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Date of Birth: 13 December 1982

Varun Aggarwal

Education

Presently working at ST Microelectronics, (www.st.com), beginning 21st June 2004.

2000 – 2004 **Netaji Subhas Institute of Technology** (earlier known as D.I.T, Delhi University)

- Bachelor of Engineering, **Electronics and Communication**
Percentage: 82.54%

1986 – 2000 **Delhi Public School, R. K. Puram**, New Delhi

- 86% marks in Class XII Examination, 2000
- 82.4% marks in Class X Examination, 1998
- Scholar for 8 years

Publications

- V. Aggarwal, “*Design of Power Saving Pedometer*”, *Electronic Design* (Penton, USA), , 07.19.04, pp. 63-64, 2003, <http://www.elecdesign.com/Articles/ArticleID/8363/8363.html> .
- V. Aggarwal, R. M. MacCallum, “*Evolved Matrix Operations for Post-Processing Protein Secondary Structure Predictions*”, in Proc., 7th European Conference on Genetic Programming, EuroGP 2004, Vol: 3003, LNCS, pp. 220-229, April 2004
- V. Aggarwal, “*Novel Canonic Current Mode DDCC based SRCO synthesized using a Genetic Algorithm*”, in *Analog Integrated Circuits and Signal Processing*, Vol: 40, 83–85, 2004
- V. Aggarwal, “*Evolving Sinusoidal Oscillators Using Genetic Algorithms*”, in Proc., The 2003 NASA/DoD Conference on Evolvable Hardware, Chicago, USA, pp. 67-76, 2003.

Awards received

Guest Reviewer as invited by an Associate Editor of IEEE Transactions on Evolutionary Computation.

Received 1st prize in **CSI (Computer Society of India) Young IT Professional Award** (Region: North, 2003).

Received 2nd prize in **Technical Paper Session, Electrical Engineering** at Tryst 2003 (Technical Festival, IIT, Delhi).

Received 1st Prize in **Embedded System Design Contest**, 2nd Prize in **Predefined Hardware Problem** and 2nd Prize in **Technical Paper Presentation (ECE)**, INNOVISION 2003, (Technical Festival, NSIT, Delhi)

CEE Rank: 183, **IIT JEE Rank:** 886

Received Merit Scholarship, **Junior Science Talent Search Examination**, 1997

58th Rank in **Regional Maths Olympiad 1999**

Cleared with distinction **Teachers Association Maths Olympiad 1997**

Skills

Languages: MATLAB, VHDL, C++, OOP Concepts, Perl, PDL (Perl Library), UNIX Shell Programming, AVR Assembly, Java (Basics), Java Script, HTML.

Packages: PSPICE/Eldo, Orcad, OPUS, Xilinx ISE Webpack, ModelSim XE, Eagle Layout Editor, SIS (from Berkley), PerlGP, Assembly Language Simulators, Adobe Acrobat, MS Office, FrontPage, Dreamweaver

Important Courses: Bipolar & MOS ICs, Linear Integrated Circuits, Analog Electron I & II, Digital Integrated Circuits, Embedded System Design, Computer System Architecture, Signal Processing

Operating Systems Worked On: Sun Solaris, RH Linux, Windows 9x/NT/Me

Projects & Exposure

Automatic analogue circuit synthesis using Genetic Algorithms

Evolving Sinusoidal Oscillators (August – December 2002): In this project, we automatically synthesized sinusoidal oscillators using Genetic Algorithms. As a benchmark, we synthesized the complete set of canonic opamp-based single frequency oscillators (SFO) automatically, earlier synthesized using intuition, ad-hoc methods, graph theory, etc. We further designed new oscillators based on opamp (3 capacitors), OTRA, DVCC and DDCC. Further work is continuing on exploring oscillators using other active building blocks and oscillators having unique topological features. I will like to acknowledge the academic help provided by Prof. Raj Senani (NSIT, Delhi) and Dr. Paul Layzell (HP, UK) for successful completion of this project.

‘Evolving Active Circuits: Thinking the human way’: The present project being in its nascent stage aims towards building a genetic algorithm to synthesize human-thinkable/conceived circuits. The idea is to combine some expert knowledge in the algorithm and make the search space more logical and easier to explore. Initial results have been encouraging.

Software tools used: MATLAB, PSPICE, TOPCAP

Predicting Protein Secondary Structure Using Genetic Programming (GP) (June-July 2003)

I worked on this project during my summer training at Stockholm Bioinformatics Centre, Sweden under the guidance of Dr. Robert M. MacCallum (www.sbc.su.se/~maccallr). Prediction of protein secondary structure is a challenging problem in the field of Bioinformatics, having immense application in the pharmaceutical industry. The best prediction accuracy achieved till date is 76% (PSIPRED, David Johns et.al.). We used a) Self Organizing Maps (SOM) and Genetic Programming (GP) to predict protein structure; b) GP on PSIPRED data to improve it for higher prediction accuracy. The projects involved preprocessing of SOM data (by developing innovative deterministic/heuristic ideas) and modifying (e.g., changing input set, modifying grammar, fitness evaluation, test/train set, etc.), fine-tuning the parameters of GP system for better results. Results were encouraging giving prediction accuracy of 63% in the first project, while we achieved an improvement of 0.3% on the PSIPRED data in the second project. A paper on the same was presented at EuroGP2004.

