

コンピュータインタフェースのシステム設計

—An Approach to the System Design in Computer Interface—

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Outline : Development of supporting system(s) for understanding computer hardware interface, and its application.

Rationale : According to our previous study of supporting system for interface learning environment, we found that

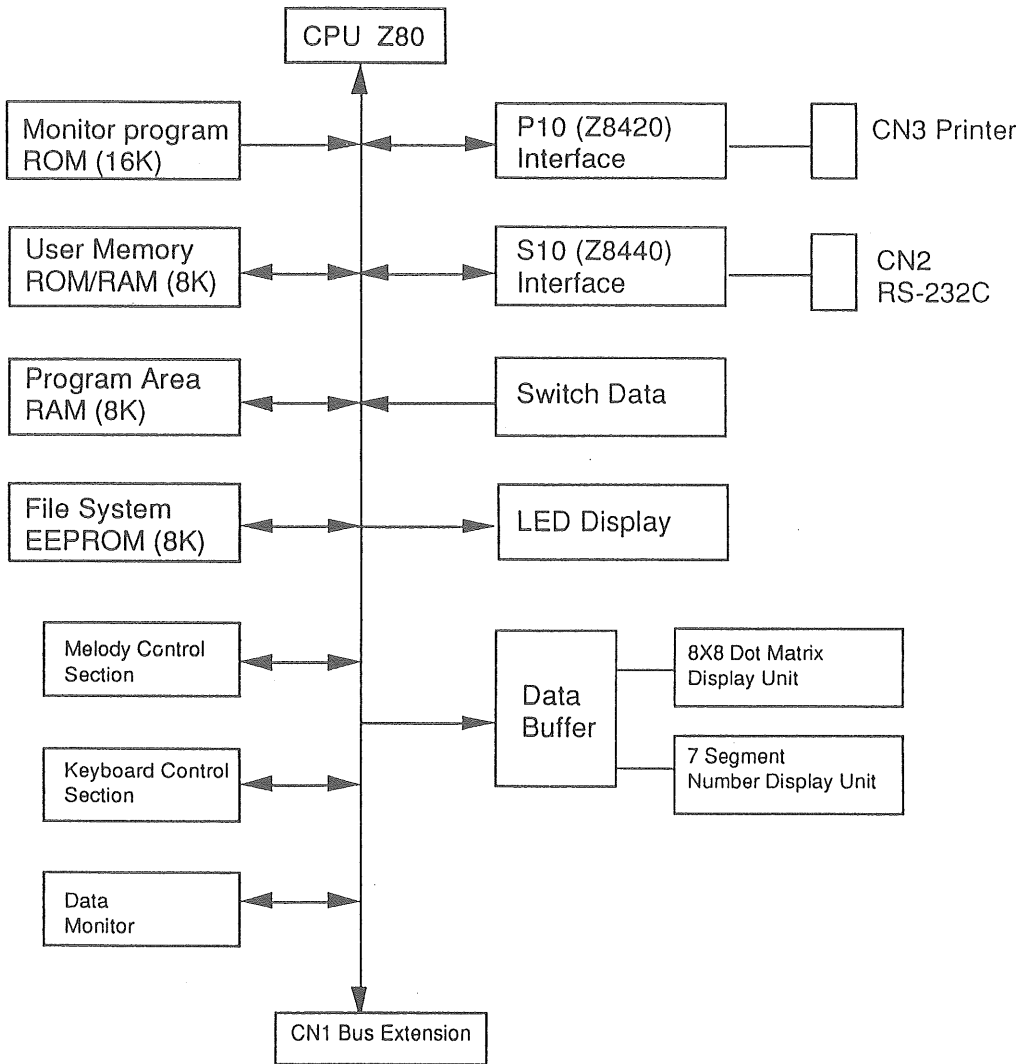
1. A technically wonderful system can be too difficult or boring sometimes.
2. If the system is very expensive, it is difficult to introduce.
3. With the usual teaching method, it takes a long time to learn but difficult to prove that learners do understand the content.

As a result, we have developed a new approach to solve the problems of hardware and teaching method.

