ELEVATOR AV INFORMATION SYSTEM

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ABSTRACT

ELEVATOR Audio-Visual(AV) INFORMATION SYSTEM has been developed to give the passengers a more comfortable and beneficial elevator ride as well as a mere means of transportation. We have realized this system by combining a computer which exclusively controls audio and visual signals with the computers which control elevators. We will report the results of our study on the effect of this system by analyzing it through psychological and physiological experiments.

1. INTRODUCTION

Using elevators may give passengers somewhat pressed and uneasy feeling in a totally enclosed space. However, this has been generally accepted as unavoidable in using a vertical means of transportation.

Actually, elevator systems collect the largest number of traffic in a building, and further more, they are quite frequently used in our daily life, although one ride is shorter than in other transportation systems including trains. Therefore, we believe it necessary not only to make them more comfortable for passengers, but to make them more profitable for building owners.

With this concept, we have developed the Elevator AV Information System which provides passengers with information through audio and video programs along with messages, in conjunction with operations of elevator cars.

2. SYSTEM CONFIGURATION

The entire system consists of a video display and an audio device set in a car, a playback control unit, an AV system control computer and audio/video programs set in an appropriate area such as the central control room of a building. The playback control unit works in conjunction with computers that control elevator operation. (Fig. 1)

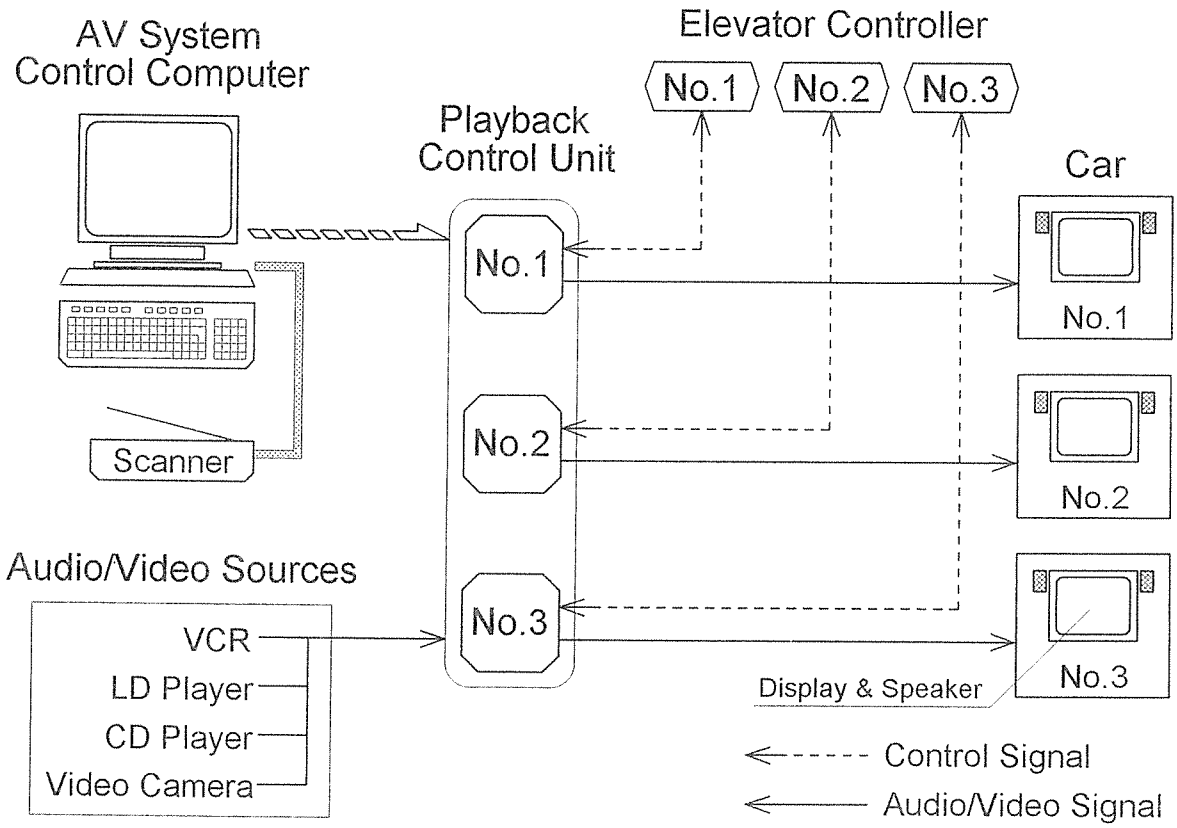

Fig. 1: System Configuration

1) Playback Control Units

These units control input and output of audio and video signals, and process pictures. A playback control unit for a specific car will communicate with the corresponding elevator controller, thus controlling necessary audio and video signals.

