in real time
- Other details to mention
  - Matias Rantanen wrote about half of the code and was in the same high school with me, but on the first grade
  - Extremely valuable embedded programming experience

# Mobile IRC client program (2004)

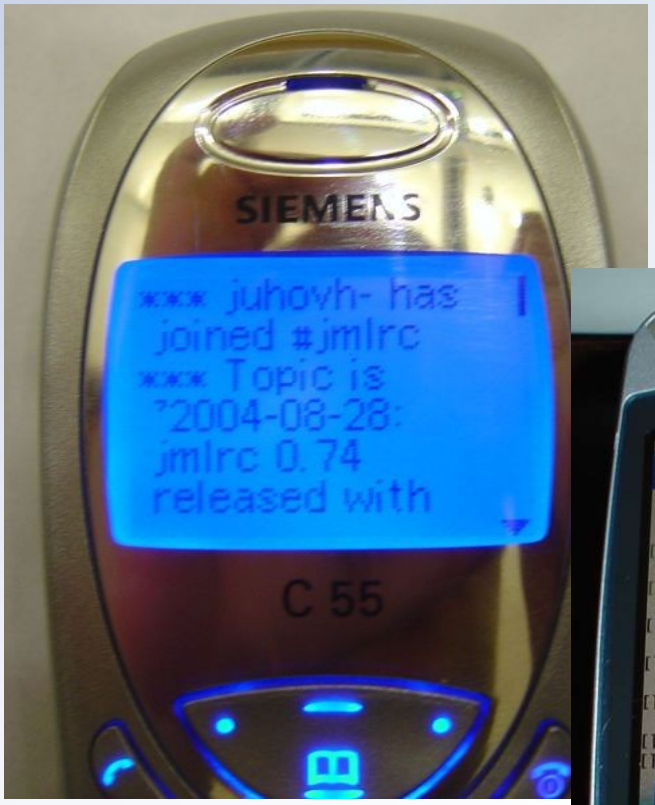
- Facts about IRC (Internet Relay Chat) in general
  - Protocol originally developed by Finnish Jarkko Oikarinen in 1988 and quickly spread around the Internet
  - Simple text based protocol, clients on almost every platform
  - Microsoft Chat was also based on IRC before they went on to develop their own real time chatting network (msn)
  - First global instant messaging system on the Internet, only recently partly superceded by IM networks and clients because of their extra features and ease of use

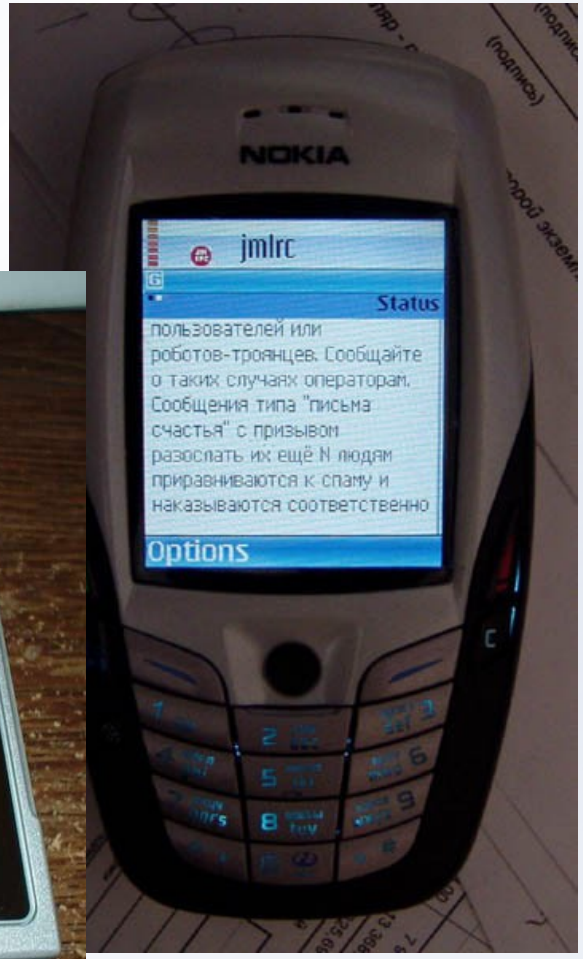
# Mobile IRC client program (2004)

