

Abhir Joshi

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I am an Electronics & Telecommunication Engineer, with almost 5 years of experience in the industry & overall over 7 years of experience in varied fields like MPEG related technologies, Set-Top Boxes, Linux, GStreamer, graphics programming using OpenGL, astronomical electro-mechanical model making, and many more. My interests span computers, embedded systems, electronics, astronomy and physics.

OBJECTIVE

To work in an environment that challenges and REALLY uses my myriad skills.

SKILLS

Computers:

Programming Languages: C, Proprietary ARM-like Assembly, C++, Java, Introduced to Tcl & Python
Scripting: Bash
Platforms: Various flavors of GNU/Linux, Windows Environment
API/Frameworks: GStreamer framework, OpenGL, SDL (Simple DirectMedia Layer), GTK+, Qt, Pthreads, Sockets, OpenMAX
Development tools: Emacs, vim, grep, sed, gdb, gcc, Lauterbach & Multi-ICE debuggers, ARM development suite
Database: MySQL
Standards: ISO/IEC 13818-1 (MPEG2 Systems), Introduced to ISO/IEC 14496-1 (MPEG4 systems), ITU-T81 (JPEG), ISO/IEC 13818-2 (MPEG2 Video) and MP4 file format
Other: HTML, XML, LaTeX, Doxygen, Linux device drivers, Introduced to UML. Drupal CMS. Have a very good understanding of GNU/Linux systems.

Other:

- Circuit designing and Troubleshooting.
- Electro-mechanical, computer-controlled model making.
- Very good problem solving capabilities
- Extremely clear fundamental concepts in electronics, mathematics and physics.

WORK EXPERIENCE

1. Working as **Lead Design Engineer** with [Imagination Technologies India Pvt Ltd](#), Pune, India, since September 2007 to date. Following were the projects executed –

OpenMAX software components for video encoder and decoder

Design & implementation of OpenMAX software components for Imagination's multi-standard video encoder and decoder on Win32 as well as Linux platform. This also involved making the components pass the OpenMAX conformance tests, as well as writing a multi stream test IL Client to demonstrate a use case of the components.

2. Worked as a **Lead Software Engineer** with [Conexant Systems Inc](#), NOIDA, India, from May 2005 to September 2007.

Conexant develops *multi-core, video decoder* chips for Set Top boxes. I worked on various levels of the software stack for those chips including application, device drivers & firmware. I was involved in the firmware development for one of the ARM-like microcontroller cores (called "TSP") specialized in de-multiplexing of MPEG2 Transport Stream with

many other features for descrambling, conditional access and PVR (Program video recording). I was a part of the core firmware team responsible for maintaining and adding new features to the Transport firmware for existing & upcoming chips.

MPEG2 Transport Stream firmware for Amstrad's and other customer's Satellite & IP Set-Top Boxes

I added new features & bug fixes in the existing TSP Firmware for NDS Conditional Access & NDS XTV (Program Video Recording) as a part of getting NDS & OpenTV certification for the platforms. Worked on **DVB** as well as proprietary **DSS** transport streams standards.

Duration: For almost the entire duration in spells on-demand

Transport Firmware for a newer Video Decoder chip named Pecos

Added support for new hardware around the TSP in an upcoming chip with more features. I was involved in developing the firmware initially on the simulator (before the chip was manufactured) and then later on the actual hardware to verify the added hardware and workarounds for hardware bugs, if any. Also added firmware support for new descrambling algorithms added in hardware. This included adding support for Microsoft's DRM.

Duration: ~ 1 year

Transfer of Technology for an IP Set Top Box

I was responsible for the ToT for one of the IPSTBs from the San Diego team of Conexant to the Noida team. This involved getting trained on the whole gamut of software stack for the Reference IPSTB platform and then training the Noida (India) team so as to own the future development & customer support for the platform. As a part of the ToT, I also added the pause/resume feature to the IPSTB software in a Video-On-Demand environment.

Duration: 4 months

Porting of ANT browser from Conexant's proprietary OS named ISOS to Linux

Studied the architecture, build system for the ANT browser. Then ported it over to Linux from the already existing ISOS OS.

Duration: ~ 2 month

Linux Kernel Module for a Media Framework

While porting an existing media framework for the Set Top Box from ISOS OS to Linux, we had to split it into parts in the user mode and kernel mode. I was a part of the team of 4 which designed and implemented it.

