Sanjukta Bhanja's Effort in Improving women representation in Computer Engineering

CRA-W Distinguished lecture series at University of South Florida, October 5th 2007

We express our immense gratitude to CRA-W for letting us host this event. It was a pleasant experience to have hosted such an event where many women actively participated who shared their views and encouraged our women students to pursue graduate studies.
This event consisted of two sessions: an invited talk and a Panel discussion regarding women in graduate studies.

Morning Session:
The invited Lecture by Prof. Mary Jane Irwin:

The morning session had a Distinguished Lecture Series by Prof. Mary Jane Irwin on **The Multi core Revolution: Opportunities Challenges and Opportunities.** The abstract and flyer for the talk is attached here.
The duration of the talk was one hour which was followed by a discussion for half an hour. Some of the statistics for the invited talk are listed below:

1. Number of attendees:52
2. Undergraduate women:8
3. Graduate women:18
4. Graduate men:12
5. Under Graduate men:6
6. Men Faculties:3
7. Women Faculty:3
8. Women Industry:2

Most of the men and as well as a significant part of the faculties were form Computer Architecture research area.

Afternoon Session:

In the afternoon session we had the two following academic events.

(a) Graduate Student and Women Forums:

The afternoon session had two forums. The first one had a half an hour discussion with the graduate students (around 25 from College of Engineering) in the VLSI and Computer architecture area. The PhD students were asked to explain their research area in Elevator Pitch form. Prof. Irwin was interacting with them one to one providing suggestions and guidelines. Both graduate women and men participated in this discussion.
This was followed by a discussion with women Graduate students (around 15) on issues with graduate studies.

(b) Panel Discussion:

The next event was a panel discussion. The Biography of the panelists is attached. Some of the issues discussed in the panel are:

- The underlying passion that led them to do PhD
- Why women feel intimidated in Engineering lack of role model was pointed out
- Continuing education and coping up with the ever changing technology
- Applying to Graduate school and the CRA-W workshop
- Why women were out numbered mostly in engineering.
- Balance between family and career.
- Mentoring for women engineers and type of society/forums women can get involved

Statistics:

Number of people attended the panel (excluding the 6 panelists) : 33*
Percent of attendees who were women : 93.93%
Percent of attendees who were undergraduates: 36.36%
Percent of attendees who were graduate students: 51.51%
Number of students from other schools and colleges (College of Arts and Science and Hillsborough Community College) : 2
*----Since it was a Friday afternoon some of the attendees left early and some of them were late. On an average there were 23-25 participants.

Advertisement:

The flyer and the panel were advertised in

1. SWE newsletter September issue (for free),
2. Paid advertisement ORACLE (University news letter),
3. Flyers sent to Hillsborough Community College and all
4. through created Mailing list of UG and graduate women for college of engineering
5. Mailing list for VLSI student groups
6. Flyer was posted at various locations in the university
7. News announcement from College of Engineering website and
8. Classroom announcements.

Social Events:

We organized food for the panel, the invited talk and also during the graduate and women forum (sponsored by CRA-W). There was a lunch organized by the College of Engineering Dean where invited speaker Dr. Irwin interacted with the Chair of EE Dr. Don Morel, University Distinguished Professor Dr. N. Ranganathan, Dean Dr. John Winsek, Provost Dr. Renu Khator and host Dr.Sanjukta Bhanja discussing about the awareness of women issues at all the levels of administration.
At the end of the panel discussion all the panelists were invited for a dinner (sponsored by CRA-W) where various aspects and challenges faced by women were discussed in a social setting.

As an after thought we felt that the event was dominated by University based academicians and for our future events we would like to avoid Friday afternoons and organize it on a weekday if the schedule permits.

Overall it was an immense pleasure to organize this event and we are looking forward to organize more events like this in future, where women and minorities gain immense insight into their career: Opportunities and Challenges.

CRA-W Distinguished Lecture Series

The Multicore Revolution: Challenges and Opportunities

Mary Jane Irwin
Evan Pugh Professor
Penn State University

Abstract: Moore's Law continues to hold resulting in a doubling of the number transistors integrated on a single chip every two years. However, thermal issues and global interconnect speed issues have made it impossible to use this plethora of transistors in the design of a single, advanced processor that runs at a faster clock rate to provide a doubling of performance. However, two processors running at the slower clock rate *will* fit on today's chips and *will* provide, in theory, this doubling of performance. Soon, four core chips will appear on the market. This talk will focus on the challenges and research opportunities brought about by the multi-core revolution that is upon us. These include architectural challenges (e.g., global interconnect options), resiliency challenges (e.g., faulty cores due to soft error upsets, process variation, aging effects, thermal hot spots), on-chip memory hierarchy design (e.g., NUCA), power/energy challenges, and programming challenges. Some initial research results that give insight into several of these challenge area will be presented. Ultimately, multi-core computing resources (time, space, communication) and emerging computing resources (power, resiliency, security) will have to be cooperatively managed by the programmer, by the run-time system, by the compilation system, and by dynamic controls in the underlying circuitry.

Biography: Mary Jane Irwin has been on the faculty at Penn State since 1977 where she currently holds the title of Evan Pugh Professor and A. Robert Noll Chair in Engineering in the Department of Computer Science and Engineering. Her research and teaching interests include computer architecture, embedded and high performance computing systems design, power and reliability aware design, and emerging technologies in computing systems. Dr. Irwin received her Ph.D. from the University of Illinois. She received an Honorary Doctorate from Chalmers University, Sweden, in 1997, was named a Fellow of The Institute of Electrical and Electronic Engineers (IEEE) in 1995, a Fellow of The Association for Computing Machinery (ACM) in 1996, and was elected to the National Academy of Engineering in 2003. Dr. Irwin is currently serving on ACM's Publications Board, on the Board on Army Science and Technology, and as a member of the Computing Research Association's (CRA)-W Steering Committee. In the past she has served as a founding co-Editor-in-Chief of ACM's *Journal on Emerging Technologies in Computing Systems* and as Editor-in-Chief of ACM's *Transactions on the Design Automation of Electronic Systems*, as an elected member of the CRA's Board of Directors, of the IEEE Computer Society's Board of Governors, of ACM's Council, and as Vice President of ACM.

October 5th, 2007 @ 10 AM CUTR 102

Hosted by

Sanjukta Bhanja (Electrical Engineering, USF) with cooperation from IEEE FWCS, SWE and IEEE Student Branch, USF

Sponsored by

The Computer Research Association's Committee on the Status of Women in Computing Research (CRA-W)

http://www.cra.org/Activities/craw/aboutCraw.php

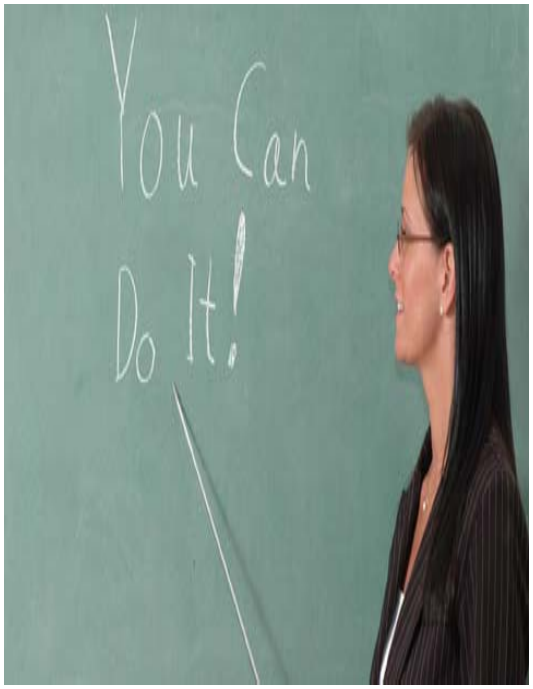
EVERYONE IS INVITED! REFRESHMENTS WILL BE SERVED !

For further information, contact Dr. Sanjukta Bhanja (bhanja@eng.usf.edu)

CRA-W presents a panel discussion

Why Grad School?

The Benfits of Continuing Your Education and Research



An honest discussion designed to assist undergraduate students deciding if advance degrees are in their future; especially, though not exclusively, the benefits to young women. This conversation will highlight both the industry and academic career paths.

Panelists

Prof. Mary Jane Irwin
Faculty, Penn-State

Prof. Beverly Sanders
Faculty, UF

Prof. Damla Turgut
Faculty, UCF

Oluwabukola "Bukie" Akinbo
Graduate Student, CSE, USF

Cindy Bethel
PhD Student, CSE, USF

Friday, Oct 5th, 3:00 PM CUTR 102

Refreshments will be served! Everyone is invited!

Biography of the Panelists

Mary Jane Irwin has been on the faculty at Penn State since 1977 where she currently holds the title of Evan Pugh Professor and A. Robert Noll Chair in Engineering in the Department of Computer Science and Engineering. Her research and teaching interests include computer architecture, embedded and high performance computing systems design, power and reliability aware design, and emerging technologies in computing systems. Dr. Irwin received her Ph.D. from the University of Illinois. She received an Honorary Doctorate from Chalmers University, Sweden, in 1997, was named a Fellow of The Institute of Electrical and Electronic Engineers (IEEE) in 1995, a Fellow of The Association for Computing Machinery (ACM) in 1996, and was elected to the National Academy of Engineering in 2003. Dr. Irwin is currently serving on ACM's Publications Board, on the Board on Army Science and Technology, and as a member of the Computing Research Association's (CRA)]W Steering Committee. In the past she has served as a founding co-Editor-in-Chief of ACM's *Journal on Emerging Technologies in Computing Systems* and as Editor-in-Chief of ACM's *Transactions on the Design Automation of Electronic Systems*, as an elected member of the CRA's Board of Directors, of the IEEE Computer Society's Board of Governors, of ACM's Council, and as Vice President of ACM.

Damla Turgut is an assistant professor at the School of Electrical Engineering and Computer Science of University of Central Florida. She received her BS, MS, and PhD degrees from the Computer Science and Engineering Department of University of Texas at Arlington in 1994, 1996, and 2002 respectively. She has been included in the WHO's WHO among students in American Universities and Colleges in 2002. She has been awarded outstanding research award and has been recipient of the Texas Telecommunication Engineering Consortium (TxTEC) fellowship. She is a member of IEEE, member of the ACM, and the Upsilon Pi Epsilon honorary society. Her research interests include wireless networking, mobile computing, distributed systems, agents, and databases.

Oluwabukola "Bukie" Akinbo, a Computer Science Student, has received Honorable Mention by Computing Research Association for 2007 Outstanding Undergraduates.

Cindy Bethel: received a B.S. degree in Computer Science from the University of South Florida in May 2004. She is currently pursuing a doctorate degree in Computer Science and Engineering at the University of South Florida with her research focus in the areas of AI, robotics, human-robot interaction, and affective computing. Cindy is a National Science Foundation Graduate Research Fellow.

Beverly A. Sanders is associate professor at the Department of Computer and Information Science and Engineering, University of Florida, Gainesville. Her research focuses on techniques to help programmers construct high-quality, correct programs, including formal methods, component systems, and design patterns. She holds a Ph.D. in applied mathematics from Harvard University.

CRA-W Distinguished Lecture Series (DLS)

Lecturer and Panelists Evaluation

Thank you for participating in the CRA-W Distinguished Lecture Series. We are always trying to improve the program and would very much value your input. Please feel free to attach any additional information you feel would be beneficial.

