April 2000

Rock River Valley Section
www.ieee.org/regional/section/rock_river/

Event Sense

The Institute of Electrical and Electronic Engineers, Inc.

Computer/Control Systems & RRV Section Meeting

Genetic Algorithms

When
April 27, 2000

Where
Rock Valley College, Technology Center, Room 117. I-90 to Riverside Blvd., exit and go west to Mulford Rd. Go south to first light, turn east into RVC. Follow road to left to last building.

Agenda
6:00 PM Social
6:30 PM Dinner
7:30 PM Program

Program
The Chrysler plant tour we had hoped to do was nixed due to Daimler Chrysler's no tour policy. Sorry it didn't work out.

Genetic algorithms are general purpose search algorithms that use principles inspired by natural population genetics to evolve solutions to problems. The basic idea is to maintain a population of knowledge structures that represent candidate solutions to the current problem. The population evolves over time through competition (survival of the fittest) and controlled variation (replication and mutation). Theoretical analyses have shown that genetic algorithms exploit the knowledge accumulated during search in a way that efficiently balances the need to explore new areas of the search space with the need to focus on high-performance regions of that space. By extracting these processes from the specific context of genetics, the algorithms can be applied to a wide range of optimization and learning problems including routing and scheduling, hydrogenerator control, engineering design optimization, gas pipeline control systems , and machine learning. Genetic algorithms have also been widely used for learning both the topology and the weights of neural networks.

Electric power in an HG is produced as the turbine converts water flow and pressure to turbine torque and speed, and the generator converts turbine torque and speed to electrical power and frequency. The control objective is to maintain the turbine speed, and thus electrical frequency, as constant as possible despite variations in power demand, water supply characteristics, and other system nonlinearities. This task is accomplished by actuating the wicket gates to adjust the direction and the amount of water impinging on the turbine blades. Aggravating the control problem are system dynamics that are nonlinear, time-varying and non-minimum phase. The nonlinear effects are due to the turbine gain, which varies with the position of the gates. The time-varying effect is due to fluctuations in the level of the supply reservoir and to the dynamic nature of the load. The non-minimum phase behavior occurs because the water pressure is in instantaneous opposition to the motion of the wicket gates, which causes turbine torque to momentarily increase when the position of the gates is commanded to decrease. This study deals with the identification problem using hydrogenerator plant data.

Speaker
Chris Wrate obtained the AAS Electronics Technology at Rock Valley College in 1983, the BSEE at U of I in 1985, the MSEE at U of I in 1996 focusing on the area of Digital Control Systems.

Chris served 5 years active duty in the US Navy as a nuclear trained, submarine officer. He continued to serve as an Officer in the Naval Reserves for 9 years and currently works in the Naval Sea Systems Command Crane facility reserve unit as an Engineering Duty Officer. Chris has worked for a number of other companies including: Wisconsin Electric Power Company, Nuclear Power Department, Point Beach Nuclear Plant; Patent Examiner - US Patent and Trademark Office; Design Engineer - Siebe Environmental Controls. Currently Chris is a Design Engineer at Gammaflux LLP, designing microprocessor based temperature control systems for hot-runner plastic injection molding machines.

Door Prizes
Sponsored by RRVS

Meal
Dinner will be buffet style (with a min. of 15) and will consist of chicken, veggies, salad, dessert. Please reserve your space and make your meal reservations by calling **Jennifer at 815-753-9974 by Monday, April 24, (please include your e-mail address)**. The cost of the **dinner** is **$5** for IEEE **members** and **$14** for **non-members**. Unemployed members may call one of the officers for special arrangements.

Note
The meeting is open to the general public. You need not be an IEEE member. Guests are welcome. However, please call to enable us to make appropriate arrangements.

March RRVS Motorola Harvard Tour Recap

After three years of trying, we were finally successful at arranging a tour of the Motorola Harvard facilities, the largest cellular operation in the US. It was definitely worth the wait.

The facility opened in 1996 and occupies 1.5 million square feet! This is a state-of-the-art facility complete with on-site daycare, a fitness center and a wellness education program.

The plant runs two shifts, 24 hours a day, 365 days a year. It produces about 60,000 cell phones per day, which translates to almost 22 million per year. It employs almost 6,000 employees (they have a lot of open reqs right now!).

Key functions that operate out of this facility are Next Generation Phone Design, Business Planning, Manufacturing, and 5 highly automated distribution lines.

Cell Phone technologies manufactured in Harvard include Analog flip, flipless, and mobile; CDMA flip and flipless; TDMA flip and flipless; and GSM flip and flipless. This site is an example of the famous Motorola quality manufacturing prowess with the operations achieving 3.1 defects per million.

The RRVS attendees extend a heartfelt thanks to Robin Crawford and the rest of the Motorola crew that did an awesome job feeding, informing and touring us through several of the manufacturing and distribution lines. We were able to walk alongside and view two StarTac manufacturing lines, including double-sided printed circuit board component placement and wave solder, assembly into the cell phone casing, and test. Some of the component pick and place machines were so fast that they defied the eye's ability to track them!

We also send a hearty thank you to Jody Metcalf for her help in arranging the tour.

It was nothing less than a spectacular, memorable experience.

May RRVS Meeting Preview

The annual RRVS election and picnic will comprise the agenda for the May meeting. This is the free barbecued steak dinner out at Hamilton Sundstrand Park with lots of assorted accompaniments. Come out and join us this year for food, networking and election of RRVS officers for the 2001 calendar year.

Regional Conference

This is an announcement for the First IEEE Electro/ Information Technology Conference to be held at the Chicago Marriott O'Hare, June 8-11, 2000. For more information please visit the conference website:

www.ewh.ieee.org/reg/4/eit2000.htm

Submissions to *Event Sense*

Send articles and job ads to the *Event Sense* editor, Bob Parro, via e-mail (preferred), or fax. Job ads will run for two consecutive months. Contact the *Event Sense* editor if the ad needs to run longer. Please make submissions by the twenty-fifth of the month. All submissions are subject to editing for style, clarity, and space considerations.

e-mail: b.parro@ieee.org

1999-2000 IEEE RRVS Executive Committee

Prof. Don Zinger
Chair,
NIU St Br Counselor
d.zinger@ieee.org
815-753-0540

Chris Wrate
Vice Chair,
Membership Chair
cwrate@compuserve.com
815-633-7400

Matt Zimmer
Secretary,
IAS Chptr Vice Chair
m.zimmer@ieee.org
815-394-3456

Larry Wachowiak
Treasurer
l.wachowiak@ieee.org
815-397-9090

Bob Parro
Joint Computer/Control
Systems Chapter Chair,
Newsletter Editor
b.parro@ieee.org
815-877-6670

Vietson Nguyen
PELS Chapter Chair
vnguyen@ieee.org
815-394-3230

Jim Buerosse
IAS Chapter Chair
j.buerosse@ieee.org
815-226-6078

Joe Etminan
Educational Activities Chair
joee@ednet.rvc.cc.il.us
815-654-5514

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Messages for student officers can be left at the NIU Dept of Electrical Engineering,
(815) 753-9974 or e-mail at sb.niu@ieee.org

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Rock River Valley Section
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Calendar

April Section Meeting ..... Apr 27
Genetic Algorithms at Rock Valley College

May Section Meeting ..... May 25
Section Elections and Picnic—Hamilton Sundstrand Park

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Established 1995

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