SCIENCE & TECHNOLOGY

Some of today's best $5 million supercomputers operate so near capacity that their circuit boards must be immersed in a special coolant to avoid overheating, but all are too slow for some tasks. For example, it can take weeks or months to simulate the airflow around a passenger jet in flight. The reason: All computers so far have shared a basic limited design—called "von Neumann architecture" in honor of the Hungarian-American mathematical genius John von Neumann (1903–57) who designed it. "A single main processing unit," Alexander explains, "calls forth programmed instructions and data from memory in sequence, manipulates the data as instructed, and either returns the results to memory or performs other operations."

Relying on only one processor creates a bottleneck in the single channel between processor and memory. The fifth-generation computers will avoid the traffic jam by using many "parallel" processors. Each will work independently on one part of a given problem and exchange its findings with other processors.

Simple as it seems, parallel processing poses daunting technical challenges. Scientists must figure out how to break complex problems into manageable bites that can be worked on "in parallel" rather than sequentially, as in today's computers. And they must develop computer programs that will allow the processors to "talk" to and interact with one another while they are working.

Ultimately, a complex network of processors in a computer might work something like a human brain—"thinking" and programming itself as it went along. Not only would such a machine be able to complete in short order a simulation of an airplane in flight, it would also work fast enough to take on some more "human" tasks—such as understanding spoken language and producing a typed letter from it.

Science fiction? Japan, the European Common Market, and the United States have all launched rival research programs aiming to be first with fifth-generation computers. The research is scheduled to take just five years.

Two Cheers for Irradiation

"Renewed Interest in Food Irradiation" by Marjorie Sun, in *Science* (Feb. 17, 1984), 1515 Massachusetts Ave. N.W., Washington, D.C. 20005.

Now that the U.S. Environmental Protection Agency has severely restricted the use of the suspected carcinogen EDB (ethylene dibromide) as a fumigant for fruits, vegetables, and grains, a lot more of America's food may be irradiated.

Despite its menacing name, irradiation does not involve radioactivity, notes Sun, a *Science* correspondent. It uses controlled doses of gamma rays or high-energy electrons to kill insects, parasites, bacteria, and even viruses. Irradiation can kill trichinae in pork, inhibit sprouting in potatoes, or eliminate fruit fly eggs on oranges.

"By any other name, irradiation of food would probably have been sanctioned by the federal government years ago," Sun believes. Twenty countries now permit some use of the process, developed during the 1950s; several international agencies, including the World Health Organization, have certified the safety of medium-energy irradiation. But in this country, the U.S. Food and Drug Administration (FDA) has barred all but a few uses. Food prepared for U.S. astronauts in space and for people suffering from immune system deficiencies, for example, is sterilized by irradiation. The FDA restricts radiation because it fears that the treatment may create harmful chemical by-products in foods, though none have yet been found.

Last summer, the FDA granted permission to food processors to begin low-energy irradiation of spices, and more foods may be added to the list soon. The trouble is, says Sun, such low-energy treatments are powerful enough to kill insects, but not bacteria. A 1958 decision by the U.S. Congress to classify irradiation as a food additive rather than a process (such as canning) largely accounts for the restriction. It is difficult to design laboratory tests of irradiation to meet the strict safety standards for additives: Laboratory animals can be fed huge quantities of additives like saccharin but not of irradiated foods.

A bill now pending in Congress would change the 1958 classification and make it easier for the FDA to allow food processors to use higher energy treatments. The next hurdle for food producers would then be convincing consumers that irradiated fruits will not glow in the dark.

RESOURCES & ENVIRONMENT

The Psychology of Saving Energy

"Saving Energy: The Human Dimension" by Paul C. Stern, in *Technology Review* (Jan. 1984), Room 10-140, Massachusetts Institute of Technology, Cambridge, Mass. 02139.

The federal government's efforts to encourage Americans to save energy in their homes have been a disappointment [see *WQ*, Autumn 1983, p. 30]. One reason, suggests Stern, a U.S. National Research Council analyst, is that Washington's emphasis on "market forces" neglects the "human factor."

High energy prices do spur people to conserve, he says, but not necessarily in logical fashion. Most consumers simply have inadequate information: They overestimate the electricity used by lights and TV sets, for example, and overlook big but "invisible" energy users such as hot water heaters.

But even providing information may not help matters, Stern notes. The source must be credible. In a 1978 experiment, Cornell researchers Samuel Craig and John McCann mailed out two batches of identical pamphlets containing energy-saving tips, one under the letterhead of the local electric utility company, the other under that of the New