1. Your name Cindy L. Bethel and affiliation USF Dept. of CSE .
2. Name of the institution where the event was held Univ. of South Florida .
3. Your role:

   ___ Lecturer
   ___ Industry panelist
   ___ Academic panelist
   X Student panelist

4. Was the event well organized? Do you have suggestions on improving the organization.
   Yes, the event was very well organized and a pleasure to attend and to participate in. I think better advertising and selection of a date other than a Friday would provide better attendance at the event. It would have been nice to also have an industry perspective as well. I truly enjoyed the event and hope to attend future events.
5. Did the event meet your own expectations?
   Yes, I think for the most part the event met with my expectations. I have attended several CRA-W events and they are all well organized and very informative. I have enjoyed all of them and I hope to continue to be involved and attend these types of events. They are so important to women in our field.
6. Would you be willing to participate in a DLS event in the future? Yes
7. Any additional comments or suggestions for improving the program?
   Mary Jane Irwin is awesome and I found her to be very informative and a wonderful role model for women in Computer Science and Engineering. I enjoyed spending time with her and enjoyed the information she so willingly shared. I am very thankful for the events that are sponsored by CRA-W. They have made such a difference in my academic experiences. I do hope that more events will be offered in different areas of interest. Thank you for all you do! I would enjoy being involved in future events to be helpful to others and to pay back some of what has been provided to me by the CRA-W.

Thanks for your input!

CRA-W Distinguished Lecture Series (DLS)

Lecturer and Panelists Evaluation

Thank you for participating in the CRA-W Distinguished Lecture Series. We are always trying to improve the program and would very much value your input. Please feel free to attach any additional information you feel would be beneficial.

1. Your name SUPRIYA KETKAR and affiliation R.A.
2. Name of the institution where the event was held UNIVERSITY OF SOUTH FLORIDA.
3. Your role:
   - ___ Lecturer
   - ___ Industry panelist
   - ___ Academic panelist
   - ✓ Student panelist
4. Was the event well organized? Do you have suggestions on improving the organization.
   YES!
5. Did the event meet your own expectations?
   YES!
6. Would you be willing to participate in a DLS event in the future? YES
7. Any additional comments or suggestions for improving the program?
   More awareness of students & participants.

Thanks for your input!

CRA-W Distinguished Lecture Series (DLS)

Lecturer and Panelists Evaluation

Thank you for participating in the CRA-W Distinguished Lecture Series. We are always trying to improve the program and would very much value your input. Please feel free to attach any additional information you feel would be beneficial.

1. Your name TRIPURA SUNDARI and affiliation _____ .
2. Name of the institution where the event was held University of South Florida.
3. Your role:
   - ___ Lecturer
   - X Student Attendee
   - ___ Industry panelist
   - ___ Academic panelist
   - ___ Student panelist
4. Was the event well organized? Do you have suggestions on improving the organization.

   Yes

5. Did the event meet your own expectations?

   Yes

6. Would you be willing to participate in a DLS event in the future? Yes
7. Any additional comments or suggestions for improving the program?

   more number of such events.

Thanks for your input!

CRA-W Distinguished Lecture Series (DLS)

Lecturer and Panelists Evaluation

Thank you for participating in the CRA-W Distinguished Lecture Series. We are always trying to improve the program and would very much value your input. Please feel free to attach any additional information you feel would be beneficial.

1. Your name HARINI DANTU and affiliation MSEE .
2. Name of the institution where the event was held USF - Tampa .
3. Your role:
   - ____ Lecturer
   - ____ Industry panelist
   - ____ Academic panelist
   - ____ Student panelist

   X student attendee
4. Was the event well organized? Do you have suggestions on improving the organization.

   Event was well organized.

5. Did the event meet your own expectations?

   Yes, very much.

6. Would you be willing to participate in a DLS event in the future? Yes
7. Any additional comments or suggestions for improving the program?

   I wish it shouldn't have been on friday afternoon.

Thanks for your input!

CRA-W Distinguished Lecture Series and Panel

Organizer Evaluation

Thank you for organizing a CRA-W Distinguished Lecture Event and Panel. We are always trying to improve the program and would very much value your input. Please feel free to attach any additional information you feel would be beneficial.

Your name Sanjukta Bhanja and affiliation University of South Florida .

1. Number of people at the lecture: 52
2. Number of people at the panel: 33
3. What events were held in addition to the lecture and panel? Include social events and meals.

   Dinner with the panelists,Lunch with Provost and Dean and Dinner with VLSI Faculty groups.

   - How many people attended these additional events? 40

4. Who are these people? Please try to estimate the make-up of the audience aggregated over all events (lecture, panel, and other events).

   - Percentage Women 74.2 Men 25.7
   - Percentage Faculty 8 Graduate Students 60 Undergraduates 28.5 Other ____
   - Percentage from Schools 2.8 Companies 2.8
   - If your event included several schools, please list the institutions and estimate the overall percentage coming from institutions other than the host school.

   Invitation was sent to Hillsborough community college: one student attended

5. Which of the following seemed to you to be the most effective way in which this event was advertised?

   X Email to an established mailing list or a newsgroup.
   X Flyers or posters
   X Word of mouth
   X Email to an ad hoc group
   X Class announcement
   ____ There was no effective advertising
   ____ Other (specify)

6. Who would you have liked to attend who didn't?

   The distinguished lecture was attended by the women grad students, women undergraduates and VLSI students. In the panel, we expected women undergraduates and grad students. Even though our expectation was met for the lecture, the panel was light due to less participation from the undergraduates.

7. What feedback have you received from students? What impact did the lecture and panel have?

   Students really participated well in both the talk and the panel. They asked many questions and discussions regarding graduate school, work/profession balance were discussed and most of them interested in future prospect of women in Engineering. I think they learnt that there is strong need for women to share idea and discuss professional issues.

8. How would you rate the distinguished lecture and lecturer?

Topic	Not Valuable	Somewhat Useful	Valuable	Essential
Talk accessible to general audience				X
Substantial time for questions				X
Meeting the lecturer before/after talk				X
Talk content includes broad perspective of field				X
Talk content includes new exciting results			X	

9. Were there additional activities you wish had been included in the event to help make the most of the lecturer's visit?

We had a large number of activities listed in our report and we feel very happy that the event got high visibility among the administrator whose awareness is critical to the growth of women.

10. Who were your panelists (name, affiliation, and level)?

Prof. Mary Jane Irwin, (Penn state University, Professor), Prof. Beverly Sanders (University of Florida, Associate Professor), Dr. Damla Turgut (Univ. of Central Florida, Assistant Professor), Cindy L Bethel (Univ. of South Florida, graduate student) and Oluwabukola "Bukie" Akinbo,(Univ. of South Florida, graduate student)

11. How would you rate the panelists and panel?

Topic	Not Interesting	Somewhat Useful	Valuable	Essential
Insight into what the experience of attending grad school is like (joys and frustrations)				X
Insight into why a research career is exciting				X
Range of careers open to those with Ph.D. degrees				X
Advice on the process of how to apply to grad school				X
Information on what Admissions Committees are looking for				X
Information on financing a graduate school education				X

12. What activities in your program were most effective and why?

Panels and the graduate student forum was effective for the students attending them. This is mainly due to the friendly set up and flexibility. However, VLSI students learnt a lot from the talk. Many of them have requested the slides later on from me.

13. Other comments on what worked well and what didn't work well?

We are thrilled about almost everything except the panel attendance and the mobility of the attendees during the panel. We hope to choose a non-Friday schedule for our next events. Advertising through the SWE, mailing lists and classroom announcements were most effective.

14. Would you consider organizing a similar event in a future year? Would your insitution provide funding?

I would love to organize such events and work as volunteer for other events that CRA-W/SWE organizes. With the budget cut in place, I suspect that there would be little help from the College, however, we would be able to involve other local chapters of SWE and try to involve NSF.

15. Any additional comments or suggestions for improving the program?

We felt that the panel was dominated by academic women. Even our graduate students were more focused on Universities as their future employers. I wish we had more industry-presence which is already a little low in Tampa area.

Thanks for your input!

Research Experience for Teachers

Collaboration with Ms. Michaela Westlake
Knowledge Module for K7/K8 students
Introduction Nano-Computing to K7-K8 Boys/Girls
Letter of support from Michaela Westlake
RET presentation
Sample Lesson plan
Sample work from Girl student only (names not revealed)
Discussion Log from Girl student only (names not revealed)

September 12, 2008

To Whom It May Concern:

I have known Dr. Sanjukta Bhanja from the 2006 summer Research Experience for Teacher summer program. She was my mentor, together we developed lesson plan focusing on nano-computing and quantum cellular automata. During the summer, Sanjukta let me work in a flexible manner, working from home and teleconferencing whenever we needed to discuss. We were interacting closely and reviewed and study lecture materials jointly. When we covered the lesson module in my class, she volunteered to visit my school and administered the lectures with me and worked with my students. Even though the lesson plan were created for all my K7 students, during her visit, she was trying to find out the gender biases towards Math, Science and Engineering careers and attempted to inspire girls towards Nanotechnology education.

In 2007, she visited my class again participating in the "Great American Teach In," conducting Science experiments in my class. She also advertised College of Engineering's nano-center and Engineering as a potential career choice, addressing some of the misconceptions and myths regarding engineering education.

In a personal note, she has always motivated me to pursue my PhD and provided me with moral support and tips to balance my family and work balance. Dr. Bhanja was one of my referees for my PhD application and wrote letters of recommendation for me.

I really enjoyed working with her trying to promote Engineering to middle-school students particularly towards young girls. This year, I know that she would apply for the National Science Foundation Research Experience for Teacher supplemental award, and I intend to work with her again.

I feel that her focus in recruiting women, working as a woman role model, highly accomplished researcher, and scholar, skillful orator would really help increase women participation in Math and Science and most importantly novel Engineering areas like nanotechnology.

Michaela Westlake

Michaela Westlake

Introduction to Computer Logic

2006 RET Lesson Plan I

Teacher: Michaela Westlake
Professor: Sanjukta Bhanja

Subject Area:

Mathematics

Grade Level:

7th/8th

Lesson Purpose:

- designed as an enrichment activity
- introduces students to mathematical applications in computer technology
- will cover basic operations with binary numbers, Boolean gates, and truth tables

Student Objectives:

1. Students will convert binary numbers into decimal numbers.
2. Students will complete truth tables for majority gates.
3. Students will construct and explain a variety of Boolean gates, such as AND-, OR-, NOT-, and Majority gates in a cooperative learning activity

Student Assessment (formal):

- Successful completion of worksheets
- Group project

Student Assessment (informal):

- Discussion Log

Sunshine State Standards:

MA.A.1.3 and 2.3 - Number Sense, Concepts, and Operations
MA.D.1.3 - Algebraic Thinking
MA.E.1.3 - Data Analysis and Probability

Approximate Time Needed:

Three 50-minute class periods:
Day 1: Binary Information
Day 2: Boolean Gates and Poster Group Project
Day 3: Completion of Group Project and Discussion Log

Prerequisite Skills:

1. Students should be able to find place values of digits in numbers.
2. Students should be able to evaluate powers.
3. Students should have a basic understanding of theoretical probability.

Procedures: Day One:

- Hand out copies of *Binary Numbers* (attached).
- Use a transparency of the handout to introduce students to the binary number system, and to demonstrate how binary numbers are converted into decimal numbers.
- Have students independently solve *Worksheet 1* (attached).
- Use a transparency of the worksheet to review the answers.

Procedures: Day Two:

- Hand out copies of *Boolean Gates* and *Worksheet 2* (attached).
- Use a transparency of the first handout to give students the background information necessary to design basic AND-, OR- NOT-, and Majority gates, with the proper labeling.
- Demonstrate to students how to find the information for and complete a truth table.
- Have students independently work out the truth table on *Worksheet 2* (attached).
- Use a transparency of the second worksheet to review the in- and outputs of the truth table.

Procedures: Day Three:

- Hand out copies of *Cooperative Learning Rules* (attached), and review with students.
- Divide class into groups of three or four (considering special needs).
- Hand out *Poster Group Activity* instructions (attached).
- Explain assignment, choices, responsibilities, and grading procedures.
- Have each individual group come forward for the required material.
- When finished with the poster, have each student complete a *Discussion Log* (attached).

