

Nov 1971

SCIENCE BULLETIN

National Science Council
214 Roosevelt Road, Section III
Taipei, Republic of China

Chiaotung University Succeeds in Building Mini-Computer

Nine years after the National Chiaotung University acquired the Republic of China's first electronic computer (an IBM-650 computer) in 1962, a team of faculty members and graduate students in the university has succeeded in building a small general purpose computer as a research and training program. The task started in 1968 with the support of the National Science Council and was completed one year ahead of schedule at a cost of less than NT\$600,000 (15,000 U.S. dollars). According to Mr. Jong-chuang Tsay, a principal member of the Chiaotung team, experiments with the mini-computer have achieved 90% success. He expects the machine to reach perfection in the near future after minor adjustments. The following is Mr. Tsay's description of the computer.—Ed.

The main memory of the computer consists of two 12x13x4 50 mil ferrite core memory planes. One of the memory planes is used to store numbers and the other is used to store instructions. Number is represented in floating-point decimal form with thirteen decimal digits. Unless the magnitude of the number is exactly zero it must lie in the range $(10^{-10}, 10^9)$. An instruction consists of three decimal digits, the first of which refers to the operation to be carried out, while the other two are addresses. The instruction repertoire contains ten instructions; namely, addition, subtraction, multiplication, division, transport, jump, write, feed in members, feed in instructions, and stop or reset memory-location. A program may consist of up to fifty two instructions. Each instruction is

actually performed by some micro-operations (e.g., there are 36 micro-operations in performing subtraction instruction) taken from the 63 micro-operations repertoire. There is a read-only memory of 36x6 50 mil ferrite core matrix used to store these 63 micro-operations. These 63 micro-operations and associated gate system control all the operations of the computer. In this computer, the addition

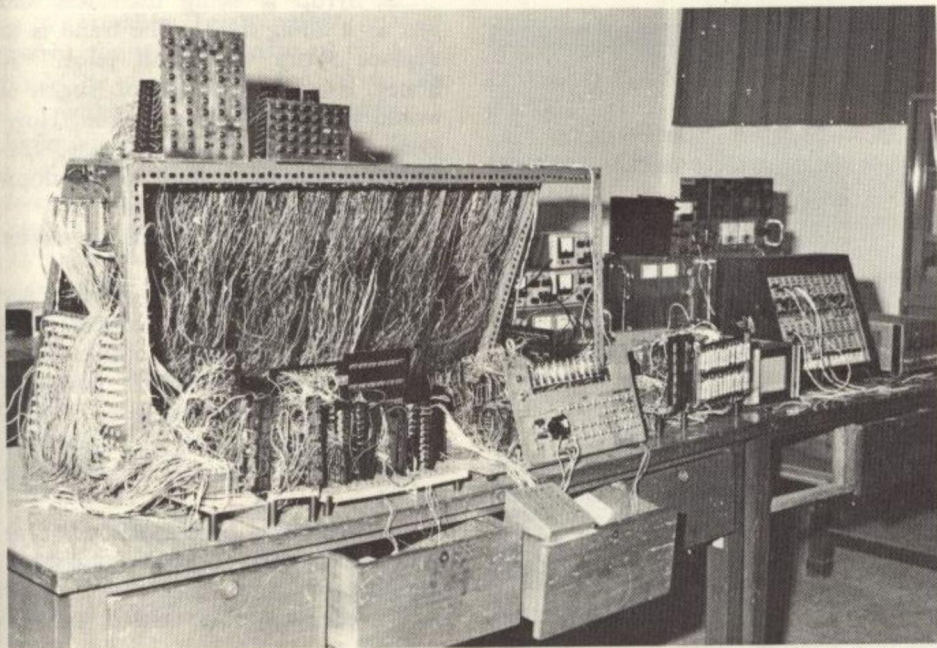
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Joint Meeting to Review Sino-US Bilateral Program

Dr. Ta-you Wu, chairman of the National Science Council and Mr. Wang Chi-wu, the Council's deputy secretary general, will leave shortly for the United States to attend a Joint Executive Meeting between the Council and its counterpart, the U.S. National Science Foundation, which is scheduled to take place in Washington later this month.

Top on the agenda is the representation and review of the First Status Report covering the period from January 23, 1969 to June 30, 1971. Other items for discussion include on-going activities under the China-U.S. Cooperative Science Program (short-term and long-term visitors, cooperative research projects, and seminars), new activities (intermediate-term visitors), priority list in respect to all activities, information manual for U.S. visitors, and special considerations.

Dr. Wu will return to Taipei after the Washington meeting, while Mr. Wang will proceed to Miami to attend the Sino-US Joint Seminar on Hurricanes and Typhoons.



The general-purpose mini-computer built by the National Chiaotung University scientists.