- Runs on any J2ME compatible device with lowest possible requirements (MIDP 1.0, CLDC 1.0)
- Includes a standalone custom HTTP server to be run on J2SE for phones that don't support direct TCP/IP sockets
- Native support for UTF-8, Hebrew and Russian character codepages for phone firmwares that don't support them
- Probably the most popular IRC client for Java enabled phones: 2,6 million page hits since 2004 and growing
- Install base unknown, but estimations run in hundreds of thousands, source code downloaded over 32,000 times
- Commercial support for BlackBerries sold by Hong Kong company S4BB Ltd. under the name of BBirc

# Mobile IRC client program (2004)







# Part-time Job Related Projects (2004-2008)

- Started work at Medixine Ltd. in December 2004
  - A small 10-20 employees eHealth software company
  - Main product is a server platform running on Windows
  - Hired as a mobile software specialist and in charge of all mobile client software projects from 2005 until 2007
  - While working there the company extended to completely new client product lines using latest technology in the mobile field including video capture, Bluetooth and RFID
  - Mobile software pilots ran in several countries, most importantly Finland, France and United Kingdom

# DeviceMonitor and MobileMonitor Data Gathering

- Data gathering from patients to the central database
- DeviceMonitor is a mobile phone data gather application, that parses the Bluetooth binary protocols of different telemedicine products
- Complemented by MobileMonitor, a manual questionnaire filling application for the symptoms that can't be measured automatically
- Modular design that supports 6 different devices from 4 different manufacturers worldwide, one protocol developed in co-operation
- Integrating new devices often needs close communication with hardware manufactures because of lack of standards in the field

# DeviceMonitor and MobileMonitor Data Gathering

- All communication with the server side using SOAP XML requests
- XML is parsed manually using kxml2 pull-parser, because of the low memory requirements in mobile environment
- Combined with MobileNurse application, can also send photos, videos and visiting data to the server automatically
- Works on most Bluetooth and J2ME enabled phones, excluding some problems with the bluetooth handling in phone firmware



# Medixine RFID Communication Board

- Developed for use of Alzheimer patients and old people who otherwise have problems using new technology
- The input device is a mobile phone with integrated RFID reader and a custom board with images and RFID tags
- When the patient touches a tag with the mobile phone, a custom message is sent to server over GPRS and processed there
- Different tags can trigger different actions, like alerts or automatic phone calls to patients, doctors or relatives
- RFID boards very simple and cheap to produce anywhere


# Medixine Mobile Content Browser (2006)

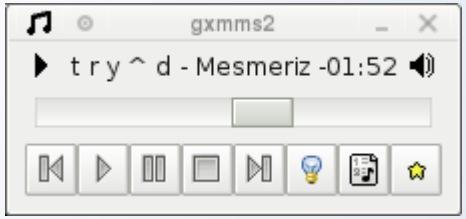
- Originally developed for use of AstraZeneca, one of the world's top 10 pharmaceutical companies, but can be used for any general purpose large data browsing
- Developed strictly with MIDP 1.0 and CLDC 1.0, so it works on all J2ME enabled devices, including very old ones
- Supports many features better known from full featured web browsers: links, text styles, colors, images, forms, back and forward buttons, caching, etc.
- Scales automatically depending on the screen size and features of the phone, regardless of brand or type
- Uses a custom XML based document format and XSL transformations on the server side to convert internal data formats into the supported document format
- Deployed into large scale production use in Finland

