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| **Project** | **Student** | **Homework 1, due November 1.** | **Homework 2**  **Due November 15.** | **Midterm will be around November 18**  **Midterm Problems for all** |
|  |  | Standard Homework is EXOR Logic synthesis. If you have individual homework, you do not need to return the standard homework.  Written report is expected for each presentation.  If there is no time for presentation, it is rescheduled to the next meeting. | Design a complete controller in Verilog or VHDL, simulate it in MODELSIM.  Emulate on VELOCE if Veloce will work.  This homework cannot be replaced with other work. This is the most useful and fundamental information for this class. | 1. **KMaps, minterms, prime implicants, essential prime implicnats, secondary essential prime implicants.** 2. **Cube Calculus and operations supercube and product.** 3. **SOP, POS, ESOP.** 4. **Three tree search methods to generate prime implicants.** 5. **Memristor and synthesis for memristors.** 6. **Reversible circuits and ESOPOS.** 7. **Multi-valued logic and encoding for MV logic in binary** 8. **Reductions of multi-output to single –output synthesis** 9. **Deterministic, non-deterministic and probabilistic state machines.** 10. **Synthesis of state machines** 11. **Synthesis of simple controllers** 12. **Data Path optimization: Scheduling and Allocation, elementary approaches.** 13. [**http://www.scribd.com/doc/6949151/Research-Methodology**](http://www.scribd.com/doc/6949151/Research-Methodology) |
| **Project 1 MEMRISTOR**  **– Software, ABC system, synthesis** | Jens Burger | **Presentation 1.**  Wednesday of second week  **(DONE)** Present memristors and IMPLY circuits.  **Presentation.** Wednesday of fourth week  Present a method and algorithm, data structure and analysis of synthesis with minimumum number of working memristors. | **Presentation.**  Learn ABC system and synthesis of AND/OR/ NOT logic circuits in it.  What methods can be adapted for your memristor project? |  |
| **Project 2 STACK\_ MACHINE**  **VHDL, Veloce, architecture** | Sahar Deraezadeh | **Presentation 2.** Monday of third week.  Present all operations of cube calculus. Show examples and ability to extend cube calculus to new operations. | **Presentation.**  VHDL of cube calculus machine (old version) and its simulation on Modelsim. |  |
|  | Linh Tran | **Presentation.**  Monday of third week.  Present stack architecture for Cube Calculus Machine. | **Presentation.**  Veloce and its uses. |  |
|  | Addy Gronquist | **Presentation.** Monday of third week.  Present stack architectures, Lukasiewicz notation, HP calculator and stack machines to recognize languages. | **Presentation**  Veloce and its uses. |  |
| **Project 3 VISION**  **FPGA, robot vision, VHDL** | Prince | **Presentation.** Monday of fourth week.  Present work of Sumitha Ajith and her team from VHDL Class. Present your ideas of integration. |  |  |
|  | Rupesh | **Presentation.** Monday of fourth week.  Present work of Eric Liskay, Andrew Northy and Neraj Kumar from VHDL class. Present your ideas of integration. |  |  |
|  | Saicharan Bandarupalli | **Presentation.** Monday of fourth week.  Present work of Mathias Sunardi and his team from VHDL class. Present your ideas of integration. |  |  |