Material and Resources Required:

Technology:

- Overhead projector

Printed Materials:

- Transparencies with lesson and examples
- Worksheets with directions, examples, problems
- Cooperative Learning Rules
- Discussion Logs

Others:

- Poster board, yarn, pipe cleaners, tooth picks, scissors, glue, rulers, coloring utensils

Additional Resources:

- Stencils with appropriate geometric shapes

Modification for Differentiated Instruction:

- Teacher will speak slowly and clearly when giving directions (ESOL).
- ESOL students should be placed in non-ESOL groups for help from their peers, and use English to participate.
- Co-teacher will be able to assist SLD students.
- Students will be completing pre-printed worksheets.
- SLD students will get additional time, if required.

Extensions:

- Take an additional class period, and have students explain the details of different Boolean gates and associated truth tables to the class. Conclude with a class discussion about this enrichment activity.
- Or, take two additional days, and continue with the lesson *Introduction to Nanotechnology*, also posted on this web site.

Teaching Tips and Resources:

It is important to be familiar with the covered topics. Review information can be found in

- Givone, D.D., *Digital Principles and Design*, New York: McGraw-Hill, 2003.

Introduction to Nanotechnology

2006 RET Lesson Plan II

Teacher: Michaela Westlake
Professor: Sanjukta Bhanja

Subject Area:

Mathematics

Grade Level:

7th/8th

Lesson Purpose

Developed as a follow-up lesson to *Introduction to Computer Logic,* posted on this site, this lesson is designed as an enrichment activity. It introduces students to mathematical applications in nanotechnology, covering basic operations with Quantum-Dot Cellular Automata, QCA wires and circuits.

Student Objectives:

1. Students will complete models of QCA wires and circuits with appropriate polarization and corresponding outputs.
2. In a cooperative learning environment, students will create a model of a QCA circuit, copying a layout, with the help of cutouts representing different connections.

Student Assessment (formal):

- Successful completion of worksheets
- Peer project

Student Assessment (informal):

- Discussion Log

Sunshine State Standards:

MA.A.1.3 and 2.3 - Number Sense, Concepts, and Operations
MA.D.1.3 - Algebraic Thinking
MA.E.1.3 - Data Analysis and Probability

Approximate Time Needed:

Two 50-minute class periods:

Day 1: Quantum-Dot Cellular Automata, QCA wires and circuits
Day 2: QCA full-adder and Discussion Log

Prerequisite Skills:

1. Students should be able to find place values of digits in numbers.
2. Students should be able to evaluate powers.
3. Students should have a basic understanding of theoretical probability.
4. Students should have some knowledge of binary numbers and Boolean gates.

Procedures: Day One:

- Hand out copies of *Quantum-Dot Cellular Automata* (attached).
- Use a transparency of the handout to introduce students to these nanostructures, and to demonstrate how QCA cells line up creating wires and circuits.
- Have students independently solve *Worksheet 1* (attached).
- Use a transparency of the worksheet to review the answers.

Procedures: Day Two:

- TEACHER PREPARATION: Go to the QCA Designer website http://www.qcadesigner.ca Download the appropriate version, create a QCA adder that will be the right difficulty level for your students, print and make copies.
- Pair students in groups of two (considering individual strengths and needs).
- Hand out copies of *Cooperative Learning Rules* (attached) and review, unless done previously.
- Hand out copies of *Peer Team Project* instructions (attached) and copies of your QCA adder.

Procedures: Day Two - continued:

- Explain assignment, responsibilities, and grading procedures.
- Hand out poster paper, copies of sheets with cutouts, scissors, and glue to each individual team. Make coloring utensils available.
- When finished with the assignment, have each student complete a *Discussion Log* (attached).

Material and Resources Required:

Technology:
- Overhead projector
- Teacher computer with internet access and printer

Printed Materials:
- Transparencies with lesson and examples
- Worksheets with directions, examples, problems
- Cooperative Learning Rules
- Cutouts
- Discussion Logs

Others:
Poster paper or large sheets of construction paper, scissors, glue, coloring utensils

Additional Resources:

- Mobile computer lab
- Video projector

Modification for Differentiated Instruction:

- Teacher will speak slowly and clearly when giving directions (ESOL).
- ESOL students should be placed with a non-ESOL peer for help, and use English to communicate.
- Co-teacher will be able to assist SLD students.
- Students will be completing pre-printed worksheets.
- SLD students will get additional time, if required.

Extensions:

- Take additional one or two class periods. In the computer lab, or by bringing the mobile-computer lab into the classroom, students can use the on-line "QCA Designer" to simulate a QCA circuit.
- Have a class discussion about this enrichment activity.

Teaching Tips and Resources:

It is important to be familiar with the covered topics and to practice creating QCA circuits. Review information, a tutorial, and computer simulations can be found in

- Givone, D.D., *Digital Principles and Design,* New York: McGraw-Hill, 2003.
- http://www.qcadesigner.ca/

Introduction to Nanotechnology

2006 RET Lesson Plan II, University of South Florida

Teacher: Michaela Westlake
Professor: Sanjukta Bhanja

Subject Area: Mathematics

Grade Level: $7^{th}/8^{th}$

Lesson Purpose:
This lesson has been developed as a follow-up to the lesson ***Introduction to Computer Logic***, posted on this site. Both lessons are designed as enrichment activities. This lesson introduces students to mathematical applications in new evolving computer technology, covering basic operations with Quantum-Dot Cellular Automata, QCA wires and circuits.

Student Objectives:
1. Students will complete models of QCA wires and circuits with appropriate polarization and corresponding outputs.
2. In a cooperative learning environment, students will create a model of a QCA full-adder, copying a layout, with the help of cutouts representing different connections.

Student Assessment (formal):
- Successful completion of worksheets
- Peer project

Student Assessment (informal):
- Discussion Log

Sunshine State Standards:
MA.A.1.3.1; MA.A.2.3.2; MA.D.1.3.1; MA.D.1.3.2; MA.E.1.3.1

Approximate Time Needed:
Two 50-minute class periods (two days):
Day 1: Quantum-Dot Cellular Automata, QCA wires and circuits
Day 2: QCA full-adder and Discussion Log

Prerequisite skills:
1. Students should be able to find place values of digits in numbers.
2. Students should be able to evaluate powers.
3. Students should have a basic understanding of theoretical probability.
4. Students should have a basic understanding of binary numbers and Boolean gates.

Procedures:

Day One:

- Hand out copies of Quantum-Dot Cellular Automata (attached to this lesson plan).
- Use a transparency of the Quantum-Dot Cellular Automata handout to introduce students to these nanostructures, and to demonstrate how QCA cells line up creating wires and circuits.
- Have students independently solve Worksheet 1 (attached).
- Use a transparency of Worksheet 1 to review the answers.

Day Two:

- TEACHER PREPARATION: Go to the QCA Designer website http://www.qcadesigner.ca/, download the appropriate version, create a QCA adder that will be the right difficulty level for your students, print and make copies of the screen.
- Pair students in groups of two (considering individual students' strengths and special needs)
- Hand out copies of the Cooperative Learning Rules (attached). Review the rules with the students, if not done previously.
- Hand out copies of Peer Team Project instructions (attached) and copies of your QCA adder.
- Explain assignment, responsibilities, and grading procedures to students.
- Hand out poster paper, copies of sheets with cutouts, scissors and glue to each individual team. Make coloring utensils available.
- When finished with the assignment, have each student complete a Discussion Log (attached).

Material and Resources Required:

Technology:

- Overhead projector
- Teacher computer with internet access
- Printer

Printed Materials:

- Transparencies with lesson content and examples
- Worksheets with directions, examples, and problems
- Cooperative Learning Rules
- Cutouts
- Discussion Logs

Others:

Poster paper or large sheets of construction paper, scissors, glue, coloring utensils

Additional Resources:

- Mobile computer lab
- Video projector with attachment to teacher's computer

Modification for Differentiated Instruction:

For the Special Needs Student:

- Teacher will speak slowly and clearly when giving students directions (ESOL students).
- ESOL students should be placed with a non-ESOL peer for help and should try to use English to participate in the peer activities (ESOL goal 1).
- Co-teacher will be able to assist SLD students during problem-solving activities.
- Students will be able to complete pre-printed worksheet.
- SLD students will get extra time on their individual assignments, if required.

Extensions:

1. Take additional one or two class periods. In the computer lab, or by bringing a mobile computer lab into the classroom, students can use the on-line "QCA Designer" [http://www.qcadesigner.ca] to simulate a QCA circuit.
2. Have an open discussion with the students about this enrichment activity.

Teaching Tips and Resources:

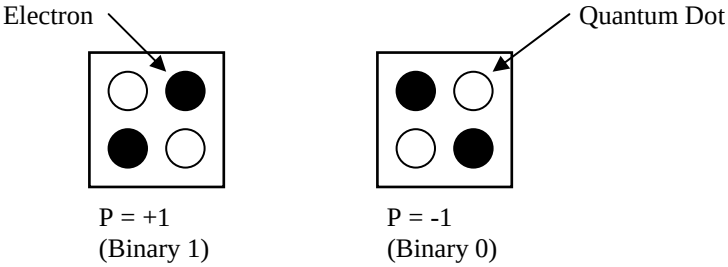
It is important to be familiar with the covered topics and to practice creating QCA circuits. Review information, a tutorial, and computer simulations can be found in

- Givone, D. D., *Digital Principles and Design*, New York: McGraw-Hill, 2003.
- http://www.qcadesigner.ca/

Quantum-Dot Cellular Automata (QCA)

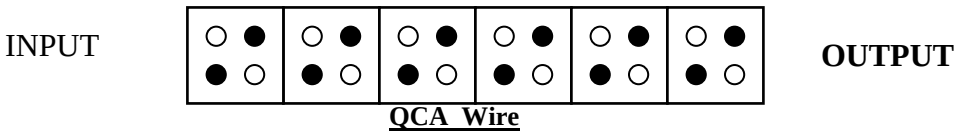
Quantum dots are nanostructures [*nano-:* one billionth part of] created from standard semiconductive material. A quantum dot can be visualized as a well. Electrons, once trapped in the dot, do not alone posses the energy required to escape. Binary information is stored in the charge configuration within a cell rather than in the on/off state of a current switch.

Each cell consists of four dots and contains two mobile electrons, which occupy antipodal ("exact opposite") sites.



Because the electrons are quantum mechanical parts they are able to tunnel between the dots in a cell. The electrons in cells adjacent to each other will interact. As a result, the polarization of one cell will be directly affected by the polarization of its neighboring cells.

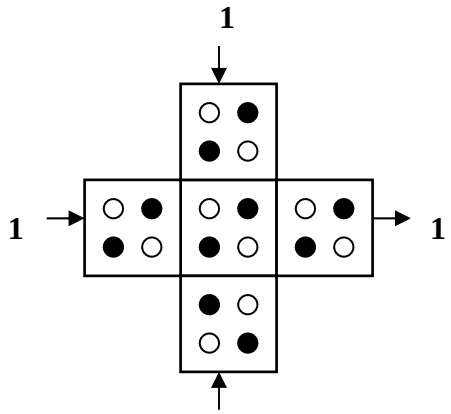
This interaction forces neighboring cells to synchronize their polarization. Therefore, an array of QCA cells acts as a wire and is able to transmit information from one end to the another. All the cells in the wire will switch their polarization to follow that of the input or driver cell.



In order to perform general computation, a set of Boolean logic gates is required to perform the AND, OR, NOT, and FANOUT operations.