Tools Used: Perl, PDL, PerlGP, MATLAB, PDB Resources, PSIPRED resources

Design of Photon Counting Detector Using FPGAs
(Jan – May 2004)

I worked in a team of three towards designing a Photon Counting Detector (PCD) in VHDL and finally configure a Xilinx Spartan XC2S200 using the generated programming file. The steps involved were the following:

- Modeling the PCD in VHDL. (Modular Design)
- Testing of RTL: Design of testing data using C code. Design of test benches based on this data to test modules and complete Design.
- Synthesis of Design to gate level netlist and PNR. (Xilinx ISE Webpack)
- Download to FPGA board (iMPACT)
- Testing of Hardware: Design of two AVR based I/O boards to feed in and feed out benchmarking data.
- Design of Complete board.

All the steps of the project were completed except the download of code on the FPGA due to time constraints. The project shall be continued by junior batches.

Software tools Used: Xilinx ISE Webpack, ModelSim, C Compiler, ICC AVR, HyperTerminal, AVR Studio, Orcad Capture.

Building a power saving pedometer using the AVR microcontroller
(May – July 2002)

I built a pedometer using the AVR microcontroller AT90S2313 under the guidance of Mr. Dhananjay Gadre. The pedometer had the capability to measure number of steps, distance and instantaneous speed of the person wearing it. The unique feature of the pedometer was its ability to save power during normal operation

The project involved:

- To decide upon the input and output capabilities of the device. Work upon different hardware issues such as power supply, microcontroller choice, etc.
- To design the hardware, draw the schematic and build the board.
- To write the software for the application in AVR Assembly. Codes for different modules were executed and tested on the simulator/hardware.
- Downloading the code to the board and testing different modules separately. Download the final code for testing.

Software tools used: Eagle Layout Editor, Wavrasn (Assembly Compiler), AVR Studio, AVRISP

Study and Implementation of DSP Algorithms
(October 2001 – March 2002)

In this project, I studied and implemented algorithms for Linear Predictive Coding of Speech and system identification under the guidance of Dr. Harish Parthasarathy (Assistant Professor, DSP, NSIT). It required study of random signals and adaptive signal processing concepts. I investigated the convergence and accuracy of different prediction algorithms such as Levinson Durbin Algorithm, Least Squares, QR decomposition, LDU decomposition, Time Recursive Least Squares, etc. Simulations of practical problems such as Adaptive Echo cancellation, Channel Equalization, etc were also carried out. All simulations were done in MATLAB.

Solving transcendental equations Using Genetic Algorithms
(December 2001- February 2002)

Genetic Algorithms have been traditionally used for optimization. I tried to apply them to solve transcendental equations. Due to the nature of the problem at hand, I studied the problem of **multimodality** in detail. I studied and implemented the crowding scheme, sharing scheme and clearing technique proposed by different researchers to tackle multimodality. I also proposed a Hybrid algorithm to evolve a better model to solve the problem and did some initial benchmarking. All experimental work and implementation was carried out in **MATLAB**.

During this work, I was in continuous contact with **Dr. Alain Petrowski**, Institute of Telecommunication, France, whose advice and guidance proved very beneficial.

Interests

My interests stem into two different fields, one being that of innovative electronic design and the other being of bio-inspired algorithms/electronics.

In recent times I have been particularly interested in bio-inspired electronics including neuromorphic electronics, circuit design automation using evolutionary algorithms (EAs) and evolutionary robotics

Hobbies

I am an active **IEEE student member** for three years. I held the post of **Organizational Secretary, Hardware Contests, INNOVISION**, (IEEE festival at NSIT) which took place from 10-12 October, 2002. I also participated in Open House 2003, NSIT as the **Coordinator, Electronics and Comm. Deptt.** I organized On-the-Spot Hardware Design Competition (Sr.) at INNOVISION 2003.

I was the sub-editor and editor of the Hindi section of my college magazine, **INSITE** for the year 2002 and 2003 respectively. I am a founder-member of CURE, The NoRagging Group (www.noragging.com) which works against bullying of students on campus. I also took up collection of money for the **Gujarat Relief Fund** organized by our college during my second semester.

I maintain a page to spread awareness about the **pioneering contribution of Sir J. C. Bose in invention of radio**. (www.geocities.com/mumukshu/bose.html).

My other interests include reading books, writing poems/articles/stories, philosophy, spirituality, etc.

References

Available on Request