Seminar: Expert Systems Applications in Power Plants

Sponsored by
ELECTRIC POWER RESEARCH INSTITUTE
Palo Alto, California

Hosted by
Boston Edison Company
and
Niagara Mohawk Power Corporation

May 27 - 29, 1987
The Lafayette Hotel
Boston, Massachusetts
Seminar on Expert Systems Applications in Power Plants

BACKGROUND

Engineering, operation, and maintenance of fossil and nuclear power plants require application of expertise in many engineering disciplines. Typically, the expertise required to find the solution to a given technical problem is acquired through many years of experience in power plant equipment design, operation, monitoring, analysis, and control. Such experience is available among a small number of "experts" in the power industry. Maintaining this expertise of field engineers and power plant operators is a major challenge to the power industry.

Expert Systems or Artificial Intelligence (AI) technology enables the knowledge of the experts to be captured in symbolic computer language. When the expert consultation is not readily available, these computer programs can help the plant staff diagnose equipment malfunctions. The expert system software can duplicate the line of reasoning used by human experts and the users can interactively follow and question the reasoning process before taking desired corrective actions.

Although relatively new to power plants, AI techniques have been used in applications outside the electric power industry for many years. The technology for building expert systems already exists in the form of expert system "shell" computer programs. These programs permit application-specific knowledge to be programmed in an English-like symbolic language in the form of "rules" that are easily understood by non-computer specialists. Expert System shells have been developed for a wide range of computers, from computers built specifically for AI applications to desk-top personal computers. Specific applications are now available or under development to address a number of problems of interest to power plant personnel.

OBJECTIVES

The objectives of this seminar are to:

- Conduct working groups that discuss specific topics related to expert systems and define needs for EPRI-sponsored activities in this area

WHO SHOULD ATTEND

Technical managers and utility engineers responsible for plant performance and operations, equipment maintenance, diagnosis and controls; engineering consultants; expert systems developers; and vendors will find this seminar beneficial.

EXHIBIT

The conference will be supplemented with an exhibit that demonstrates a representative selection of EPRI and commercially developed products using expert system technology. Many of the products on display at this exhibit will also be the subject of papers presented in the technical sessions.

ONSITE MATERIALS AND PROCEEDINGS

Each attendee will receive a three-ring binder with a copy of the papers presented at the conference.

In addition to this agenda, a few papers (from the United Kingdom, France, Czechoslovakia, Switzerland, etc.) have yet to be confirmed for presentation. A final agenda will be distributed at the meeting.

TECHNICAL INFORMATION

For technical information regarding the seminar, please contact:

S. Murthy Divakaruni       David Cain
EPRI, Project Manager     EPRI, Project Manager
(415) 855-2409            (415) 855-2112

Bjorn Frogner
Vice President
Expert-EASE Systems
(415) 593-3200

LOCATION

The seminar will be held at the Lafayette Hotel, 1 Avenue de Lafayette, Boston, Massachusetts, 02111. (617) 451-2600
Agenda

Tuesday, May 26, 1987
Registration (5:00 to 6:30 p.m.)

Wednesday, May 27, 1987
Registration (7:30 a.m., Ballroom Foyer)

Session 1: General (8:30 to 10:00 a.m.)
- Introduction
  S.M. Divakaruni, EPRI and E. Haddad, Boston Edison Co.
- Welcome Address
  C. Daley, Vice President, Boston Edison Co.
- Expert System Technology - An EPRI Perspective
  S.M. Divakaruni, J. Scheibel, and A.F. Armor, EPRI
- EPRI Projects: Technical Progress Update
  D. Cain and B. Sun, EPRI

Session 2: Expert System Technology
(10:00 a.m. to 12:00 noon)
Chairpersons: J. Scheibel, EPRI
  S. Little, Boston Edison Co.
- Session Keynote: Utility Perspective of Artificial Intelligence
  C. Saylor, Niagara Mohawk Power Corp.
- Tutorial: Development and Application of Expert Systems
  - Selecting Expert Systems Applications
    D. Cain, EPRI
  - Expert System Tools
    L. Lidsky, M.I.T.
  - Building an Expert System
    S.M. Divakaruni, J. Scheibel, EPRI

Lunch (12:00 noon to 1:30 p.m.)
Luncheon Speaker: K. Yeager
  Vice President & Director
  Coal Combustion Systems Division
  EPRI