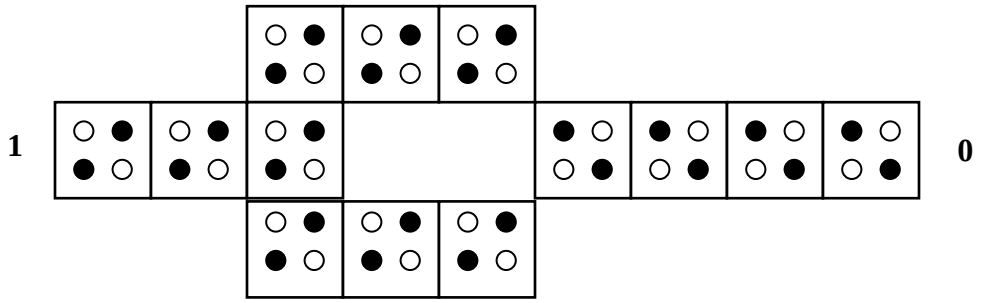
The QCA majority gate produces an output, which reflects the majority of the inputs. Majority gates can be used to implement AND and OR gates:

- By setting one of the inputs of the majority gate to 0 we create an AND gate.
- If we set one of the inputs to a 1 we produce an OR gate.



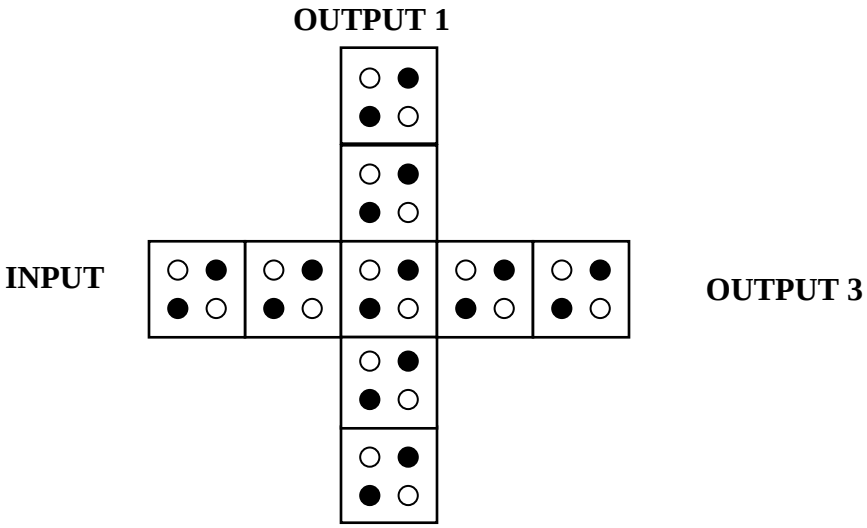
QCA Majority Gate

To implement the inverter or NOT gate, cells are positioned at 45 degrees with respect to each other, and will interact inversely; their polarization is always inverted ("changed to the direct opposite").



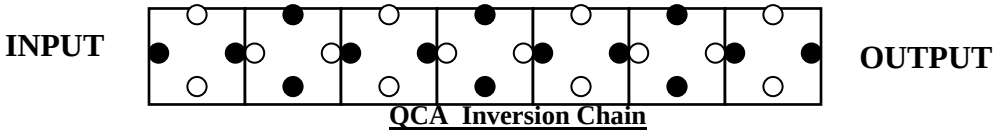
QCA NOT- or Inverter Gate

In a FANOUT, one signal comes in and several copies go out. Each output reflects the input.



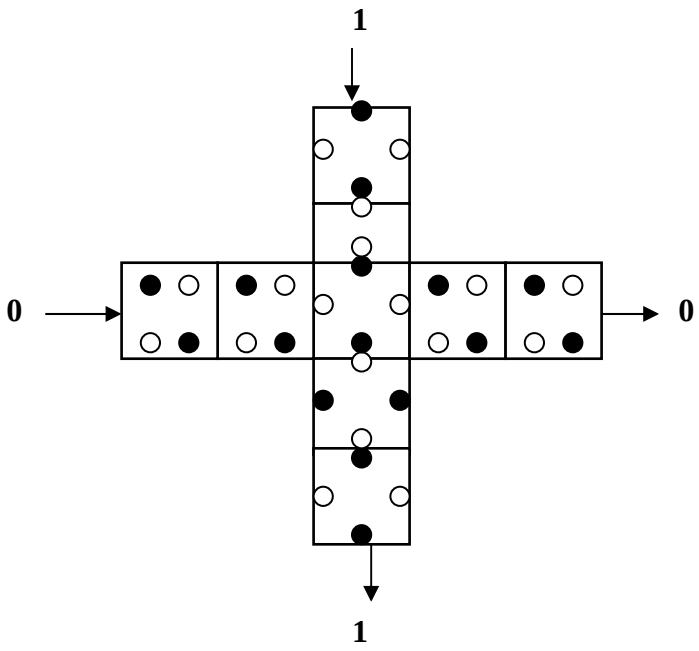
QCA Fanout

When the dots in a cell are rotated 45 degrees, the cells will act inversely. A wire created with these 45-degree cells will form an "inversion chain," where each cell in the chain takes on the opposite polarization of its nearest neighbors.



QCA Inversion Chain

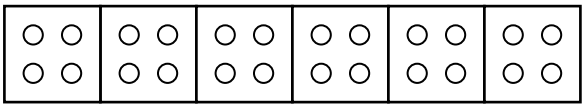
In a QCA crossover, a wire of regular cells crosses a wire of 45-degree cells. Here, the two wires do not interact, meaning that information along one wire will not interact with information along the crossed wire – signals can be crossed directly over each other.



QCA Crossover

Worksheet 1: Complete each diagram with the missing electrons.

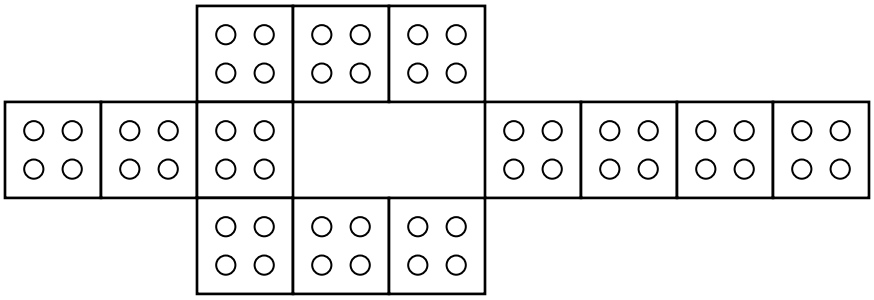
1. **INPUT**



OUTPUT

QCA Wire

2. **1**

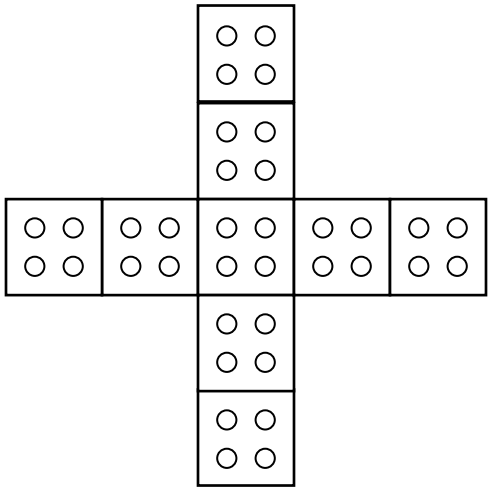


0

QCA NOT- or Inverter Gate

OUTPUT 1

3. INPUT

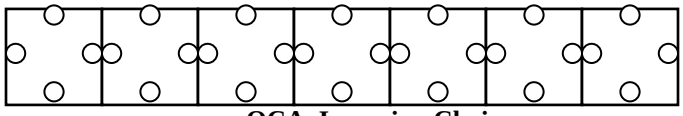


OUTPUT 3

OUTPUT 2

QCA Fanout

4. **INPUT**

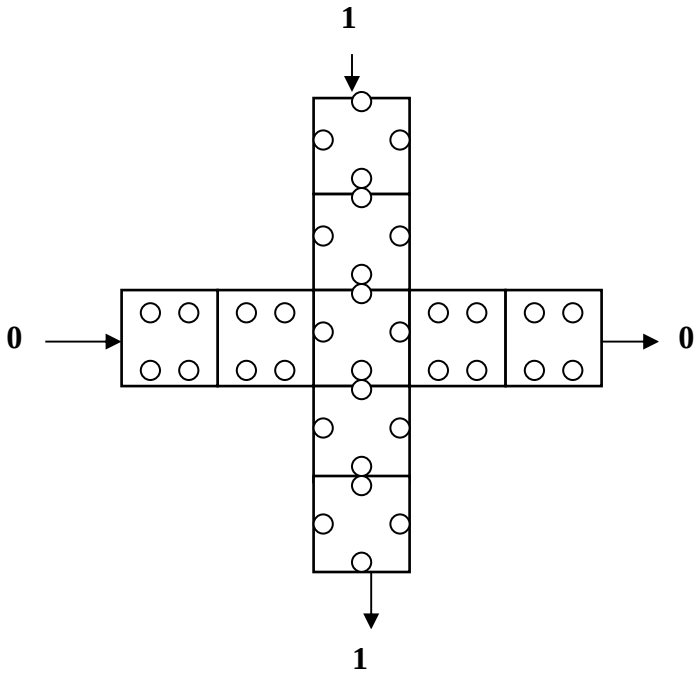


OUTPUT

QCA Inversion Chain

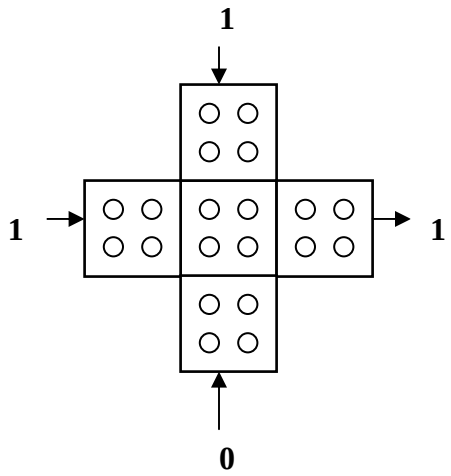
Worksheet 1 - continued

5.



QCA Crossover

6.



QCA Majority Gate

Peer Team Project

- Each team will be responsible for re-creating a QCA-circuit layout.
- Both members of the team will equally share the tasks associated with the project.
- Each team will receive large sheets of paper, sheets with cutout cells, scissors, glue, and a diagram to be re-created. Coloring utensils will be available, if needed.
- The project should be finished by the end of this class period.

Step 1: Decide on how many QCA cells you need of each type.

Step 2: Cut the cells out that you need.

Step 3: Glue the cells on the poster paper, creating your circuit according to the diagram.

Step 4: Fill-in the color of the Quantum Dots for the electrons.

Step 5: Label your diagram.

Step 6: Make sure to write the names of both team members, as well as the class period on the project.