Experts to Help Develop Food Processing Industry in Taiwan

Six Chinese scientists in the United States came to Taiwan last month at the invitation of the National Science Council to study the local food processing industry and make recommendations for its further development. As a result of their visit, an ad

hoc group comprising representatives of interested government agencies has been appointed to take actions suggested by the experts.

Headed by Dr. David C. Chu, president of Shanghai Instant Foods, Inc. in Los Angeles, the team of ex-

perts is composed of Dr. H. Y. Yang, professor of food science at Oregon State University; Dr. Archie C. Loo, director of Research Labs of Carnation Company; Dr. Frank Zee, technical director of Kern Foods Company; Dr. Larry Lee, vice president of Shanghai Instant Foods, Inc.; and Andrew Hsu, a research biochemist with the U.S. Department of Agriculture. Their respective specialties are marketing and sales, future food trends, new product development, food processing and canning techniques, quality control, and law and regulations.

The scientising spent their first days in Taiwan visiting 22 food processing factories throughout the island in the company of Mr. Li Hsiu, a specialist of the Joint Commission on Rural Reconstruction. The familiarization tour was followed by discussions with local experts on a wide spectrum of topics ranging from development of new products to marketing and sales. The following is a summary of the discussions.

Suggestions

1. Tropical fruit salads seem to have a brighter future than fruit cans of homogeneous content and should be mass produced for marketing.

2. Syrup is being used less and less as a filling fluid. The trend is to replace syrup with fruit juice. If honey is used in place of sugar, it would be helpful to promotion. However, there should be a standard formula for the filling fluid to be adopted by all the processing plants.

3. I. Q. F. frozen fruits should be developed.

4. There is a growing demand for pineapple juice and concentrated fruit juices in the international market. However, technical problems such as the preservation of flavor, large-container packaging and prevention of can corrosion remain to be solved.

5. There has been a 19 per cent increase in the demand for frozen vegetables in the American market. Development in this field is recommended.

6. Chinese scientists in the United States are willing to provide formulas

Chiaotung University Succeeds

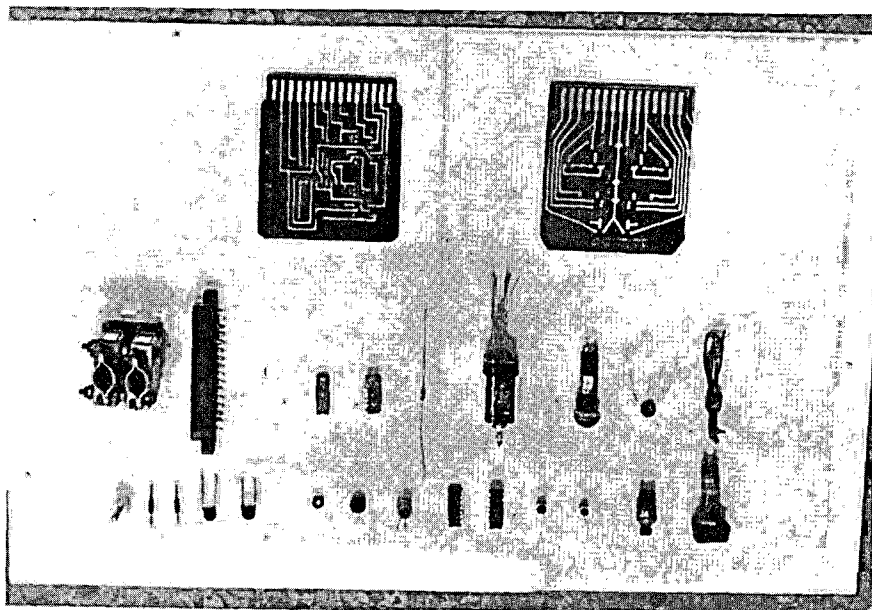
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of two decimal digits of r and s is performed by storing them in two decimal counters and transferring s (r) pulses to the other counter that stores r (s). Of course, if there is a carry, it should be taken into consideration. Subtraction is performed

by the addition of the minuend and the subtrahend in 9's complement form. Any arithmetic operation of this computer is based on these principles. There are ten numerical display tubes and many neon lamps used as a man-machine communication medium.

Some characteristics of this computer is listed as follows:

Logic Element	Low-scale Integrated Circuit
Main Memory	12x13x4x2 50-mil Magnetic Core Memory
Micro-Operation Control Memory	36x6 50-mil Magnetic Core Memory
Machine Cycle Time	20 μ s*
Memory Cycle Time	320 μ s*
Instruction Format	Two Addresses Instruction
Number Representation (Range)	Floating-point (10^{10} , 10^9)
Programming System	Stored Programming
Computing System	Decimal Serial
Number of Instructions	10

* The time may be varied by changing the external connected capacitors.