Session 3: Expert Systems Applications for Power Plant Operations (1:30 to 5:30 p.m.)
Chairpersons: C. Saylor, Niagara Mohawk Power Corp.
  H. Roman, Public Service Electric & Gas Co.
- An Expert System Technology for Work Authorization Information System
  J. Munchausen*, K. Glazer, Southern California Edison Co.
- AI-Aided Operation Guidance System in Thermal Power Station
  H. Takaoka, S. Aoki, K. Kawai, H. Masuyama, Toshiba, Ltd. (Japan)
- A Scheduling Support System Based on Fuzzy Inference for Startup of Fossil Power Plants
  H. Matsumoto, Hitachi, Ltd. (Japan)
- Artificial Intelligence: Applications in Water Chemistry
  D. Sopocy, Sargent and Lundy Engineering Co.
- The WELDER Expert System
  R. Antinoja, Bechtel National Corporation

Registration

Seminar on Expert Systems Applications in Power Plants

The seminar will be held at the Lafayette Hotel in Boston, Massachusetts (617) 451-2600. To make your room reservation, please send the enclosed hotel reservation card directly to the hotel.

To qualify for the negotiated room rate of $115 single or double occupancy, you must make your reservation by April 26, 1987. After this date our block of rooms will be released for public sale.

Registration
Attendance will be limited to the first 200 registrants.

To register, please complete and return this form with your registration check. For further information please contact Claudia Runge (address below).

Checks should be made payable to EPRI. Credit cards are not accepted.

(please print)
Name ________________________________
Title ________________________________
Organization __________________________
Address ______________________________
City/State/Zip _________________________
Telephone (______) ________________

Please check appropriate box.
□ I represent an EPRI member utility and have enclosed a check for $100.
□ I represent a nonmember utility or other organization and have enclosed a check for $375.
□ I represent the government or university and have enclosed a check for $100.
□ I am a speaker and have enclosed a check for $100 (fee waived for member-utility speakers)

This registration form, accompanied by your check, should be returned to:
Claudia Runge
Sr. Conference Coordinator
Electric Power Research Institute
3412 Hillview Avenue
Palo Alto, CA 94304
(415) 855-2149

Refunds will be given for cancellations received by May 22, 1987.

*First name listed in bold denotes presenter.
EXHIBIT: (6:00 to 7:30 p.m.)

Friday, May 29, 1987

Session 7: Expert Systems Applications for Power Plant Diagnostics (8:00 to 11:30 a.m.)
Chairpersons: L. Olsen, Consolidated Edison Co.
S.M. Divakaruni, EPRI

- An Interactive Power Plant Performance Diagnostic Assistant
  T. Kessler, J. Liu, B. Frogner, P. Wallace, Expert-EASE Systems
- A Generator Expert Monitoring System
  B. Lloyd, Ontario Hydro; B. Sharma, EPRI; C. Brede, SRI International
- Expert Systems for Turbine Thermal Performance Diagnostics
- An Expert System for Rotating Equipment Vibration Diagnosis
  G. Finn, T. Fritsch, J. Hall, Stone & Webster Engineering Co.
- Combination of Numeric and Symbolic Processing in Fault Detection and Diagnosis
  O. Berg, R. Grini, OECD Halden Project (Norway)
- A User-Friendly Expert System for Diagnosing Boiler Tube Failure in Fossil Power Plants
  G. Singh, University of Texas at San Antonio; S. Gehl, J. Scheibel, EPRI
- Knowledge-Based Diagnosis of Rotating Machinery from Math Models
  R. Skatteboe, G. Tangen, K. Berg, Kongsberg Kvaro Co. (Norway)

Lunch (11:30 a.m. to 1:00 p.m.)
Luncheon Speaker: Dr. B. Chandrasekaran
Ohio State University
Topic: Future of Knowledge Acquisition

Session 8: Expert Systems Technology Transfer (1:00 to 3:30 p.m.)

- PANEL DISCUSSION: Technological and Programmatic Impediments to Expert Systems Implementation in Power Plants
  Moderators: R. Miller, Virginia Power Co.
  S.M. Divakaruni, EPRI
- Working Group Summaries
- Concluding Remarks
  E. Haddad, E. Baytch, S. Little, Boston Edison Co.;
  C. Saylor, Niagara Mohawk Power Corp.;
  S.M. Divakaruni and D. Cain, EPRI

Adjourn (3:30 p.m.)