MEP Technical Report 8807

TITLES AND ABSTRACTS OF TECHNICAL NOTES ON RESEARCH IN COMPUTER-AIDED DESIGN FOR 1988

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1. MEP Technical Report 8801
   The application of Prolog to intelligent CAD/CAM
   Alan H. Bond, Dong Hun Kim, and Basuki Soetarman
   February 1988
   To be Submitted to IEEE Trasanctions on Software Engineering

   The appropriateness and efficiency of Prolog for use in Intelligent CAD/CAM systems is examined. The main CAD/CAM area used in the study was the design and manufacturing of mechanical systems. The three years experience of the UCLA intelligent CAD/CAM group, in using VM/Prolog, is described. A number of CAD/CAM systems, written in Prolog, are discussed. Representation, programming and efficiency issues in using Prolog for CAD/CAM are then examined.

2. MEP Technical Report 8802
   Experience in using Prolog for intelligent CAD/CAM
   Alan H. Bond, Dong Hun Kim and Basuki Soetarman
   February 1988
   Submitted to the Symposium on Logic Programming 1988

   The three years experience of the UCLA intelligent CAD/CAM group, in using VM/Prolog, is described. The main CAD/CAM area used in the study was the design and manufacturing of mechanical systems. A number of CAD/CAM systems, written in Prolog, are discussed. Representation, programming and efficiency issues in using Prolog for CAD/CAM are then examined.

3. MEP Technical Report 8803
   The concept of intelligent CAD/CAM
   Alan H. Bond
   February 1988

   The notion of intelligent CAD/CAM system is not well understood. We present an attempt at a properly motivated discussion of this idea in the context of current industrial practice.

4. MEP Technical Report 8804
   The cooperation of experts in manufacturing
   Alan H. Bond
   February 1988
   Extended Abstract Submitted to 1988 Distributed Artificial Intelligence Workshop

5. MEP Technical Report 8805
   Parallelism in CAD/CAM
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   February 1988
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We first describe the approach to CAD/CAM taken by the UCLA Intelligent CAD/CAM group, which is a component of the Manufacturing Engineering Program. We have integrated the artificial intelligence language Prolog with the CAD system CADAM, to produce the CADLOG system. Then, using CADLOG, we have programmed several expert systems for different CAD/CAM areas. The group consists of a mixture of computer science and mechanical engineering PhD students, and is lead by Dr. Alan Bond, who has a computer science and AI background.

We then briefly discuss the two main kinds of parallelism in intelligent CAD/CAM systems. First, an intelligent CAD/CAM system should be a distributed set of cooperating intelligent agents, each of which is an expert system. Second, each agent should run on a parallel workstation, and we suggest a parallel logic programming methodology for implementation of agents.

6. MEP Technical Report 8806
   Subplanning methods for problems with sequentially decomposable states
   Alan H. Bond and Kang J. Chang
   March 1988

   A relatively common type of practical problem can be partitioned into a sequence of subproblems, such that solution of the ith subproblem depends only on the solutions to the prior subproblems. This can occur because of spatial and physical decoupling in the world state. The particular example used is that of finding the optimal manufacturing process plan for a prismatic part. The complete solution is built incrementally, in which the solution so far, to the prior subproblems, forms a set of constraints for solution of the current subproblem. A blackboard method is described which is able to use all knowledge that is available for the particular problem being attempted. Knowledge of manufacturing features, of partitioning into subproblem sequences, of processing choices, of constraints among process choices, and of growth of optimal plans can all be used. In addition, the method of solution of one subproblem uses a description organized into abstraction levels. Search for optimal choices is made at each level in turn.

7. MEP Technical Report 8810
   Research at UCLA on intelligent CAD/CAM
   Alan H. Bond
   April 20, 1988
   Presented at visit by Lockheed to IMAR meeting at UCLA

8. MEP Technical Report 8811
   Research at UCLA on intelligent CAD/CAM
   Alan H. Bond
   May 2, 1988
   Presented at visit by Hughes Space and Communications Division

9. MEP Technical Report 8812
   Research at UCLA on intelligent CAD/CAM
   Alan H. Bond

May 12, 1988
Presented at visit to CADAM Inc., CIM Product Development Group

10. MEP Technical Report 8814
Research at UCLA on intelligent CAD/CAM
Alan H. Bond
May 1988