COOPERATIVE - LEARNING GROUND RULES

1. **Cooperate with everyone in your group.**
2. **Give praise liberally.**
3. **Use no put-downs.**
4. **Listen carefully to others.**
5. **Get all ideas out in the open. (There's no such thing as a bad idea!)**
6. **Achieve a group solution for each problem.**
7. **Make sure that everyone understands the solution before continuing.**
8. **Share the leadership of the group.**
9. **Make sure that everyone participates and no one dominates.**

Discussion Log

Name:_____ Period:_____ Date:_____

1. **What I expected to learn today was:**
   _____
   _____
   _____

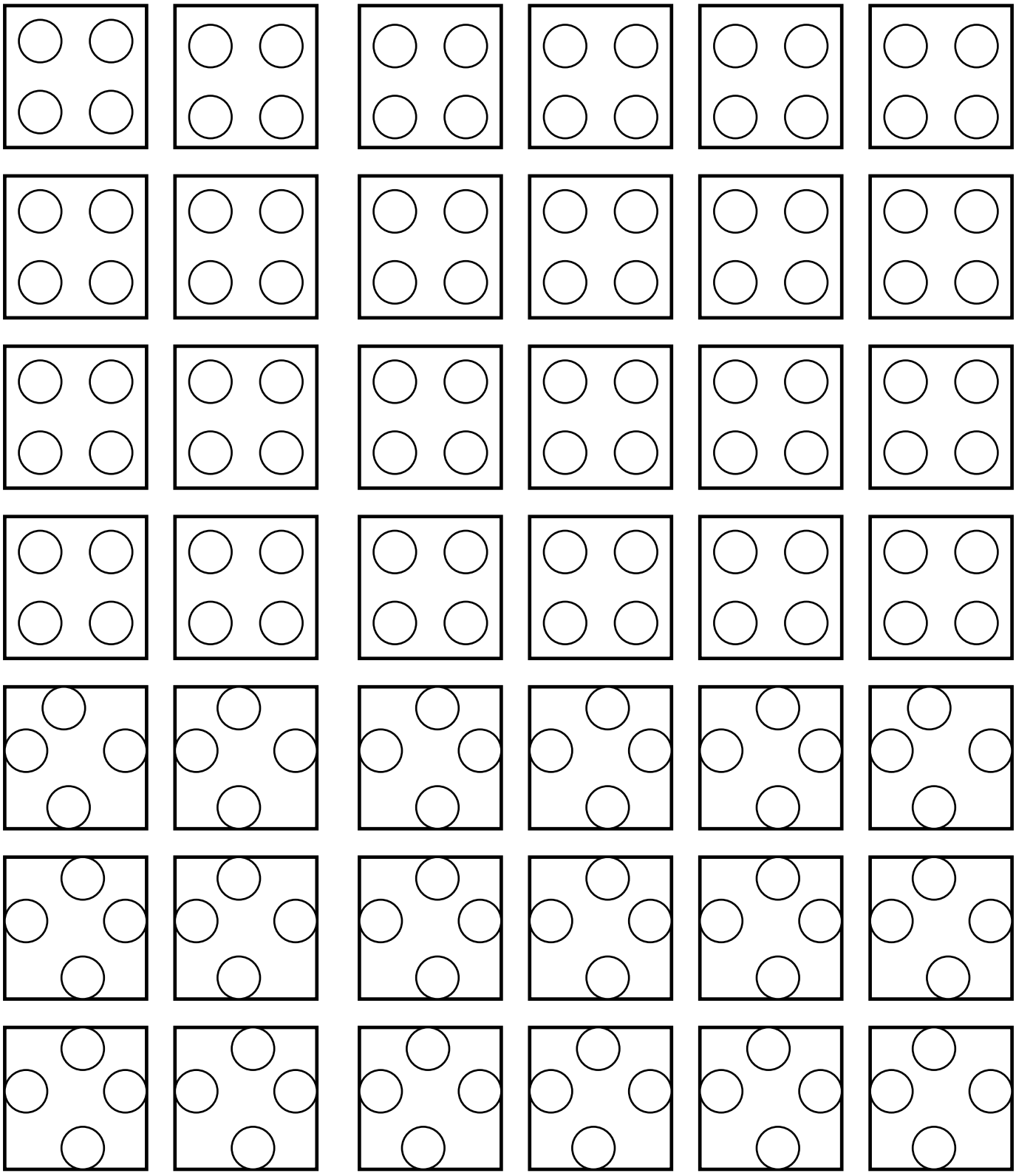
2. **What I would like to know more about nanocomputers is:**
   _____
   _____
   _____

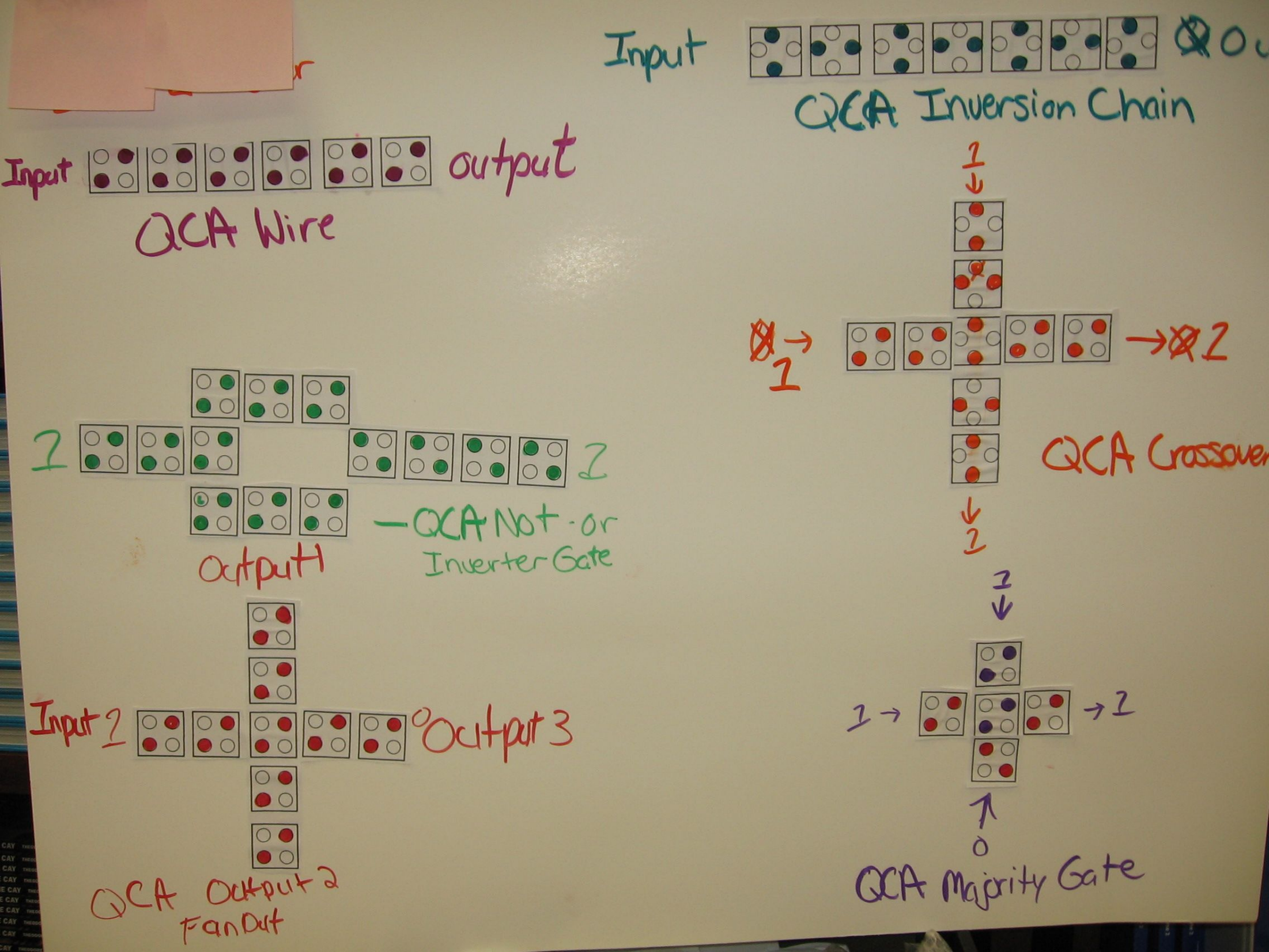
3. **What I have learned from this lesson is:**
   _____
   _____
   _____

4. **What I liked / did not like about the work with my peer was:**
   _____
   _____
   _____

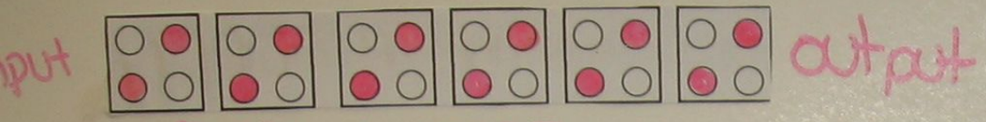
5. **Additional comments or suggestions I would like to make are:**
   _____
   _____
   _____

Cutouts



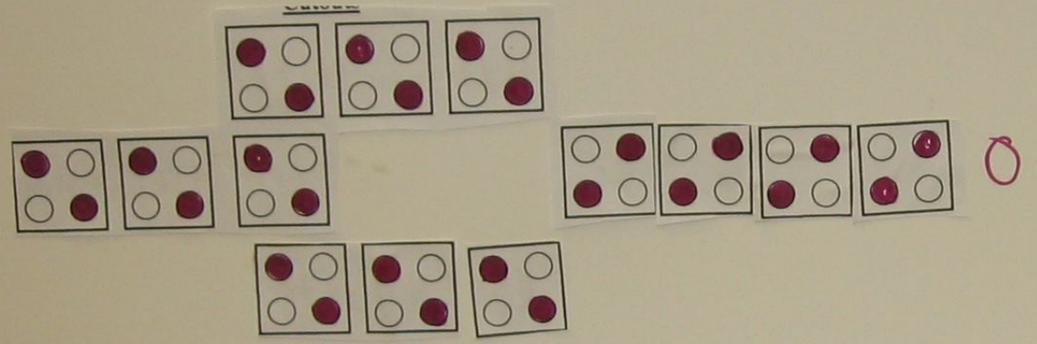

Input
output
QCA Wire
Input
QCA Inversion Chain
1
1
1
QCA Crossover
1
1
QCA Not - or
Inverter Gate
Output
Input 1
Output 3
Output 2
QCA Output 2
FanOut
1
1
0
QCA Majority Gate

1.



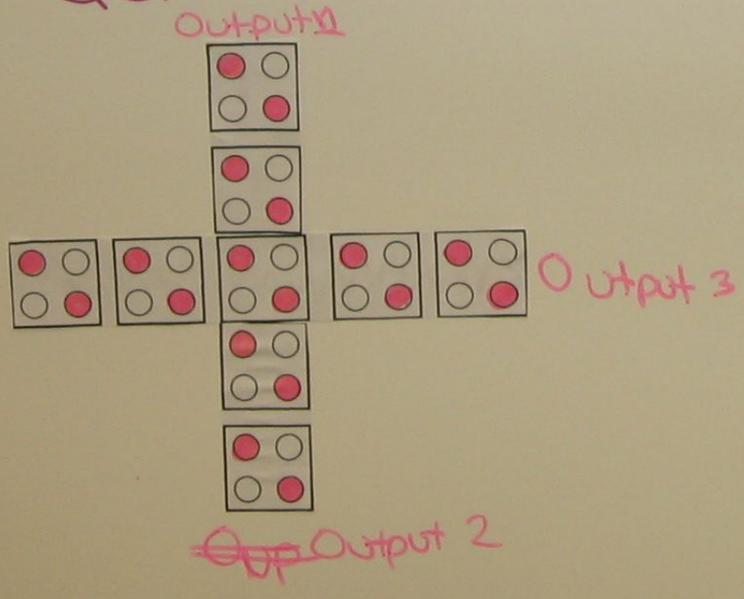
QCA WIRE

2.



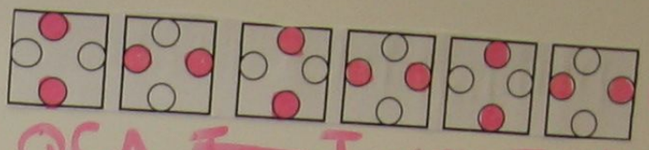
QCA NOT- or Inverter Gate

3.