| **Project 4 KALMAN**  **FPGA, robot control, VHDL** | Govindu Sri Harsha Dev  [govindu@pdx.edu](mailto:govindu@pdx.edu) | **Presentation.** Monday of fourth week.  Present the mathematical concept and applications of Kalman filter. Your idea for the controller architecture. Hardware realization of Matrix operations. |  |  |
| **Project 6 ESOPOS circuits** | Robert Fiszer | **Presentation**  Wednesday of fourth week.  Present reversible functions, reversible gates, PSE gates and ESOPOS circuit. Present previous work on using ESOP and RM concepts in synthesis of reversible circuits.  *This cannot be your previous presentation from conference* *or classes.* Emphasize on software design and evaluation. |  |  |
| **Project 7**  **Chaotic Logic** | ChinniKrishna Kothapalli | **Presentation**  Monday of third week.  Present the basic advantages, ideas and designs of chaotic circuits. |  |  |

**Order of student presentations in class or in additional meetings**

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| **Week of class** | **Number of presentation** | **Date** | | **student** | | **Topic** | **To be done** |
| 2 | 1 | October 3, 2012 | | Jens Burger | | **Memristor and IMPLY gate** | Needs a good written report with answers to my questions in class. |
| **3** | 2 | October 8, 2012 | | Sahar Deraezadeh | | **Cube Calculus** | Needs a good written report. PPT slides. |
| **3** | 3 | October 8, 2012 | | Linh Tran | | **Stack Architecture for CCM** | Needs a good written report. PPT slides. |
| **3** | 4 | October 8, 2012 | | Addy Gronquist | | **Stack Architectures** | Needs a good written report. PPT slides. |
| **3** | 5 | October 8, 2012 | | ChinniKrishna Kothapalli | | **Intro to Chaotic circuits** | Needs a good written report. PPT slides. |
| **4** | 6 | October 15, 2012 | | Prince | | **Work of Sumitha Ajith** | Needs a good written report. PPT slides. |
| **4** | 7 | October 15, 2012 | | Rupesh | | **Work of Eric Liskay, Andrew Northy and Neraj Kumar** | Needs a good written report. PPT slides. |
| **4** | 8 | October 15, 2012 | | Saicharan Bandarupalli | | **Work of Mathias Sunardi and his team** | Needs a good written report. PPT slides. |
| **4** | 9 | October 15, 2012 | | Govindu Sri Harsha Dev | | **Kalman Filter in FPGA** | Needs a good written report. PPT slides. |
| **4** | 10 | October 17, 2012 | | Robert Fiszer | | **ESOP based synthesis of reversible circuits and the ESOPOS concept.** | Needs a good written report. PPT slides. *This can be a chapter of your Master Thesis.* |
| **4** | 11 | October 17, 2012 | | Jens Burger | | **Logic Synthesis for IMPLY gates with the minimum number of working memristors** | Needs a good written report. PPT slides. |
| **5** | 12 | October 22, 2012 | |  | |  |  |
| **5** | 13 | October 22, 2012 | |  | |  |  |
|  |  |  | |  | |  |  |
| **student** | | | **Research/Project**  **Topic** | | **Reading Materials** | | | |
| Jens Burger | | | **Memristor and IMPLY gate** | | 1. papers by HP team, 2. papers of Lehtonen, 3. Perkowski ‘s slides, 4. papers and webpage about ABC system. 5. Papers from directory given you by me 6. <http://www.bing.com/videos/search?q=memristor+videos&view=detail&mid=A5952FFF47FE52D0CA99A5952FFF47FE52D0CA99&first=41> 7. <http://www.bing.com/videos/search?q=memristor+videos&view=detail&mid=041A5E680A43D3439724041A5E680A43D3439724&first=0> 8. <http://www.bing.com/videos/search?q=memristor+videos+kvatinsky&view=detail&mid=997D91EC7B012853F5AA997D91EC7B012853F5AA&first=0> | | | |