Duration: ~ 4 months

Other smaller projects involved implementing Picture in Graphics, adding support in the video driver to implement trick modes in a *multi-chip* video decoding hardware, developing test pattern using ffmpeg for aspect ratio testing. In the course of work, I also got acquainted to development tools like ARM Developers Suite, Multi-ICE debugger, Lauterbach debugger, StarTeam source code management software.

(Note that the Conexant's BMP department, in which I worked, is now a part of NXP Semiconductors)

3. Worked as a **Systems Development Engineer** with [DG2L Technologies Pvt. Ltd.](#), Mumbai, India, from December 2003 to April 2005. The projects I executed there are –

MPEG2 Transport Stream generation and decoding libraries

I implemented the MPEG2 Transport Stream multiplexing and de-multiplexing libraries to implement the ISO/IEC 13818-1 standard to a large extent. Both the libraries were developed from scratch using C++.

Duration: ~ 8 months

Digital Cinema System

Designed and implemented parts of two components of the Digital Cinema System, named CineCaster and CineBlaster. It involved reliable delivery of the encrypted MPEG4 movie content to the CineBlasters from the CineCasters over a satellite using an MPEG2 Transport stream. The reliable delivery mechanism has a return channel over IP. The MPEG2 Transport stream was generated using the libraries that I developed.

Duration: ~ 5 months

Phoenix Live Decoder

Designed and implemented the application software for the hardware based live MPEG4 decoder to play live RTP streams.

Duration: ~ 2 months

Media Player for Set-Top Box

Designed the architecture and also implemented the software for the Hardware based Media Player for a Set-Top Box running Linux. The player can also play encrypted content. It uses third party libraries for retrieving the keys and decrypting the content.

Duration: 1 month

PROJECTS

Following is a list of electronic, programming and electro-mechanical projects that I have done independently between 1996 and 2003

Electronics:

Data Logger

Developed and implemented a data logger using the 8085 microprocessor development system for logging the temperature and light intensity variations during the Total Solar Eclipse of 11th August 1999. This setup was carried all the way to Bhuj in Gujarat, where the actual experiment was carried in the totality path. An accurate hardware clock of 1 Hz was also implemented for this purpose.

Security System

Developed and implemented a security system which is now installed in a jewelry shop in Kalyan. The circuit supports a total of 8 zones with 7 magnetic sensors, an emergency alarm and a movement detector

Light Controlled Servo system

The project objective was to cut down the excessive light coming into a car from an approaching vehicle at night time by moving a thin plastic film having a *transparency gradient*, in front of the windshield. It worked by moving the darker part to the front in response to the high light intensity and thus avoiding many accidents. We had independently developed an ***LDR Characteristic Linearizing Circuit*** to compensate the nonlinear characteristics of the LDR. This project idea can be further developed and implemented.

Assembled a number of hobby circuits like amplifiers, radio, clap switch, etc. Have experience in designing of circuits, making PCBs by doing artwork and etching and troubleshooting them. I had acquired the skill to repair radios while studying in the final year diploma. Also Developed a small AM transmitter in the Medium Wave band.

Working Models: (also involving electronics and computer interfacing)

The Total Solar Eclipse

A computer controlled model showing the phenomena such as diamond ring, corona, Bailey's beads, etc during a total solar eclipse (TSE). It is basically a light effect using several electric bulbs whose intensity is controlled by ***Pulse Width Modulation*** i.e. by changing the duty cycle. The parallel port of computer is used to interface to the model circuitry.

The Sun, Moon and the Earth System

This is an electro-mechanical working model that shows rotation of earth, revolution of earth, revolution of moon and precession motion of earth's axis. It shows various facts like Eclipses, Occurrences of eclipses only on some new moon and full moon days, Kepler's laws, six month long day and night on the Poles, change of pole star, etc in 3D, in solid reality. This model is one of its kinds in probably the whole India. Not even the Nehru Planetarium has a model like this one. This model had bagged the first prize at IIT Kanpur in the astro-modeling competition in TechKriti 2001

Programming:

Universe

An Interactive 3D simulation (using OpenGL) that shows the orbital mechanics of the earth and the moon along with the Solar System and Galaxy. It shows phenomenon like occurrences of eclipses, occurrences of eclipses only on some full moon and new moon days, six month day and six month night on north and south pole of the earth, precession motion of the earth, rotation of equinoxes, rotation of moon's orbit, etc. In the simulation, during a solar eclipse the moons shadow (umbra and penumbra) can be seen racing over the earth's surface. The user can navigate through the 3D space using a mouse, as if sitting in a space ship. It also shows comet orbits and their tails, precession of mercury's orbit around the sun and the three models of the Big Bang theory. Some screen shots of the program are available on my website (<http://www.abhirjoshi.com/programming/universe.html>)