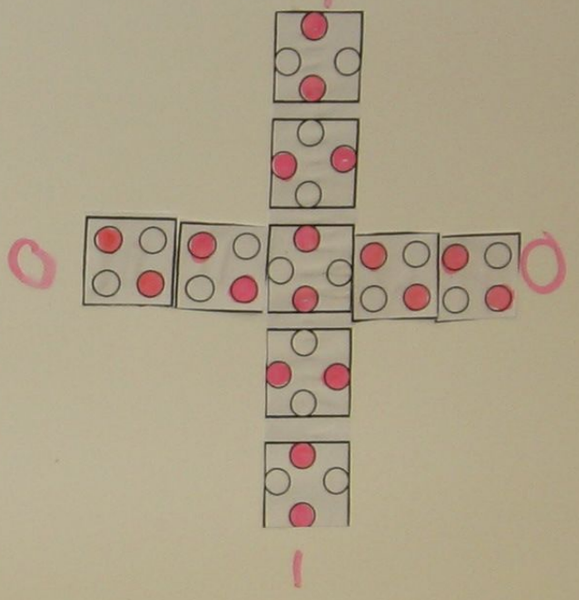


QCA Fanout

4.

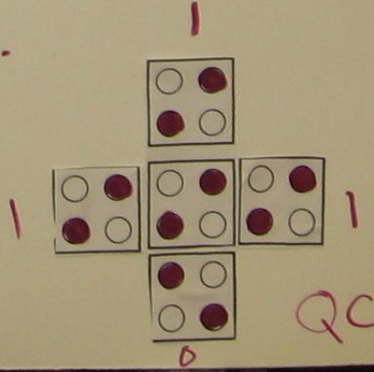


QCA ~~Inverter~~ Inversion Chain



QCA Crossover

6.

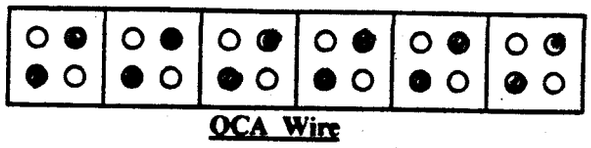


QCA Majority Gate

83/100 3/23/17 R.2

Worksheet 1: **Complete each diagram with the missing electrons.**

1. **INPUT**

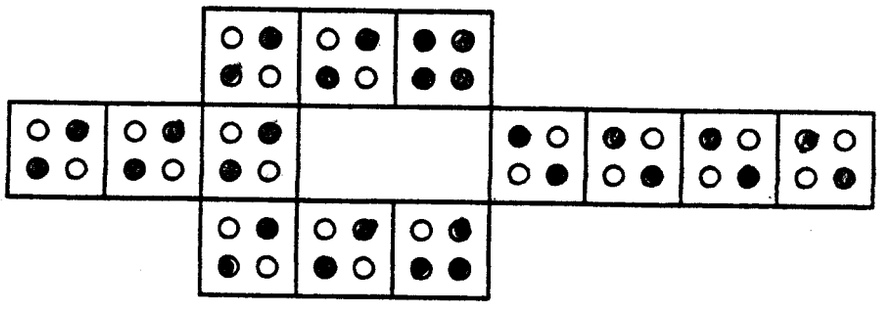


OUTPUT

QCA Wire

-1/4

2. **1**

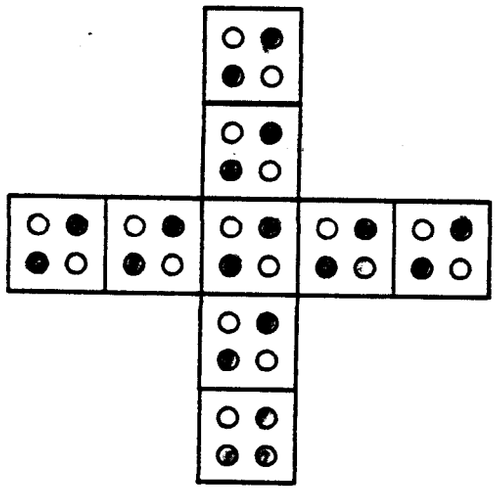


0

QCA NOT- or Inverter Gate

OUTPUT 1

3. **INPUT**



OUTPUT 3

OUTPUT 2

QCA Fanout

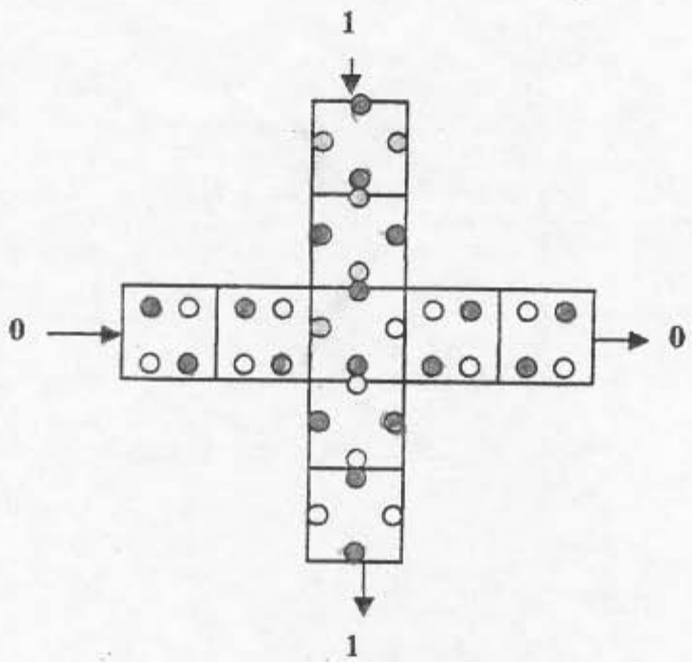
4. **INPUT**

OUTPUT

QCA Inversion Chain

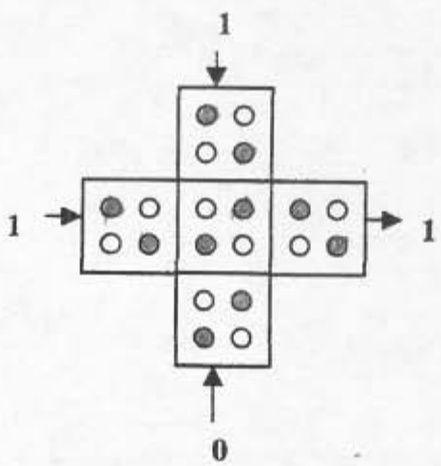
Worksheet 1 - continued

5. $-\frac{1}{2}$



QCA Crossover

6. $-\frac{1}{4}$



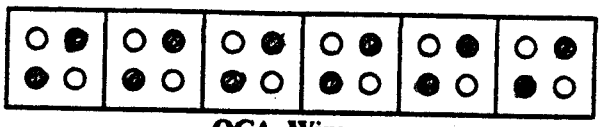
QCA Majority Gate

92/100

2

Worksheet 1: **Complete each diagram with the missing electrons.**

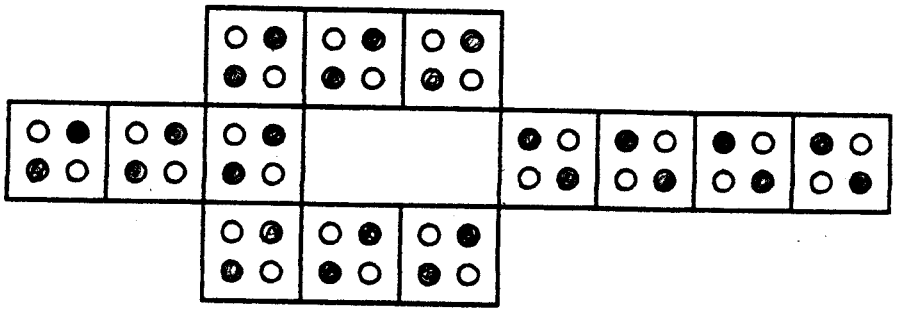
1. **INPUT**



OUTPUT

QCA Wire

2. **1**

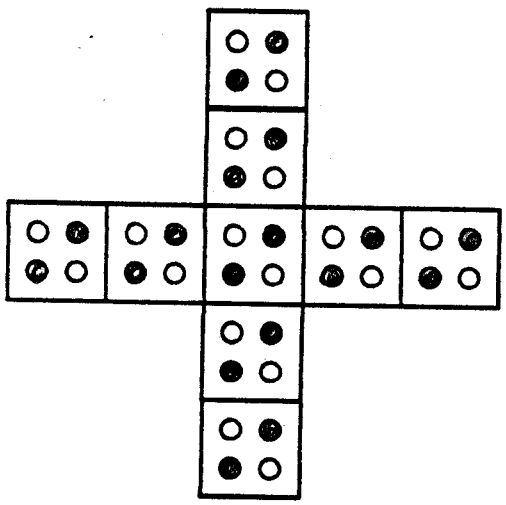


0

QCA NOT- or Inverter Gate

OUTPUT 1

3. **INPUT**

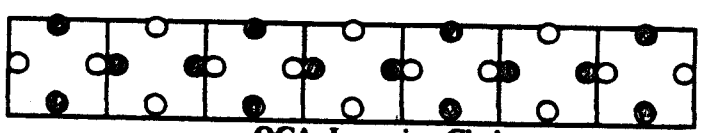


OUTPUT 3

OUTPUT 2

QCA Fanout

4. **INPUT**

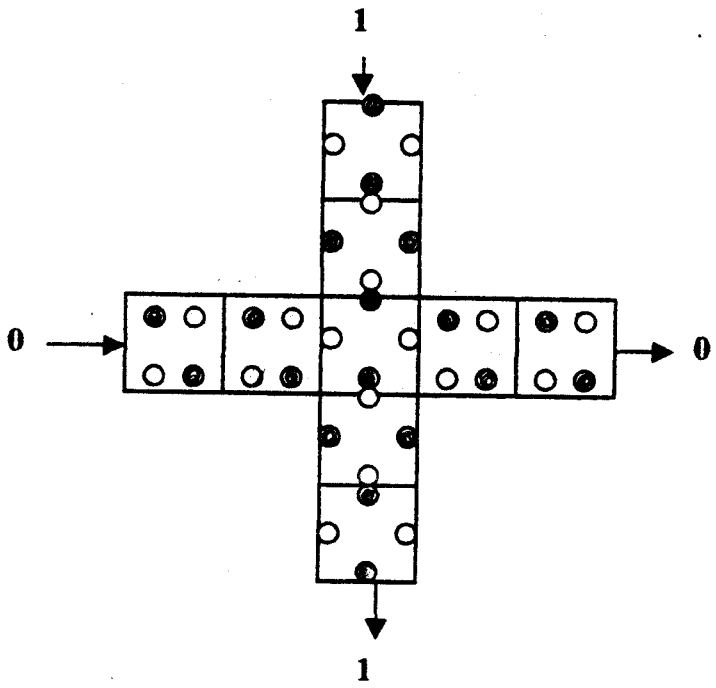


OUTPUT

QCA Inversion Chain

Worksheet 1 - continued

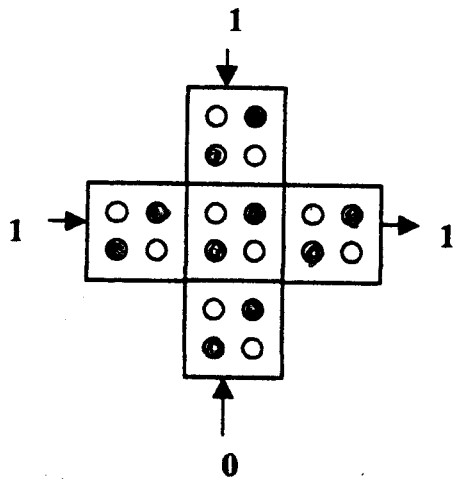
5.



OCA Crossover

$-\frac{1}{2}$

6.



OCA Majority Gate

Discussion Log

Period: 2 **Date:** 3/26/7

1. **What I expected to learn today was:**
   about math equations that we were going to face in the future.

2. **What I would like to know more about nanocomputers is:**
   how do they function

3. **What I have learned from this lesson is:**
   what nanocomputers are.

