Issues on AI and Expert Systems

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Abstract:

AI and knowledge-based expert systems (KBES) provide a new technology
for developing computer applications by providing mechanisms to
represent the types of intelligent behavior used in problem solving
which cannot be handled in conventional computer systems. Since design
is inherently an intelligent, ill-structured task, it is not one
suitable for computerization using standard programming techniques. AI
and KBES offer the promise of extending the range of design computer
applications to include those tasks which have been successfully
computerized because of their non-algorithmic nature.

In a few years AI and KBES applications in CAD have moved from the
stage of a conceptual technique of interest in that where the implemen-
tation of some tasks using an al-based approach is nothing more than a
programming exercise. However, significant problems still remain in a
more wide-spread use of such systems. The current state-of-the-art
permits rapid development of stand-alone interpretation or diagnostic
tasks. Prototypes of systems and general frameworks for design tasks
are just emerging. Issues of geometric representation and reasoning,
temporal reasoning, interfaces to databases and algorithmic tasks and
integration into large-scale CAD systems are still open problems. Many
of the issues which cause problems in the development of CAD systems
with conventional programming techniques are invariant with the change
in programming technology. Addressing these problems is a challenge to
research in both the CAD and AI communities.

In addition to their role as computational aids in the design process,
AI and KBES provide a representational formalism for the process
itself. Creation of AI and KBES tools requires an examination and
formalization of the design process here-to-for unattempted. Gathering
and recording of the knowledge used in the design process is invaluable
in itself. Once in a formal representation we can examine the know-
ledge and design process itself. Through such formalisms and critical
evaluations these new techniques offer one of their greatest benefits -
the opportunity to provide a rational basis for and understanding of
the design process. Thus AI and KBES provide not only the tools for
improving design automation but permit design itself to be improved.

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data between energy management and facilities management systems. He is also extensively involved with the BIT 2000 project group to define research needs in integrated CAD and committees of the British Standards Institution on the representation of buildings in computers.

James Whiteley Ure trained at Manchester Polytechnic, awarded Diploma in Electrical Engineering and Control Engineering and CEI II in Electrical and Systems Engineering and at the University of Surrey where he obtained an MSC in Energy Engineering.

1966 - 1969 was spent in the Merchant Navy where he was Senior Electrical Officer responsible for organizing maintenance systems and staff training. He then joined the PSA where he progressed from being Site Control Engineer on building services contracts through to contract supervision of M and E building services projects with total contract values of up to $23 million.

During 1980 - 1981 he instigated energy surveys and monitoring procedures for Government estate and advised on technical and economic viability of energy conservation measures. In 1981 he joined Building Design Partnership as Associate with responsibility for M and E engineers and technicians. He has a particular interest in energy effective design and energy conservation and has presented a number of papers, both nationally and internationally, on energy efficiency in buildings.

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Dr. Rehak is a member of ACM, IEEE Computer Society, Phi Kappa Phi, Sigma Xi, and Chi Epsilon. He is the author of over 50 technical papers and reports. In addition, he is a recipient of a 1985 NSF Presidential Young Investigator Award.

Dr. Rehak's research interests center on the development of advanced computer applications for engineering and scientific problems with emphasis on the civil engineering domain. His work includes:

- Applications of state-of-the-art computer technologies including expert systems, relational database management systems, and alternative computer system architectures to engineering systems.

- Extending and enhancing the computer technologies used in engineering problem solving.

- Research, design, and development of large scale, interdisciplinary engineering software tools and support environments, and engineering application programs.