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AD A104793

**Knowledge-Based Expert Systems:  
A Brief Bibliography**

**Michael D. Rychener**

26 June 1981

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COMPUTER SCIENCE

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Michael D. Rychener

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Carnegie-Mellon University  
Department of Computer Science  
Schenley Park  
Pittsburgh, PA 15213

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This research was sponsored by the Defense Advanced Research Projects Agency (DOD), ARPA Order No. 3597, monitored by the Air Force Avionics Laboratory Under Contract F33615-78-C-1551.

ARPA Order - 3597

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## 1. Introduction

A number of Artificial Intelligence (AI) systems have appeared in recent years whose approaches appear very fruitful for a wide variety of real-world tasks that are performed by knowledgeable (but not necessarily understanding) experts. In the interest of acquainting a wider audience to a representative sampling of these systems, and especially to the approaches they embody, the following selective reading list is proposed. These readings are not overly technical, and usually make their main points by way of examples of natural language dialog between a user and the expert AI system. Papers usually contain further references to related work and background material. The intended audience includes engineers (especially designers), social scientists, computer specialists without AI background, and other professionals.

In the following, I have grouped papers roughly into categories, some of which contain specific systems while others are broader overviews or even general introductions to the wider field of AI. In the interest of being representative, a number of systems of approximately equal significance to those given here have been omitted. The papers here do in fact refer to these others.

### 1.1. Expert Systems in General

[Feigenbaum 77]

[Waterman&Hayes-Roth 78]

[Michie 79]

[Nii 80]

[Newell 81]

[Winston 77]

[Simon 69]

[Nilsson 80]

[Boden 77]

[McCorduck 79]

[Erman&Lesser 78]

? Forthcoming: AI Handbook, by Barr and Feigenbaum

? Forthcoming: book on expert systems by Hayes-Roth et al (Aug. '80 workshop)

### 1.2. Electronics and Computers

[Brown&Burton 75]

[Sussman 77]

[Sussman&Steele 80]

[de Kleer 79]

[Borning 79]

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[McDermott.J 80]

[Grinberg 80]

[Director&Parker&Siewiorek&Thomas 81]

### **1.3. Engineering Design in General**

[Rieger&Grinberg 77]

[Freeman&Newell 71]

[Eastman 81]

[Bennett&Engelmore 79]

[Powers 72]

[Fenves&Norabhoompipat 78]

### **1.4. Other expert systems**

[Davis&Buchanan&Shortliffe 77]

[Pople 81]

[Duda&Gaschnig&Hart 79]

[Nii&Aiello 79]

[Buchanan&Feigenbaum 78]

[Lindsay&Buchanan&Feigenbaum&Lederberg 80]

[Genesereth 79]

[Weiss&Kulikowski&Amarel&Safir 78]

[Waterman&Peterson 80]

### **1.5. Other Specific AI Techniques of Interest**

[Clancey 79]

[Sacerdoti 75]

[Stefik 81]

[Lenat 75]

[Lesser&Erman 77]

[Davis 80]

[Hayes&Ball&Reddy 81]

[Teitelman&Masinter 81]

**Acknowledgment.** Allen Newell made many useful comments on preliminary versions of this paper.



## 2. Bibliography

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Bennett, J. S. and Engelmore, R. S.  
 SACON: A knowledge-based consultant for structural analysis.  
 In *Proc. Sixth International Joint Conference on Artificial Intelligence*, pages 47-49.  
 Tokyo, 1979.  
 Advises users of a program, MARC, for analysis of physical structures

### [Boden 77]

Boden, M.  
*Artificial Intelligence and Natural Man*.  
 Basic Books, New York, 1977.  
 Chapters 1, 10, 12, 15 are pertinent to expert systems

### [Borning 79]

Borning, A. H.  
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 PhD thesis, Stanford University, 1979.

### [Brown&Burton 75]

Brown, J. S. and Burton, R. R.  
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 SOPHIE electronics lab simulation

### [Buchanan&Feigenbaum 78]

Buchanan, B. G. and Feigenbaum, E. A.  
 DENDRAL and Meta-DENDRAL: their applications dimensions.  
*Artificial Intelligence* 11:5-24, 1978.  
 Chemistry (mass spectroscopy) and scientific inference

### [Clancey 79]

Clancey, W. J.  
 Tutoring rules for guiding a case method dialogue.  
*International Journal of Man-Machine Studies* 11:25-49, 1979.  
 Turning expert systems into teaching / tutorial ones; also 6th IJCAI (1979), pp. 155-161

### [Davis 80]

Davis, R.  
 Meta-rules: reasoning about control.  
*Artificial Intelligence* 15:179-222, 1980.  
 There is a companion paper in the same issue, pp. 223-239

### [Davis&Buchanan&Shortliffe 77]

Davis, R., Buchanan, B. and Shortliffe, E.  
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*Artificial Intelligence* 8:15-45, 1977.  
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 (EMYCIN)

### [de Kleer 79]

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### [Director&Parker&Siewiorek&Thomas 81]

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 Model design in the Prospector system for mineral exploration.  
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 See also [Waterman&Hayes-Roth 78], pp. 203-222

## [Eastman 81]

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 Recent developments in representation in the science of design.  
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 (Forthcoming): Building design, geometric modelling, and integrity of design databases

## [Erman&amp;Lesser 78]

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 General system-building ideas

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Feigenbaum, E. A.  
 The art of artificial intelligence: I. Themes and case studies of knowledge  
 engineering.  
 In *Proc. Fifth International Joint Conference on Artificial Intelligence*, pages 1014-  
 1029. Massachusetts Institute of Technology, 1977.  
 Overview of a number of Stanford systems and their methods

## [Fenves&amp;Norabhoompipat 78]

Fenves, S. J. and Norabhoompipat, T.  
 Potentials for artificial intelligence applications in structural engineering design  
 and detailing.  
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 Computer Aided Design*, pages 105-119. IFIP Working Conference, Grenoble,  
 France, March, 1978.  
 A view from outside AI

## [Freeman&amp;Newell 71]

Freeman, P. and Newell, A.  
 A model for functional reasoning in design.  
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 Somewhat general, problem-solving approach

## [Genesereth 79]

Genesereth, M. R.  
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 In *Proc. Sixth International Joint Conference on Artificial Intelligence*, pages 311-  
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 User consultant for MACSYMA

## [Grinberg 80]

Grinberg, M. R.  
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## Semi-Automatic Digital Designer (SADD)

## [Hayes&amp;Ball&amp;Reddy 81]

Hayes, Phil, Ball, E. and Reddy, R.  
Breaking the man-machine communication barrier.  
*Computer* 14(3):19-30, March, 1981.

## [Lenat 75]

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## [Lesser&amp;Erman 77]

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Chapter 12 is pertinent to expert systems

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Overview of a number of expert systems projects

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