4. **What I liked / did not like about the work with my peer was:**
   I liked the activities, I did not like

5. **Additional comments or suggestions I would like to make are:**
   that it was a great time of learning.

Discussion Log

N

Period: 1 Date: 3/21/06

1. **What I expected to learn today was:**
I was expected to learn about websites.

2. **What I would like to know more about nanocomputers is:**
How the little dot things in the chips get bigger.

3. **What I have learned from this lesson is:**
The things in the chips have to be as far away from eachother as posible.

4. **What I liked / did not like about the work with my peer was:**
I couldnt really understand her.

5. **Additional comments or suggestions I would like to make are:**
None.

Discussion Log

N Period: 2nd Date: 3-20-07

1. **What I expected to learn today was:**
   learn about computers

2. **What I would like to know more about nanocomputers is:**
   How they process

3. **What I have learned from this lesson is:**
   How nanocomputers work

4. **What I liked / did not like about the work with my peer was:**
   I liked the poster and the activities

5. **Additional comments or suggestions I would like to make are:**
   I had alot of fun

Publication on Active Learning Scenario in VLSI Classes

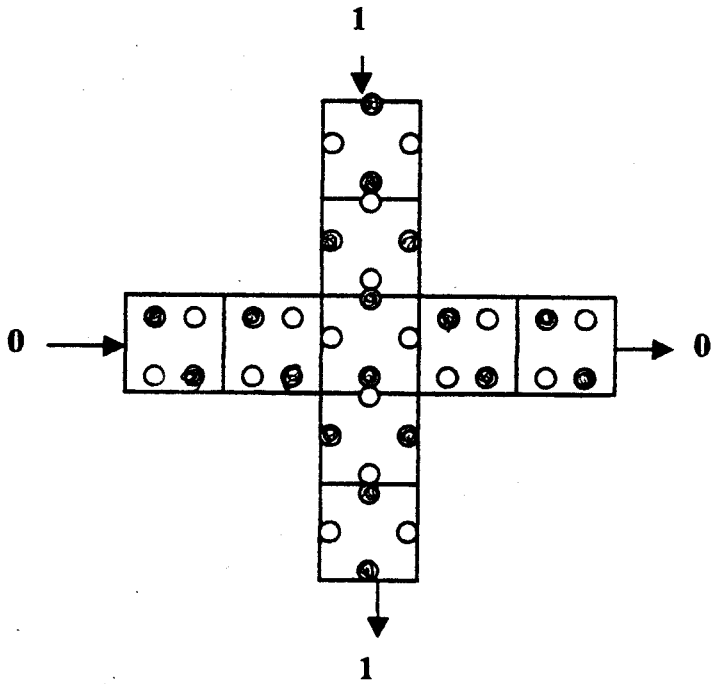
IEEE Frontiers In Education 2006

The Women study is highlighted

0-7803-9077-6/05/$20.00 © 2006 IEEE **October 28 – 31, 2006, San Diego, CA**
36th ASEE/IEEE Frontiers in Education Conference

Worksheet 1 - continued

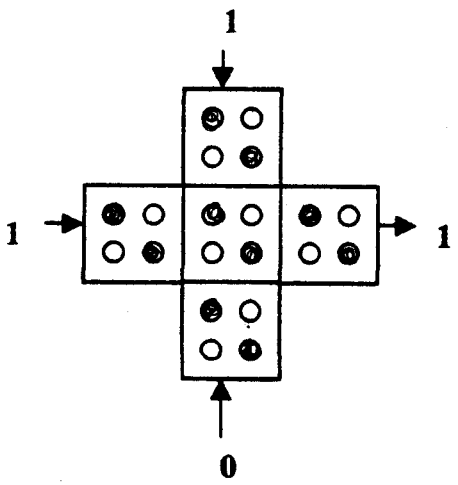
5.



OCA Crossover

$-\frac{1}{2}$

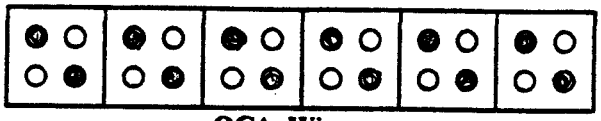
6.



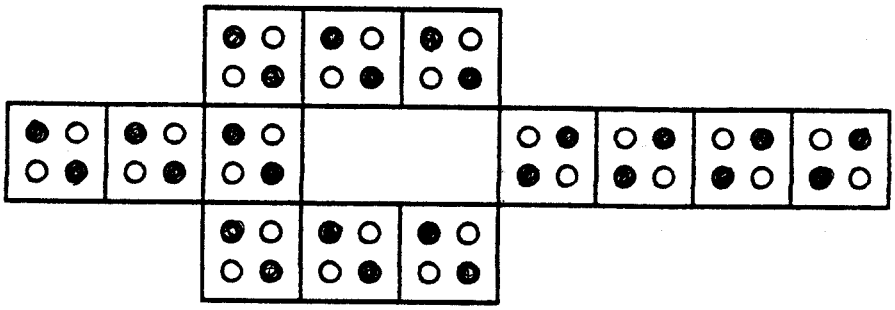
OCA Majority Gate

92/100

Worksheet 1: Complete each diagram with the missing electrons.

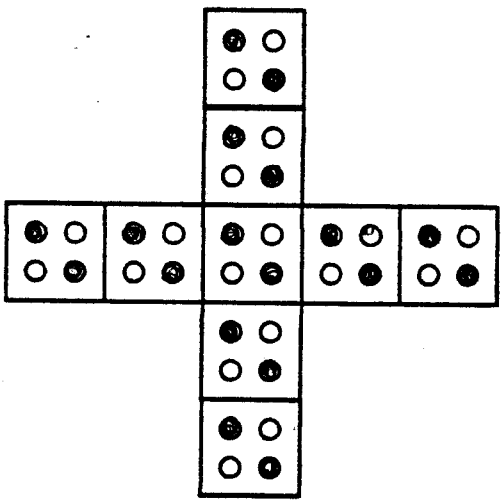
1. INPUT  OUTPUT

QCA Wire

2. 1  0

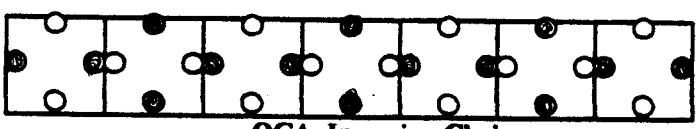
QCA NOT- or Inverter Gate

OUTPUT 1

3. INPUT  OUTPUT 3

OUTPUT 2

QCA Fanout

4. INPUT  OUTPUT

QCA Inversion Chain

WIP- Dominant Sensory Mode based Groups in VLSI Classes

Sanjukta Bhanja
Department of Electrical Engineering,
University of South Florida, Tampa, FL-33620
Email: bhanja@eng.usf.edu

Abstract **- We are working with the hypothesis that active learning is more productive when heterogeneous groups of VLSI hardware students, with different learning styles, interact with each other. The proposal explores instruments to judge the dominant sensory modes of hardware/VLSI engineering students, along with their affinity for logical modules and the underlying physics of semiconductor. Since VLSI course content involves learning from tool manuals, solving problems, and also listening to class lectures, we test for visual, auditory and kinesthetic learning mode. Preliminary result indicates that the heterogeneous groups based on dominant sensory mode yielded 19% better performance than random grouping. Future focus will be on (a) exploring different instruments, (b) evaluating their success in classifying the dominant learning mode and (c) investigating the role of women in the co-operative learning scenario.**

Index Terms – Active Learning, Cooperative Learning, Sensory mode, VLSI Design Education

INTRODUCTION

This work is an on-going attempt to evaluate the success of dominant sensory mode on cooperative active learning for teaching VLSI courses to Computer Engineering students. Cooperative learning [1,2,3] is one of the most effective form of active learning, where students learn by discussing and participating in a group by directly engaging rather than passively depending on the instructor. In this work, we are exploring that role of students' dominant sensory mode [4] on the co-operation and learning of a VLSI student.

We are *currently* using a standard instrument to judge sensory mode [5], but augmented to measure their interest in digital design and physics of semiconductor. Preliminary results show that heterogeneous sensory mode works better than the grouping scheme based on prior familiarity.
We intend to *continue* our work in the three following directions: (1) to explore effective instruments (one that is based on [5] and a VLSI-centric one that we plan to develop) to judge the sensory mode for VLSI students (2) to evaluate various grouping strategies in cooperation, such as heterogeneous vs. homogeneous, on learning and (3) to evaluate grouping schemes for minority students like women additionally with the sensory mode.

OVERALL APPROACH

Hypothesis: Active learning based on dominant sensory mode of a student, enhances understanding in VLSI education. Additionally, active learning scenarios need to be gender sensitive.

In a VLSI design course, we can appeal to three sensory modes for learning: the visual, auditory and kinesthetic modes [4]. We plan to develop a VLSI-centric dominant sensory mode analyzer in the coming semesters. For this new instrument, towards the beginning of the course, three topics are to be selected for activating the three modes. One would be more graphically oriented. The second would be lecture-oriented. And, the final one would be a simple CAD assignment. Based on the performance of each student on these lectures, we would determine individual student's dominant sensory mode. The subgroups would meet before and after assignments, tests, quizzes and project submissions to discuss relevant issues covered in the class or required for the assignments. Performance enhanced has to be judged by statistical analysis over 6 to 8 semesters so as to filter assessment noise and sampling variations.

Women tend to participate less in active learning discussion sessions. The level of confidence affects their interest in discussion [6]. "Women also find it difficult to have their opinion and input heard" [7]. In this study, we would try to evaluate the improvement in women participation not only by paying attention to their sensory mode, but also by experimenting with teams with different gender compositions.

Analysis: The subgroups can be studied thoroughly: What kind of sub-groups generates better participation and understanding of subject material? Would the groups consist of students with similar modes? Or would students of diverse modality in a group facilitate learning? What is the best ratio of *men and women*, that is conducive for women to participate more in a group?
Evaluation: We would interact closely on the set-up and evaluation with Center for Research Evaluation And

Measurement (CREAM), at University of South Florida. Evaluation would be performed using questioning strategy proposed in [8,9] spanning knowledge, comprehension, application, analysis, synthesis and evaluation oriented questions will be used in the quizzes and tests. Assessment of success would be made based on (i) pre and post assignment quiz, (ii) student portfolio, consisting of assignments, quizzes, learning diary, and experience statements, and (iii) post assignment discussions.

PRELIMINARY APPROACH AND RESULTS

We have already explored an established instrument for judging dominant learning style [5]. This instrument is based on questionnaires on individual preference in the dominant learning mode, visual, auditory and kinesthetic. A few example questions are: "Do I learn to spell better by repeating words out loud than by writing the words on paper?" (auditory) or "Am I good at working and solving jigsaw puzzles and mazes?" (visual) or "Can I remember best by writing things down several times?" (kinesthetic). On each questions, students were asked to answer by three qualitative choices: "often", "sometimes" and "seldom". The scoring schemes [5] categorize questions into three sensory modes and we scored "often" as 5 points, "sometimes" as 3 points and "seldom" as 1 point. We then tabulated the scores for all the questions that are grouped into one particular sensory mode to judge the student's own perception of his/her learning modes. We sorted the scores of the student in three learning mode and choose mode that gathered the highest point as *dominant sensory mode*.

We also augmented the questionnaire by asking the students to assess their own affinity towards logic design and device semiconductor physics. We also scored based on similar qualitative choices ("Very interest", "somewhat interested" and "not interested"). The scores of 5, 3 and 1 points were assigned to the above choices respectively.

We used the above instrument successfully in heterogeneous grouping, both based on dominant learning mode and students' affinity for logical module versus physical understanding of devices. Our primary effort was to have as diverse group as possible with respect to dominant sensory modes and also to ensure that each group has students that are good in both logical design and semiconductor physics. The subgroups actively discussed relevant topics and issues before and after assignments, tests, quizzes and project submissions. In an earlier semester, we offered the same course, but the grouping schemes were based on students' choice of partners based on prior familiarity.