| Sahar Deraezadeh | | | **Cube Calculus** | | 1. Chapter of a Perkowski book on Cube Calculus. 2. Book on Cube Calculus by Dietmeyer. 3. Book on Cube Calculus by Roth? 4. Reports (and chapters) from previous classes about Cube Calculus Machine, old and new version. 5. Webpages about CCM. 6. <http://www.bing.com/search?q=cubical+notation+logic+synthesis&FORM=HDRSC1> 7. <http://www.computer.org/comp/trans/tc/1969/01/01671114.pdf> 8. <http://www.ece.unm.edu/~jimp/vlsi_test/papers/fund_cad_algos.pdf> 9. <http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.92.5547> 10. <http://delivery.acm.org/10.1145/810000/803582/p9-rosenberg.pdf?ip=131.252.212.103&acc=ACTIVE%20SERVICE&CFID=168654162&CFTOKEN=20589686&__acm__=1349742287_048743e6bed2653c008201e2e654a403> | | | |
| Linh Tran | | | **Stack Architecture for CCM** | | 1. Chapter of a Perkowski book on Cube Calculus. 2. Book on Cube Calculus by Dietmeyer. 3. Book on Cube Calculus by Roth? 4. Reports (and chapters) from previous classes about Cube Calculus Machine, old and new version. 5. Webpages about CCM. 6. <http://icwww.epfl.ch/~seicules/DTIS/web/lectures/DT7.pdf> 7. <http://delivery.acm.org/10.1145/810000/803607/p179-gaines.pdf?ip=131.252.212.103&acc=ACTIVE%20SERVICE&CFID=168654162&CFTOKEN=20589686&__acm__=1349742424_b24e345cfe5481419bdc173be63b2684> 8. <http://books.google.com/books/about/Computer_logic_testing_and_verification.html?id=HeO7AAAAIAAJ> 9. <http://dl.acm.org/citation.cfm?doid=224841.225156> 10. <http://www.computer.org/csdl/proceedings/vlsid/1995/6905/00/69050225-abs.html> 11. <http://web.cecs.pdx.edu/~mperkows/CLASS_VHDL_99/tran888/lecture007-cube-calculus.pdf> 12. <http://web.cecs.pdx.edu/~mperkows/CLASS_VHDL/==projectCCM.html> 13. <http://web.cecs.pdx.edu/~mperkows/CLASS_479/LECTURES479/PE017.Cube-Calculus-Machine.pdf> 14. users.ece.utexas.edu/~adnan/syn-07/009-multi-valued-**logic**.ppt 15. <http://www.ece.tamu.edu/~sunil/projects-web/papers/mvlogic.pdf> | | | |
| Addy Gronquist | | | **Stack Architectures** | | 1. Webpage of VHDL class about stacks. 2. Books and Wiki about basic computer architectures based on stack. 3. Uses of stack in languages and LISP machines. 4. Other materials for this team 5. <http://www.scribd.com/doc/64138079/Micheli-Synthesis-and-Optimization-of-Digital-Circuits-Converted-Page003> 6. <http://www.amazon.com/LOGIC-DESIGN-OF-DIGITAL-SYSTEMS/dp/B001E3N5ZO> 7. <http://downloadfreefilesearch.com/search.html?type=all&search=switching+theory+and+logic+design+by+kohavi&wm=144&sub=9> 8. <http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=93794&isnumber=3066&tag=1> 9. <http://www.odbms.org/download/030.02%20Subieta%20Stack-Based%20Architecture%20and%20Stack-Based%20Query%20Language%20March%202008.PDF> 10. <http://en.wikipedia.org/wiki/Stack_machine> 11. <http://www.codeproject.com/Articles/461052/Stack-based-vs-Register-based-Virtual-Machine-Arch> 12. <http://wiki.answers.com/Q/What_is_a_stack_based_architecture> 13. <http://brainwagon.org/2010/12/02/the-j1-forth-cpu-running-on-an-fpga/> 14. <http://blog.tube42.se/?tag=fpga> 15. <http://academic.research.microsoft.com/Paper/5989437.aspx> 16. <http://academic.research.microsoft.com/Paper/3217886.aspx?viewType=1> | | | |