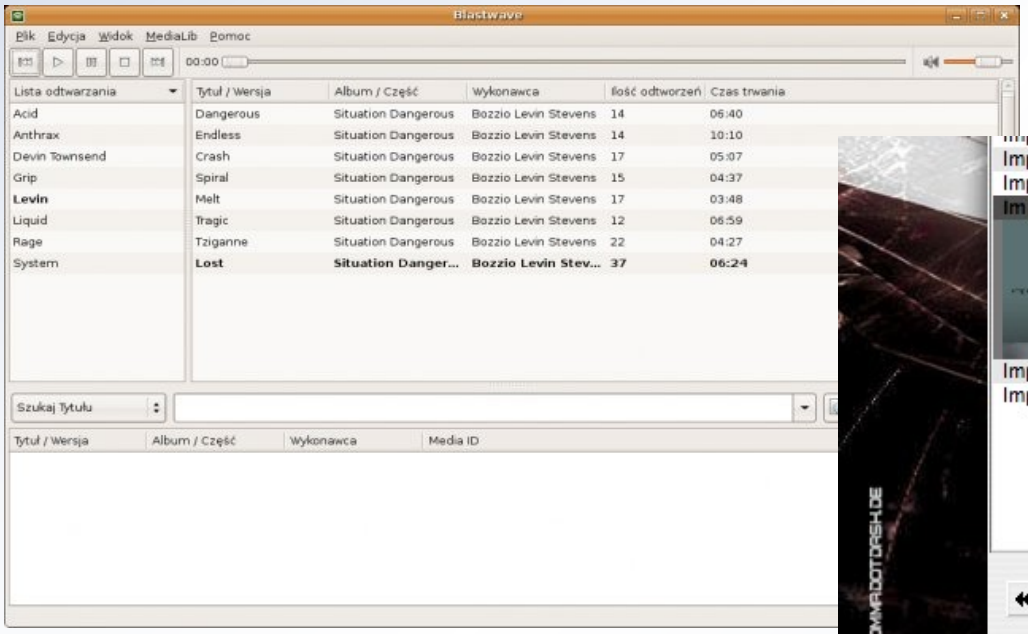
# XMMS2 Music Player (2005-2008)

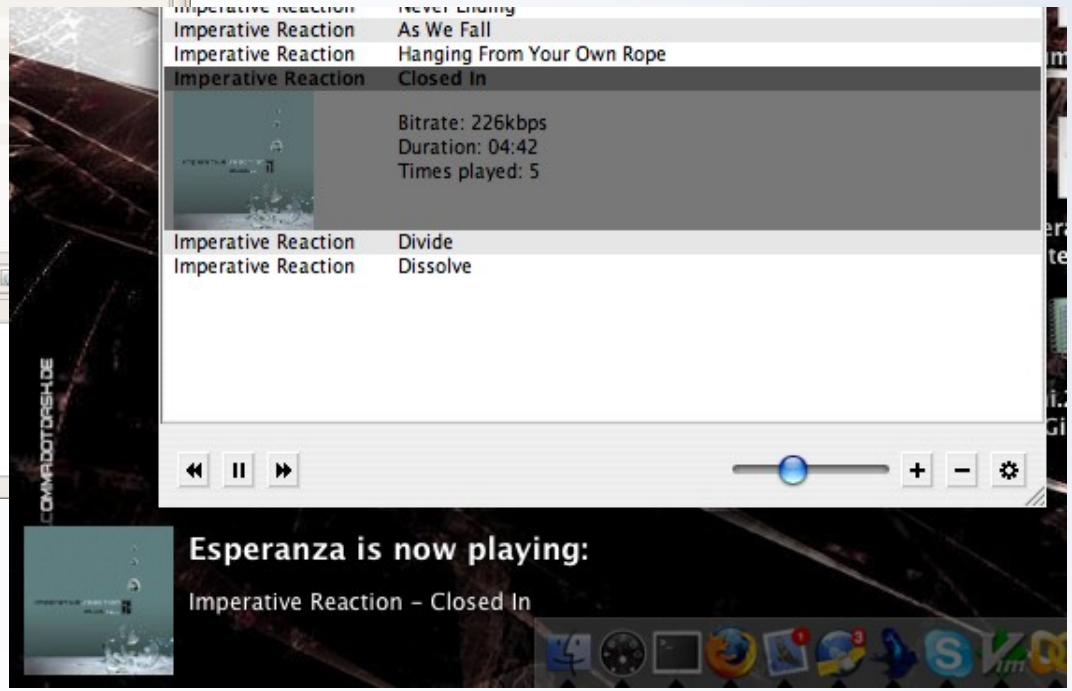
- A lightweight crossplatform music player
  - Developed since 2003, but started to gain a lot more momentum around 2005 after the first official release
  - Includes a fast media library for searching and organizing the songs stored on the computer
  - Can be run in an embedded environment, i.e. Neuros OSD
  - Full client-server architecture makes it possible to control the player from many locations concurrently
  - Main development on Linux, ported to run on Mac OS X, NetBSD, FreeBSD, Solaris and Windows XP/Vista
  - Participated and chosen into Google Summer of Code on years 2006, 2007 and 2008 as a mentoring organization

