

## **Chapter IV**

### **Summary and Conclusion**

#### 4.1 SUMMARIZING PRESENT WORK :

Artificial Intelligence Scientists decided there must be a way to make computer program intelligent. To make program intelligent, provides with it lots of high quality specific knowledge about some problem area. This realization led to the development of special purpose computer program, system that were expert in some narrow problem area. These programs were called EXPERT SYSTEM which in turn is called KNOWLEDGE ENGINEERING. It involves interaction between the expert system builder KNOWLEDGE ENGINEER and one or more experts in some problem area. The KNOWLEDGE ENGINEER EXTRACTS from the human experts their procedures, strategies and rules of thumb for problem solving and builds the knowledge into the expert system. Knowledge engineering relies heavily on the study of human experts in order to develop intelligent, skilled program.

Design is a complex task, involving different types of knowledge and problem solving strategies. We define formulation task as a design problem. A large amount of knowledge is associated with formulation task. The present work has been proposed for building the EXPERT SYSTEM for voltage regulator design. The voltage regulator design is process guided by empirical formulae and standard data, backed by theoretical analysis. But the selection of the components require to satisfy certain rules based on

experience. design of voltage regulator thus forms an ideal problem to be tackled by knowledge based system than by a conventional computer program. With the help of this system attempt has been made to work out following designs, i) Rectifier design, ii) filter design, iii) Regulator design. The user has to merely select the option he wants and specify required voltage and current for their regulator/power supply. The system provides the user with specifications and selection of component with circuit performance.

The software (power designer) mainly comprises of three parts i) main menu, ii) Design procedure, iii) Database. The main menu enables user to select and activate particular design procedure mentioned on menu screen. The design procedures contain the knowledge about formulation of design organised in 'CASE's. You can switch the CASEs to design a particular circuit stage of power supply system. The data base of the POWER DESIGNER contains the knowledge about facts concerning some electronic components used in design procedure. The data is organised as stream oriented files of the RECORDS; RECORDS are structure of the data. Rules are formulated for appropriate selection of components from data sheet. An intelligent program is developed to process the data base to select appropriate component.

This dissertation consists of four chapters. The FIRST chapter contains an overview of EXPERT SYSTEMS. It starts with review of the research done in AI, EXPERT SYSTEM FIELD followed by various expert systems and some systems regarding interpretation, diagnosis, monitoring, prediction designing. A detail account on What is EXPERT SYSTEM' definition, anatomy i.e. architecture, problem solving methods in AI (search), search direction (forward, reverse, algorithm for search direction has been given. A description of rule based frame base approach, advantages of knowledge base, database systems its limitations is also included. Concept of hybrid architecture and multiexpert system is introduced, limitations, of current EXPERT SYSTEM technology are pointed out. A brief look at work to be done, aim of work, requirement of regulator in various fields of electronics, different types, why ES approach, the orientation of work are given.

The SECOND chapter deals with POWER SUPPLY DESIGN. It starts with the need of power supply, types of power supplies. A brief account on regulated versus unregulated power supplies, various types of regulated power supplies has been given. It gives a detail account of rules for the design of the rectifier - filter stage of the power supply. Also introduced are concept of regulation and a detail designing procedures of linear voltage regulators using

discrete components and IC's. For discrete component circuits, it describes designing of Zener diode regulator, Emitter follower regulator, series regulator, shunt regulator. For IC regulator it gives design of regulator using IC 741, precision regulator (IC 723) its various configurations, General purpose (3-T) regulators (78XX). The chapter ends with detail account on design procedure for 78XX as well heat sink design.

The third chapter deals with detailed overview of SOFTWARE developed. The chapter starts with purpose of software, a brief note on how to use software and its main menu. A detailed look on design procedure of rectifier, filter and regulator designs, algorithms and procedures, description of programs has been given. This follows a detail account on database, integration of concepts and technique from database technology, Expert system work, representation of knowledge in data processing and conventional database, diode data base, Zener diode database, Transistor database IC 78XX database, Transformer capacitor database, Heat sink database, the database contains definition of data structures, rules for component selection and algorithms for data access. The chapter ends with use of 'C' language for the development of AI software.

The prototype of 'POWER DESIGNER' a system to design voltage regulator/power supply, has been planned to prove the concept of using expert system approach for engineering design, where design is guided by expert's knowledge. The prototype system, developed to work on IBM PC/AT or its clones with Turbo C uses database approach. It selects accurately, the components required for voltage regulators/power supply from manufacturer's data sheet. The designing knowledge is arranged as CASEs. Data base approach is highly dependent of the data structure. There are some advantages of using expert system for regulator design e.g. speed of operation is more, better automisation, increase reliability, heatsink selection, durability roundness and compatible with future need. You can add the knowledge of ES by increase number of CASEs. Also other types of regulators can also be included in the future expansion. This system forms a ready reckoner for the novice designer and useful design book for the engineers.

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