Some of the component parts used in the computer.

for mixed fruit and vegetable juices such as the V-8 juice.

7. There has been a fast proliferation of instant foods over the past years as demand has kept rising. A high degree of technical sophistication is required in their development. Dr. Loo has offered to provide 29 formulas of instant foods.

8. Sterilization of foods and containers should be stressed in canning or packaging process.

9. Artificial meat made from soybean protein can be mixed with natural means to reduce cost without damaging the nutritional value and flavor of the food.

10. A shortage of tomato supply is being felt in the United States as a result of manpower shortage. The Republic of China can capitalize on its abundant labor supply to develop processed tomato products for export to the United States. An additional advantage can be derived from the fact that the tomato harvesting season in Taiwan and the United States falls at different times.

11. Canned frozen Chinese foods should be developed.

12. Automatic devices should be introduced to save manpower and help improve quality control.

13. Criteria of quality control should be revised and upgraded to meet international requirement.

14. Quality control is of utmost importance. It should be stressed throughout the manufacturing process beginning with the selection of raw material. Quality control work in Taiwan at present is more or less a matter of formality. To strengthen quality control, the man in charge of the task should be vested with the power to act without outside interference. While quality control should be strictly enforced by the manufacturers, the government can contribute to its successful implementation by providing the manufacturers with incentives such as the allocation of larger export quotas.

15. Food processing technicians, especially those making tin plate and handling canning, should be given short-term training abroad with the support of the National Science Council.

Dr. Chu's Views

A final meeting was held at the National Science Council for an exchange of views before the visiting scientists returned to the United States. Dr. Chu summed up his views about the local food processing in-

dustry as follows:

1. Environmental sanitation at certain plants should be improved.

2. The local plants should adopt more automatic devices. Such machinery can be purchased abroad for mass production at home.

3. Products should not be exported to middlemen as raw materials. They should be sold directly to the consumers for greater profit margin.

4. By-products should be utilized to the maximum.

5. Tin plate should be manufactured domestically.

6. The Bureau of Commodity Inspection and Quarantine should establish a training class for quality control personnel of the various plants.

7. A constant supply of new products should be maintained. The Food Industry Research Institute should utilize its modern facilities to develop New products. The laboratory products should first be manufactured by food processing plants on trial basis. If successful, the products should be exported to overseas markets for experimental sale. Should the market reaction be favorable, the Institute should give the formulas to the local plants for mass production.

8. To maintain the competitive position of Chinese products, the local food processing industry should step up its market survey to find out future trends as well as current needs. Manufacturers should establish a brand name for their own products by assuming shipment and marketing responsibility themselves instead of seeking the help of foreign firms.

Asked how Chinese food products can carve a niche in the American market, Dr. Chu suggested that during the initial stage the products be shipped to some of the 208,000 supermarkets in the United States for a six-month trial sale. Then the marketing should be gradually taken over by a Chinese manned sales network.

Sales Network

In this connection, Dr. Chu proposed a world-wide Chinese sales network formed by overseas Chinese businessmen or domestic firms. The proposed network will be responsible for market survey so as to provide accurate market information to manufacturers, making recommendations concerning production techniques, acting as the manufacturers' guarantor in securing bank loans, and handling the marketing of Chinese products.

Dr. Yang suggested the development of Chinese foods as snacks in view of the growing popularity of the latter in the United States. However, due consideration should be given to American recipes in preparing the snacks so that there will be neither over-abundance nor deficiency in calorie or protein content. Furthermore, he added, the amount of energy and the contents of protein, minerals and vitamins should be indicated on the labels for the reference of American consumers.

Stressing the importance of quality control, Dr. Lee suggested that the man responsible for the task be placed in a position of the same standing as the superintendant of the factory so that he can discharge his duties without fear of obstruction. At the same time, the government should take legislative measures to get rid of products of inferior quality.

Also present at the NSC discussion session were NSC Chairman Dr. Ta-you W, Finance Minister K. T. Li; Economic Minister Y. S. San, Dr. Y. S. Tsiang, commissioner of the Joint Commission on Rural Reconstruction, and representative from other interested government agencies. They all expressed their appreciation for the suggestions made by the experts and promised to take actions accordingly.

Dr. Hornig Arriving

Dr. Donald F. Hornig, president of Brown University, at Providence, Rhode Island, and Mrs. Hornig are scheduled to arrive in Taipei on November 1 for a week-long visit at the invitation of the National Science Council and the Chinese Institute of Engineers.

Dr. Hornig, who was science advisor to former President Lyndon B. Johnson, last visited Taiwan in 1967 as head of a high-level science mission. The major steps taken in the Republic of China's science development since then are largely the result of that visit.

This time Dr. Hornig will visit some academic institutions and laboratory facilities on the island and make some sightseeing. On November 5 he will address the opening session of CIE's Golden Jubilee Convention at the Chungshan Building.