Fast Fourier Transform

This program lets the user draw an arbitrary time domain signal on a graphics surface. On every update of the time domain signal, the program calculates its FFT and draws it. It also draws the reconstructed signal with a certain cutoff specified by the user. It can also calculate short time Fourier transform of audio data read from the microphone and display it on the screen in real time. (<http://concept-dsp.sourceforge.net>)

Antenna Radiation pattern plotter

A 3D radiation pattern plotter for different antennas like Long wire antenna, Broad Side array and End Fire array. The different parameters like the length of antenna or the number of array elements can be changed and corresponding changes in the radiation pattern can be observed

Electron bunching in a two cavity Klystron

Simulates bunching of electrons in the drift space due to the RF signal applied to the buncher cavity

Bookmarked Video recorder & player with arbitrary text overlay capabilities using Gstreamer

An application suite based on Gstreamer elements for a potential customer. The real world application involves video auditing of drain pipelines, etc.

Derivative and Integration

Explains the concept of Derivative and Integration graphically. Given a function, the program can plot the its derivative and integral.

Database server using Java and a number of utility applets for Machinery Alignment

Machinery alignment using Two dial, Three Dial and Reverse Dial methods was implemented using Java applets. A *central, multipurpose* database server was also developed to serve the applets with machine data. It also supports authentication for remote database management. We had developed a simple protocol to be used between the server and the applets.

Tetris, the brick game

The classical brick game.

More information on the working models, programs and electronic circuits can be found on my website at <http://www.abhirjoshi.com/>

EDUCATION

Bachelor of Engineering (Electronics and Telecommunication), July 2001

Bharati Vidyapeeth's College of Engineering, Navi Mumbai
Mumbai University (Formerly Bombay University),
Score: 61 %

Diploma in Industrial Electronics, May 1998

Vidya Prasarak Mandal's Polytechnic, Thane
Score: 76 %, Topped the class in the first two years and was 4th in the final year

SSC, March 1995

Fatima High School, Ambernath
Score: 85%

ACHIEVEMENTS

- Got the **FIRST** prize at **IIT Kanpur** for the working model of sun, moon and earth system in the Astro Modeling Event of the Techkriti 2001
- Bagged the **THIRD** prize in the IEEE-CRCE advanced software competition in the year 1999 for the simulation in the program "Universe"
- Secured the **SECOND** position in the Inter-Engineering Diploma College ISA QUIZ '97 competition, conducted by the "International Society for Measurement and Control", Bombay chapter.
- Won the APLAB scholarship twice in the year 1996 and 1997 for the aptitude to pursue Engineering Studies and develop professional skills in Electronic Engineering practices.

MISCELLANEOUS

- Passed the NCST-D level exam with 92 percentile overall and 99 in C programming
- In Feb 2001, I took the Graduate Aptitude Test in Engineering (GATE) and scored 96.64 percentile.
- I took GRE in Oct 2003 and TOEFL in Dec 2004. My score is 1260/1600 for GRE and 287/300 for TOEFL.
- From Jan 2003 to Aug 2003, I redesigned and implemented the electromechanical working model of the Sun, Moon and Earth System to make it more compact, lightweight and portable. Snaps of the [new model](#) are available on my website.
- From Feb 2003 to March 2003, I also taught C programming in a local computer institute.
- I am a member of an amateur astronomical organization named "Khagol Mandal" since 1995 and have been actively involved in its activities of popularizing astronomy, especially in developing electro-mechanical working models.
- Developed my own small 3D graphics rendering library. It renders points in isometric & perspective projections, does umbra and penumbra shadow calculations for spherical bodies and also does hidden point calculations.

SPECIAL APTITUDES

I am most competent in subjects like C, C++ and Assembly language Programming, Digital Signal Processing and Electronic circuit designing.

Whenever I study a topic, I go very deep into it and will try to avoid believing a thing with which I am not convinced (unless, of course, it is critical to believe it and go ahead for other things). So I pursue a topic until I understand it perfectly and hence most of the fundamentals of electronics and mathematics are very clear to me. So I am able to VISUALIZE things easily and think independently and creatively. This is evident from the projects that I have made. My long term goal is to work in telecommunications for space technology.

OTHER INFORMATION

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