Preliminary study shows that this grouping scheme resulted in

- almost *19* % better performance than students finding their own partners based for prior familiarity. The performance improvements were based on final project scores. The standard deviation of the scores remained virtually the same for both classes, with 8.2% reduction in variability (σ/μ), where μ and σ are the mean and standard deviation of scores.
- female students in the class (*30* % of the class) showed dominant auditory skills over men: the scores were higher in auditory questions over visual and kinesthetic. Based on the scoring scheme, the visual learning mode was better for men than women.

Based on preliminary results, we feel that the instruments as well as course module for heterogeneous active-learning groups, would promote VLSI learning significantly. Our ongoing effort is on evaluating the learning inventory that we used [5] versus a new instrument that is specifically targeted towards VLSI students involving the selection of three types of course materials -- (1) graphically oriented, (2) lecture-oriented and (3) hands-on CAD assignments -- each activating the three main learning modes, visual auditory, and tactile, respectively. The current instrument relies on students' own perception about their learning mode. One interesting point to evaluate would be to judge the correlation of self-perception of one's own dominant learning modes with that captured by the instrument that we would develop.

DELIVERABLES

Deliverables from this study would consist of (i) course materials for identifying the sensory modality, (ii) quizzes and hand-outs to judge sensory mode, (iii) statistical analysis of the above quizzes over three/four years, (iv) assignments, quizzes and tests in general for the entire course, and (v) discussion logs. *The deliverables will be relevant for undergraduate and graduate students and instructors in digital design courses like CMOS/VLSI, Logic, Architecture and Advanced Digital System.*

REFERENCES

[1] J. L. Cooper and P. Robinson, "Getting started: Informal small-group strategies in large classes," *New Directions for Teaching and Learning*, vol. 81, pp. 17–24, 2000.

[2] I. Rubin and C. Hebert, "Model for active learning: Collaborative peer teaching.," *Cooperative Learning and College Teaching*, vol. 46, no. 1, pp. 26–30, 1998.

[3] M. Towns, "How do I get my students to work together? getting cooperative learning started," *Chem. .Engr. Education*, vol. 75, no. 1, pp. 67–69, 1998.

[4] R. Dunn, ``Understanding the dunn and dunn learning styles model and the need for individual diagnosis and prescription," *Reading, Writing and Learning Disability*, vol. 6, no. 30, pp. 223--247, 1990.

[5] Learning Style Inventory, http://rrcc-online.com/~psych/lsinventory.html, Last accessed 05/17/2006.

[6] J. Gallos, "Gender and silence: Implication of women's way of knowing," *College Teaching*, vol. 43, no. 3, pp. 101–105, 1995.

[7] J. Margolis and A. Fisher, "Unlocking the clubhouse: women in computing," *MIT Press*, 2002.

[8] B. B. S., *Taxonomy of Educational Objectives, Handbook I: The Cognitive Domain*. New York: DavidMcKay Co Inc, 1956.

[9] J. McTighe, "Questioning for quality thinking," tech. rep., Mimeographed Baltimore: Maryland State Department of Education, Division of Instruction,, 1985.

PROFESSIONAL SERVICES

5. IEEE WIE National Symposium on Emerging Technology WieNSET –2007, on 29-30 June.

On June 29-30, 2007 IEEE WIE Calcutta Section organized a very successful two days National Symposium at West Bengal University of Technology, Salt Lake City, Kolkata, in association with IEEE Calcutta Section and WBUT.
About 200 participants (students, research scholars of engineering, young engineering graduates, faculties and professionals) from different Engineering Colleges,

Universities, Industries were attended the Symposium, among them about 60% were female participants.

WIE were honored with the presence of our invited guests Prof. Debesh Das, Minister-in-Charge, IT Govt. of West Bengal, Prof. S. K. Sanyal - Vice Chancellor, Jadavpur University, Prof. A. R. Thakur - Vice Chancellor, WBUT, Mr. Debanjan Dutta, MD & CEO of Webel and Prof. Salil K. Sanyal, Chair IEEE Calcutta Section for the inaugural session. Dr. Iti Saha Misra, WIE Chair, Calcutta Section delivered the welcome address and Dr. Gargi Keeni, General Chair, WieNSET- 2007, delivered her speech about WieNSET.

The symposium was enriched by the excellent keynote speeches and invited talks of many eminent speakers from academia and industry including eminent women Engineers.

- Vasantha Erraguntla, Intel Corp. *(Core Design)* Keynote I (F)
- Basabi Bhaumik, IIT, Delhi, *(Brain Modelling)* Keynote II (F)
- Bhargab B. Bhattacharya, ISI, Kolkata, *(Digital Geometry)* Keynote III
- Sudeshna Sarkar, IIT, Kgp, *(AI)* Invited Talk I (F)
- Siddhartha Sen, IIT, Kgp, *(MEM's)* Invited Talk II
- Sanjukta Bhanja,Univ. of South Florida, *(Nano Computing)* Invited Talk III (F)

Out of 60 submitted papers, 24 Technical papers were accepted for presentation, 19 papers (79%) were authored or co-authored by women, in Poster Session, out of 11 papers 4 papers (36%) were contributed by women as author or co-author. There was a session for Technical Design Model Contest both from hardware and software designing area. About (43%) 3 designs were contributed by women Engineers out of 7 design models.

A panel discussion on the topic "*Challenges of women participation in workforce – is it the educational system, the social environment or the technical*

inclination?" was the much attractive part of the Symposium where eminent personalities like Prof. Indira Ghosh, Bioinformatics Centre, Pune, Prof. Tapan Ghosal, Jadavpur University, Kolkata, Ms. Roshni Sen, Joint Secretary, South 24 Parganas, Prof. Jasodhara Bagchi, Chairperson State Women Commission, Ex-Prof, Women Studies, Jadavpur University, Prof. Jaba Guha, Ex-prof, Economics, Jadavpur University and Dr. P.P. Das, Interra Systems (India) Limited, Salt lake participated. They focused mainly on the confrontation and hardships that woman of today face inside and outside their home. As workingwomen need to take double role both at home front and work place that sometimes pull back her from the top position at professional life. Glass ceiling is another problem for women professionals to be in the highest position of an organization discussed by Prof. Jaba Guha. Social awareness, equality and respect may be only the driving force to enhance women participation in workforce. Above all self-attitude towards professional duties may make substantiate difference in career profile that is pointed out by Prof. Indira Ghosh and Ms. Roshni Sen.

The most awaited and useful part of the Symposium was the career guidance program for students and young participants. People from Intel, BARC, Price Waterhouse Coopers, ISRO, DIT, Nicco Venture and Ekta Incubation Centre took active participation. It was of much help to the students who are at the onset of entering into their professional world.

GLSVLSI 2009

Boston, Massachusetts, May 10-12, 2009

http://www.glsvlsi.org/

Sponsored by ACM SIGDA, with Technical Support of IEEE*: CEDA and CASS

The 19th edition of GLSVLSI will be held in Boston, Massachusetts. Original, unpublished papers, describing research in the general area of VLSI are solicited. Both theoretical and experimental research results are welcome. Proceedings will be published by the ACM and will be available through the ACM Digital Library and IEEE Xplore. For detailed information, visit http://glsvlsi.org/.

Program Tracks:

- *VLSI Design*: design of ASICs, microprocessors/micro-architectures, embedded processors, analog/digital/mixed-signal systems, NoC, interconnects, memories, and FPGAs.
- *VLSI Circuits*: analog/digital/mixed-signal circuits, RF and communication circuits, chaos/neural/fuzzy-logic circuits, high-speed/low-power circuits, arithmetic circuits.
- *Computer-Aided Design (CAD)*: hardware/software co-design, logic and behavioral synthesis, logic synthesis and technology mapping, simulation and formal verification, layout (partitioning, placement, routing, floorplanning, compaction), buffer insertion, CAD for datapath synthesis, algorithms and complexity analysis.
- *Low Power and Power Aware Design*: circuits, micro-architectural techniques, thermal estimation and optimization, power estimation methodologies, and CAD tools.
- *Testing, Reliability, Fault-Tolerance*: digital/analog/mixed-signal testing, design for testability and reliability, test vector compression, silicon debug and diagnosis, online testing techniques, static and dynamic defect- and fault-recoverability, and variation-aware design.
- *Emerging Technologies*: 3D integration, probabilistic architectures, optical interconnects, microfluidics, CNT, SET, RTD, QCA, VLSI aspects of sensor and sensor network, and CAD tools for emerging technology devices and circuits.
- *Post-CMOS VLSI:* evolutionary computing, optical computing, quantum computing, reversible logic, spin-based computing, biological computation, nanotechnology, molecular electronics, quantum devices, biologically-inspired computing. Emphasis should be on the analysis, novel circuits and architectures, modeling, CAD tools, and design methodologies.

Paper submission deadline:	**November 30th, 2008**
Special session proposals deadline:	**December 20th, 2008**
Acceptance notification:	**February 5th, 2009**
Camera-ready paper due:	**March 3rd, 2009**

Paper Submission: Authors are invited to submit full-length (6 pages maximum), original, unpublished papers along with an abstract of at most 200 words. To enable blind review, the author list should be omitted from the main document. Previously published papers or papers currently under review for other conferences/journals should not be submitted and will not be considered. Electronic submission in PDF format to the **http://www.glsvlsi.org** website is required. Author and contact information (name, street/mailing address, telephone, fax, e-mail) must be entered during the submission process.

Paper Format: Submissions should be in camera-ready two-column format, following the ACM proceedings specifications located at:
http://www.acm.org/sigs/pubs/proceed/template.html
and the classification system detailed at: **http://www.acm.org/class/1998/**

Paper Publication and Presenter Registration: Papers will be accepted for regular or poster presentation at the symposium. Every accepted paper MUST have at least one author registered to the symposium by the time the camera-ready paper is submitted; the author is also expected to attend the symposium and present the paper.

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GLSVLSI 2008

Orlando, Florida, May 4-6, 2008

http://www.glsvlsi.org/

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The 18th edition of GLSVLSI will be held in Orlando, Florida. Original, unpublished papers, describing research in the general area of VLSI are solicited. Both theoretical and experimental research results are welcome. Proceedings will be copyrighted and published by the ACM. Published papers would also be accessible through ACM digital library.

Program Tracks:

- *VLSI Design*: design of ASICs, microprocessors and micro-architectures, embedded processors, analog/digital/mixed-signal systems, multi-chip modules, FPGAs.
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- *Testing, Reliability, Fault-Tolerance*: digital/analog/mixed-signal testing, design for testability and reliability, online testing techniques, static and dynamic defect- and fault-recoverability, and variation-aware design.
- *Emerging Technologies*: nanotechnology, molecular electronics, quantum devices, biologically-inspired computing, single electron transistors, resonant tunneling devices, VLSI aspects of sensor and sensor networks, and CAD tools for emerging technology devices and circuits.

Paper submission deadline: December 7, 2007
Acceptance notification: January 15, 2008
Camera-ready paper due: February 14, 2008

Paper Submission: Authors are invited to submit full-length (6 pages maximum), original, unpublished papers along with an abstract of at most 200 words. To enable blind review, the author list should be omitted from the main document. Previously published papers or papers currently under review for other conferences/journals should not be submitted and will not be considered. Electronic submission in PDF format to the **http://www.glsvlsi.org** website is required. Author and contact information (name, street/mailing address, telephone, fax, e-mail) must be entered during the submission process.

Paper Format: Submissions should be in camera-ready two-column format, following the ACM proceedings specifications located at:
http://www.acm.org/sigs/pubs/proceed/template.html
and the classification system detailed at: **http://www.acm.org/class/1998/**

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