| ChinniKrishna Kothapalli | | | **Intro to Chaotic circuits** | | 1. Webpages and WIKI on chaotic circuits 2. Papers that you gave me. 3. Other papers by Sinha. 4. Papers on Analog FPAAs 5. Paper on MR FPGA – memristor based FPGA of new generation 6. <http://en.wikipedia.org/wiki/Chua's_circuit> 7. <http://en.wikipedia.org/wiki/Chaos_computing> 8. <http://www.imsc.res.in/~sudeshna/PRE_17.pdf> 9. <http://www.docstoc.com/docs/81019780/INTRODUCTION-TO-PATTERN-CHEMISTRY--Parts-1-to-4> 10. <http://www.powershow.com/view/15029a-ZGU4Y/Simple_Chaotic_Systems_and_Circuits_powerpoint_ppt_presentation> 11. <http://wn.com/Chaotic_behavior_with_MATLAB> 12. <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1046831> 13. <http://www.worldscientific.com/doi/abs/10.1142/S0218127403008053> 14. <http://www.worldscientific.com/doi/pdfplus/10.1142/S0218127403008053> 15. <http://www.worldscientific.com/doi/pdf/10.1142/S0218127412500113> 16. <http://www.worldscientific.com/doi/pdf/10.1142/S0218126609005575> 17. <http://prl.aps.org/pdf/PRL/v102/i10/e104101> 18. <http://ac.els-cdn.com/S0375960105003166/1-s2.0-S0375960105003166-main.pdf?_tid=c566422e-1240-11e2-bcdc-00000aab0f02&acdnat=1349808197_613602014b1c8a357879065be102b6a1> 19. <http://prl.aps.org/pdf/PRL/v71/i13/p2010_1> 20. <http://repository.ias.ac.in/60883/1/13-pub.pdf> 21. <http://pre.aps.org/pdf/PRE/v66/i1/e016209> 22. <http://repository.ias.ac.in/60908/1/40-pub.pdf> 23. <http://www.camtp.uni-mb.si/chaos/2008/lectures.shtml> | | | |
| Prince | | | **Work of Sumitha Ajith** | | 1. Reports by Sumitha Ajith. 2. Webpages about FPGA and VHDL based robot vision architectures 3. Perkowski’s slides from ECE 479 class about robot vision. 4. Slides about Hough Transform from there and from other sources. 5. <http://proceedings.spiedigitallibrary.org/proceeding.aspx?articleid=1316587> 6. <http://www.youtube.com/watch?v=ojfTEXZvQOg> | | | |
| Rupesh | | | **Work of Eric Liskay, Andrew Northy and Neraj Kumar** | | 1. Report by Liskay, Northy and Kumar. 2. Perkowski’s slides from ECE 479 class about robot vision. 3. Slides about Hough Transform from there and from other sources. | | | |
| Saicharan Bandarupalli | | | **Work of Mathias Sunardi and his team** | | 1. Report by Mathias Sunardi from last VHDL class. 2. Slides about Hough Transform from there and from other sources. | | | |
| Govindu Sri Harsha Dev | | | **Kalman Filter in FPGA** | | 1. Slides by Perkowski on Kalman filter. 2. Papers on FPGA-based Kalman filter. 3. <http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=4297329&tag=1> 4. <http://cas.ee.ic.ac.uk/people/gac1/pubs/VanderleiFPL07.pdf> 5. <http://www.dsprelated.com/showmessage/58704/1.php> 6. <http://www.bing.com/videos/search?q=kalman+filter+++robot&view=detail&mid=126A6ACF318BC5F0AB45126A6ACF318BC5F0AB45&first=0> | | | |
| Robert Fiszer | | | **ESOP based synthesis of reversible circuits and the ESOPOS concept.** | | 1. All variants of our paper on ESOPOS. 2. Papers on ESOP-based reversible synthesis that I mentioned recently 3. Other papers from Internet on ESOP-based reversible synthesis 4. Review Survey paper by Saeedi and Markov. 5. Chapter of a Perkowski book on Cube Calculus. 6. Book on Cube Calculus by Dietmeyer. 7. <http://www.informatik.uni-bremen.de/agra/doc/work/11_evohot_impr_esop_synthesis_reversible_circuits.pdf> 8. <http://www.cs.unb.ca/~gdueck/courses/cs6805/papers/ESOP_trans.pdf> 9. <http://academic.research.microsoft.com/Keyword/35585/Reversible-Logic> 10. <http://www.cs.unb.ca/~gdueck/courses/cs6805/papers/PacRim.pdf> 11. <http://citeseerx.ist.psu.edu/showciting?cid=4462084> 12. <http://www.aueb.gr/pympe/hercma/proceedings2007/H07-FULL-PAPERS-1/SAMPSON-VOUDOURIS-KALATHAS-PAPAKONSTANTINOU-1.pdf> | | | |