computer sciences

From papers delivered to the Third International Joint Conference on Artificial Intelligence at Stanford University

The impact of artificial intelligence

Artificial intelligence (AI) has apparently progressed far enough that the time has come to worry about some of its impacts on society, according to a study conducted by the San Francisco Chapter of the Institute of Electronic and Electrical Engineers Systems, Man and Cybernetics Society.

The study, sponsored jointly by the IEEE and the National Science Foundation, found that most AI experts believe artificial intelligence systems capable of profoundly influencing society will be commercially produced before the turn of the century. By 1980, they predict, automated personal identification systems and industrial robots will be commercially produced. Before the turn of the century, automatic language translators, robot chauffeurs and automated intelligence gathering systems may be used.

The personal impact could be tremendous. An automated intelligence gathering system, for example, would be capable of making logical inferences concerning social trends, enabling the Government to make more precise policy decisions, on the one hand, or better control dissident groups, on the other.

The report summarized the most important long-term effects of AI as: a decreased need by most persons for direct human contact; erosion or elimination of some heretofore uniquely human activities; accurate weather and economic forecasting; large-scale displacement of human workers from work activities; automation of the mechanics of government, education, law and health care that could imply a concentration of responsibility leading to an elite ruling class.

The latest on robots

Several projects throughout the world are aimed at teaching a robot to assemble machines from a pile of parts. In Japan a robot follows instructions given in the form of line diagrams of the components. At MIT a robot learns to copy a pre-assembled pile of blocks. At Stanford, preprogrammed hand manipulations control the automatic assembly of an air pump. One of the most versatile approaches is that taken by the Department of Machine Intelligence at the University of Edinburgh. There a computer learns about a group of objects first hand by picking them up with a mechanical hand, and looking at them through a television system and finally assembling them into a structure, all under the tutelage of a human operator. After a while, the computer "catches on" and can finally be left by the operator, busily putting simple toys together like a preoccupied child.

Computer-directed chemical synthesis

With 20,000 new chemicals mass-produced each year, the task of planning synthesis schemes to make them has become formidable. Now a computer program developed by N. S. Sridharan as part of his doctoral thesis project at the State University of New York, Stony Brook, may help solve the problem.

The program is based on storing a vast memory of chemical reactions in the computer and then providing a set of strategies to help the computer learn about chemical synthesis as it solves particular problems.

Already the program has been able to solve the problem of synthesizing vitamin A, a complex task that originally took several teams of human experts two decades to complete.

aerospace sciences

Another Convair 990 for airborne science

Since the mid-air collision of the research plane the "Galileo" last April that took the lives of 11 scientists and engineers working with NASA's Ames Research Center, Ames has been looking for a replacement airplane (SN: 4/21/73, p. 256). The airplane was a Convair 990—no longer in production. So NASA feels especially fortunate now in finding one. The 990 can more easily be modified than other such aircraft to fit the needs of remote sensing of earth and space.

NASA announced it has chosen California Airmotive Corp. for negotiations for a replacement. The negotiations will be based on aircraft acquisition, spare parts and the modifications required to make the aircraft a flying laboratory.

The one under consideration was formerly operated by Garuda Indonesian Airways. If negotiations go well with Airmotive, NASA thinks the airplane could be ready for scientific missions by the end of this year.

One important mission coming up (in which the crashed 990 was to participate) is the Atlantic Tropical Experiment of the Global Atmospheric Research Program (GARP), scheduled for next spring.

The total cost for acquisition and modifications of the airplane will be $2.5 million.

Close-up view of Mercury

Seven months from now in March 1974, earthlings will get their first close-up look at the planet Mercury. A Mariner spacecraft with television cameras aboard will send back photographs of Mercury's surface with a resolution of 300 meters. The spacecraft, to be launched Nov. 3, 1973, will first fly by Venus where pictures of the surface are not expected (SN: 8/4/73, p. 73) and then to within 1,000 kilometers of Mercury.

Because Mercury is so close to the sun, it is difficult to observe from earth. Only gross shading characteristics can be distinglished on the planet with earth-based telescopes. The results of the flyby will be used to map Mercury's surface, determine the orientation of the spin axis and establish a cartographic coordination system. The photographic team will also search the pictures for satellites of the planet.

After passing Mercury, the spacecraft will go into an orbit around the sun which will bring the craft near Mercury two more times. Scientists hope the equipment lasts long enough to provide useful scientific information from the second Mercury encounter in September 1974 and the third in March 1975.

New satellite for TV and telephones

The fifth in a series of Intelsat IV commercial communications satellites was launched last week from Cape Kennedy. The new satellite will add 4,000 telephone circuits plus television to the channels already in operation between the United States and other countries.

The satellite was placed into synchronous orbit at an altitude of 22,300 miles. At that altitude orbital velocity of the satellite matches the rotational speed of earth, so the satellite is over the Atlantic all the time.

The satellite, like its predecessors, is owned by International Communications Consortium (Intelsat), which reimburses NASA for the launch costs and the rocket. The first and second satellites were placed in orbit in 1971; the third and fourth, in 1972.