The goal of expert systems research was to program into a computer the knowledge and experience of an expert. Expert systems are used in medicine, business management, for searching for natural resources and much more. Randal Davis, of MIT is quoted as saying, "Expert systems can be experts - you come to them for advice. Or they can be coworkers, on a more equal footing. Or they could be assistants to an expert. All along the spectrum there are very useful systems that can be built.”

Expert Systems came at a time when AI research was shifting "from a power-based strategy for achieving intelligence to a knowledge based-approach." Where formerly researchers were aiming at making more powerful systems that used clever techniques and tricks, they instead began to look at programming more knowledge into machines.

The rise in expert systems research brought with it a new type of engineering: knowledge engineering. It was the job of a knowledge engineer to take the knowledge of an expert and convert that knowledge into a form that could be understood by computers. This was a quite a long process. In the case of Mycin, several physicians were presented with cases and asked to diagnose the patient, propose a treatment and explain the reasoning behind their decisions. From these interactions with the experts, knowledge engineers came up with a set of rules to be programmed into the computer. Then the computer was tested on several cases and its conclusions matched with those of human experts. When necessary, rules were added or modified to fix errors in the computer's program.

However, expert systems still had their limitations. It took a lot of time to build the system with many hours of testing and debugging. Also expert systems lacked what Douglas Hofstadter called "the more subtle things that constitute human intelligence such as intuition." Sometimes we know things, but can't really explain exactly why we know it. We often make decisions on this type of intuition. Since engineers didn't have any defined rules for how intuition worked, they couldn't program intuition into computers.

Also lacking in expert systems was the ability to learn from its mistakes. If a human expert came to a incorrect conclusion, she would be able to understand and learn from her mistake in order to avoid making the same or similar mistakes in the future. An expert system, however, could not learn from its mistakes and would not be able to avoid making the same mistake in the future. Once an expert system was found to have an error, the only way to fix that error was to have it reprogrammed by an engineer.

Some Examples of Expert Systems

Mycin
Drendal