Dr. Hornig will also call on Vice President-Premier C. K. Yen and be the latter's dinner host on the same day. He and Mrs. Hornig will leave for the United States on November 7.

Creator of Synthetic Human Growth Hormone Due Here This Month

Dr. Cho Hao Li, a renowned pioneer in biochemical research, and Mrs. Li are scheduled to arrive here from the United States in late November for a short visit, the Academia Sinica reported.

A member of the Academia Sinica, Dr. Li is coming here to attend the first consultation conference in preparation for the academy's future Institute of Biochemistry. The establishment of the Institute is Dr. Li's idea, and he has done much to hasten its activation.

Dr. Li, who is professor of biochemistry and experimental endocrinology at the University of California, has engaged in hormone research for years. Earlier this year, he electrified the scientific world with the announcement that he and his assistants

From Sugar to Liquor

For the Taiwan Tobacco and Wine Monopoly Bureau, which has been eagerly trying to turn out new products that would satisfy its domestic consumers and at the same time earn some valuable foreign exchange from abroad, there is good news from the laboratory of the Institute of Chemistry, Academia Sinica. Scientists of the Institute announced that they had just succeeded in brewing a kind of high-grade liquor out of cane sugar with a taste not unlike that of whisky.

The newly developed liquor, which contains 50% alcohol, was distilled from fermented sugar, according to have succeeded in making synthetic human growth hormone, a breakthrough that promises unlimited applications in biological and medical fields.

Aside from presiding over the conference in Academia Sinica, Dr. Li is expected to deliver a lecture on his synthetic growth hormone before returning to the U.S.

to the scientists. For flavor they added a kind of spice made of coconut oil and turpentine.

Professional tasters have given the sugar-brewed liquor a high rating although they admitted that there was a slightly biting taste. The Institute is trying to filter out impurities in the liquor that might be responsible for this defect by means of natural silk.

If the chemists succeed in getting rid of the biting taste, the future of the new liquor is assured. Cane sugar is one of Taiwan's major agricultural products. With the world sugar market subject to the unpredictable fluctuations of demand, export of this commodity has ceased to be an important factor in the Republic of China's foreign trade. Using the surplus sugar to brew high-grade liquor would save the sugar industry as well as creating a new dollar earner for the monopoly bureau.

To Pick Science Teachers for Fact-Finding Trip Abroad

The National Science Council has decided to send 10 science teachers and science education administrators in public high schools to Japan and the United States on a fact-finding trip in the current school year.

During the trip, which will last from two to three months, the science education mission will observe how science education is being handled in the American and Japanese high schools with particular attention to laboratory activities and teaching materials.

Selection of the candidates for the trip will be made by the Taiwan Provincial Department of Education and the Taipei Municipal Department of Education. NSC will make the final screening.

The program was initiated by NSC last year as part of its efforts to upgrade science education at the high school level in the Republic of China. Beginning from the next school year, the administration of this program will be handled by the Ministry of Education.

Entomologists Score New Success

Entomologists in Taiwan are waging another microorganic war in Chiayi against insects on farm crops by using "nuclear polyhedrosis viruses" to kill cutworms on green asparagus. Success is already in sight.

Early this year, local scientists successfully used parasitic wasps, nematodes DD 136 and micro-pathogen against diamondback moths, cabbage worms, and lavas of lepidopterans, which had been a plague to the island's vegetable crops.

The use of microorganisms to control insects has a reassuring effect on consumers who often fear possible toxic residues on the crops if pesticides are used.

Nuclear polyhedrosis viruses are isolated from diseased bodies of cutworms, according to Professor David Fung-yeen Yen of National Taiwan University, who also is a specialist of the Joint Commission on Rural Reconstruction (JCRR).

Yen has headed the laboratory work jointly carried out by the JCRR plant industry division and the NTU plant pathology department in recent years.

The entomologist explains that one cubic centimeter of the NPV solution produced by the laboratory contains 180 billion viruses, which should be diluted by 1,000 to 1,500 times before it is used. Its effect theoretically is permanent and thorough, says Yen.

During the past two years, 360 hectares of green asparagus in Chiayi have been producing material for processing frozen green asparagus for export. Cutworms began to attack the crop in May last year, damaging its plants and markedly reducing its yield.

To save the crop from further damage by these insects, JCRR has sent a batch of the NPV solution to Hsinkang, Chiayi County for application. Twelve bottles of the solution totaling six liters were sprayed on part of the crop and in a few days a spectacular result was achieved, as countless dead cutworms were seen hanging from the asparagus plants.

Spraying will be continued, according to the field workers, in a mop-up action against the harmful insects in all the 360 hectares of green asparagus, which is a potential foreign exchange earner for Taiwan.