# XMMS2 Music Player (2005-2008)

- Several clients can connect to the server at once
- Clients can control the player freely locally or remotely
- Minimum requirement is ANSI C compiler



# XMMS2 Music Player (2005-2008)

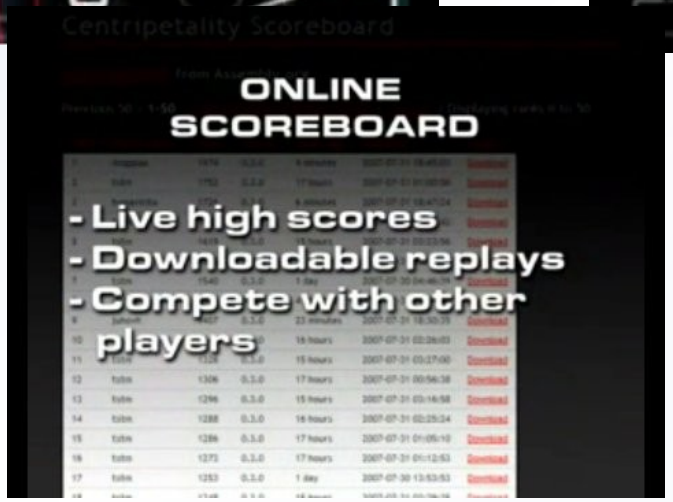
- Contribution to the XMMS2 player codebase
  - Mainly in charge of new plugins and format support
  - Written support for WMA, AAC, ALAC, MAC, TTA & Shorten
  - Written audio effect plugins equalizer, karaoke and vocoder
  - Porting to Solaris and several big patches for Win32 port
  - Demuxer/decoder separation in the plugin architecture
  - Many other bugfixes and cleanups in the codebase
- Originally XMMS2 related projects written by me
  - Phase vocoder library that enables changing speed and pitch independently. Implemented using FFTW fast fourier transformation library and frequency domain manipulation.
  - ASF parser library ***libasf*** that can parse all .asf/.wma/.wmv files by Microsoft written from scratch. Used by XMMS2 and iPod firmware Rockbox for playing WMA files.

# Centripetality Space Shooter Game (2007)

- A multiplatform arcade space shooter game
  - Programmed from scratch only using ANSI C and common SDL and OpenGL libraries for best possible portability
  - Possibility to save and send small tens of kilobytes big replays for each game and to download them from the Internet
  - User can change and add background music without recompilation of the program or doing any modifications
  - Tested to run on 5 different operating systems and 4 different processor architectures without problems
  - Released as free software for modifications and redistribution including the music and graphics files in the package
  - Tested throughly using valgrind for no memory leaks or memory segmentation problems in the program, high quality C code

# Centripetality Space Shooter Game (2007)






# Various Finished School Projects

- Operating Systems Project (TKK, grade: 5/5, 3 students)
  - Extend an existing operating system by adding features
  - User space system calls, file system drivers, swap, etc.
- Compiler Project (TKK, grade: 5/5, 2 students)
  - Create a miniJava compiler that compiles to SPARC binary
  - Experience with parsing, optimizing and code generation
- Digital Signal Processor Project (TKK, grade: 5/5, 3 students)
  - Create a program on a DSP board and demonstrate it
  - Additional TI-86 GUI and control protocol designed by us
- Distributed Databases Project (Tsinghua, grade: 90/100, 3 students)
  - Create a distributed database with nodes in several locations
  - My responsibility mainly the networking layer and parsers
- In short: I like project works much more than theory.

# Plan at BUPT and Possible Interests

- Current state of studies at TKK as of autumn 2008
  - 170/180 credits finished plus 20 credits from masters' thesis later, however some major courses still missing because of the large amount of optional courses (mainly languages)
  - Plan to write masters' thesis on telecommunications software
- Fields of particular interest end experience
  - Programming on Free Software platforms, i.e. Nokia Nxxx series, OpenMoko, Linux routers, mostly using C or Java
  - Wireless Internet technology in everyday use
  - Areas combining telecommunications and signal processing, especially multimedia formats and protocol related work
- Fields that are not so interesting to me or not so experienced at
  - Enterprise systems, Flash, HTML, CSS, XML processing
  - Symbian development or other broken C++ (i.e. Qt)

# End of Presentation

Thank you for listening.

I hope to be able to learn new things
and give my own insight into old matters.