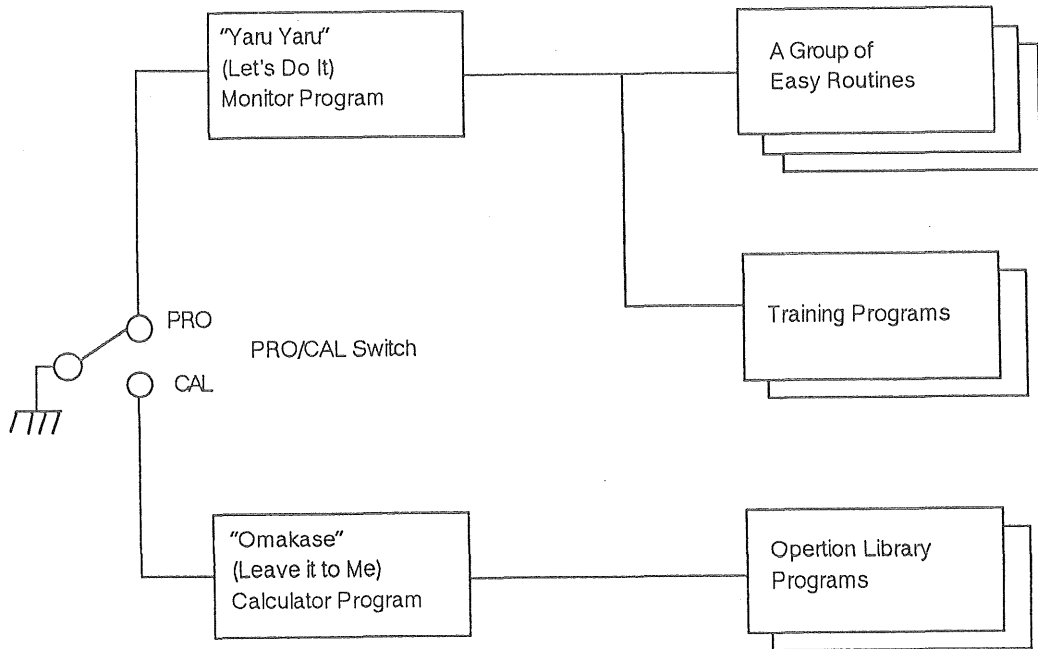
Characteristics and explanation of the new approach :

Characteristics :

1. Programming can be done by easy computer language-which may look like BASIC.
2. The hardware construction is built around the importance of human interface emphasizing on the five basic human perceptions. Therefore, learners will be able to enjoy learning through imitation sound, melody, and LED display.
3. Learners will easily be able to practice the lessons anywhere since the system will be like a handy computer with 100V activation.
4. Because of an interface between the supporting system and personal computer, all programs which are written can be downloaded from the personal computer into the supporting system after compiling and assembling.
1. **Monitor Program** : This is the central program when the interface board is used in programing mode. It reads and processes requests from operators through key-boards, and utilizes the interface board efficiently.



2. **Easy Routine Programs** : These programs are divided into processing units such as initializing hardwares on the interface board, inputting switch data, and outputting data to the LED display unit. They will help operators to use interface board easily. They are equal to computer system calls or those commands of BASIC. There are about fifty subroutines on the interface board.
3. **Training Programs** : Besides easy routine programs, there are eight more kinds of programs which are broken down to twenty six ways of using depending on the address. These programs will help operators who are beginners in computer pro-



gramming to use the interface board.

4. **“Omakase” (leave it to me) Calculation Program** : A central program when the interface board is used in calculator mode. It uses the input data from the keyboard and does various operations.

Application and Practical Training :

This new approach was applied to a real education environment to see how the method and interface board affect learning.

Subjects of the practical training : are those who have experiences in programming using high level computer languages. They understand numeric representation but have never studied assembly language and computer hardware.

Content of the practical training : The subjects learn Z80 assembly language using interface functions with I/O. To most efficiently utilize the interface board, there will be some considerations :

1. To understand the operation of computer hardware interface, subjects learn assembly language in the beginning but not thoroughly. Instead, they learn and understand the computer operation and performance of the interface board through the training programs. They also experience the differences between the interface board and

regular computer board.

2. With various I/O operations, the content will well be organized and become more interesting.
3. Since the Easy Routine Program (described before in Software Construction of Interface Board) will made assembly language look like BASIC, the subjects will be able to use less steps in programming. Therefore, programming assembly language will not be so boring and time-consuming.

〔論文の要旨〕 現在のフィールドにあるコンピュータの100%とって良いと思うがすべて産業用であるのが実態である。したがって、学校教育用としたヒューマンインタフェースも含め、学習者に対して非常に不向きであり、難解である。そこで筆者はこれら難点を克服するため、コンピュータテクノロジーの中でも最も難解といわれる、コンピュータインタフェースのシステム設計をやさしく修得するためのシステム、教授法を開発し、それらについて論じている。