2) AV System Control Computer

This computer enables modifications of AV programs, and it can also be used to edit still pictures by using a scanner.

3) Audio/Video Sources

These sources include a Video Cassette Recorder(VCR), an LD player a CD player a video camera and commercial broadcasting programs.

4) Video Display

Currently, our recommendation for displays which are suitable for use with elevator systems is:

1. 21-inch color Plasma Display Panel(PDP), or
2. 10-inch color Liquid Crystal Display(LCD)

3. SYSTEM APPLICATIONS

The major usages of the system will include:

1) Providing information that will be useful within the building, for example, information on respective floors about facilities, equipment, and available services.

2) And, more importantly, actions to be taken at the time of fire or earthquake.

3) Advertising and PR media for tenants in the building.

4) Providing passengers with a comfortable and refreshing ride by presenting beautiful, scenery video pictures and sound.

As a typical example of the system usage in an office building, we are going to introduce an elevator we have had in our headquarters building in Osaka, Japan.

Fig. 2 shows a car interior with video display. A 21-inch color PDP is set above the entrance, with a slant of 16 degrees. Also, we paid extra attention to the design of lighting fixtures not to make the lighting too dazzling to passengers watching the display. We realized this while realizing an appropriate illumination in the car. Actually, the main lighting was arranged up around the wall panels, and the lighting at the ceiling center was designed to be of an indirect type for soft and adequate lighting.

Here are some examples of the display screens.

Fig. 3 is the screen to be displayed while the car is running. The video program mainly covers scenery pictures and company events. The bottom part of the screen can be used for scrolling messages.

Fig. 2: Display in Elevator Car
(Fujitec Headquarters Building)

Fig. 3: Display during Car Running

Fig. 4 is the screen to be displayed during the car deceleration. A message, announcing the next stop floor, is superimposed on a still picture. This screen can be automatically selected when the deceleration order has been issued for a next stop.

In addition to the sample usages we introduced here, this system can also be applied to elevators in various types of buildings such as department stores, hotels, event halls, condominiums and hospitals, just by reprograming the software.

In particular, the application of the system in department stores will not only enable floor guide announcements, but also contribute to arousing customer interest. In addition, an animated elevator attendant can be programmed to move and speak in accordance with the elevator operation. (Fig. 5)

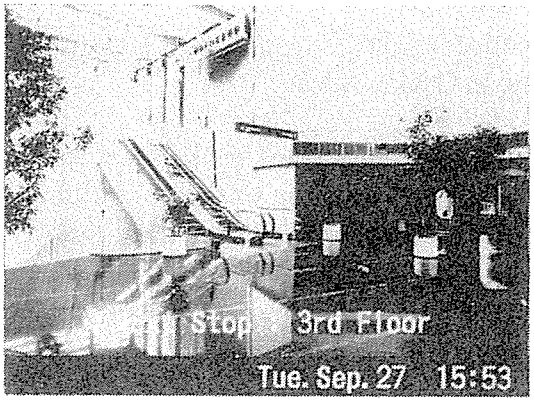

Fig. 4: Display during Deceleration

Fig. 5: Animated Elevator Attendant on Display

4. PSYCHOLOGICAL and PHYSIOLOGICAL EVALUATION

4.1 Purpose

By operating the elevator, we evaluated psychological and physiological effects of this system and the software on elevator passengers.

4.2 Methods of Experiment

4.2.1 AV Software

Before evaluating this system, we had predicted that effects of the AV software for the display would be significant. Therefore, we analyzed impressions of passengers using a conventional elevator and took a concept that adequate video software should be those which give passengers bright, active and interesting images. We prepared some AV software to satisfy this concept and repeated experiments for evaluation. Finally, we selected two software; "Landscape in the Sea" and "Puppies". It should be also noted that scrolling messages are displayed on the bottom part of the screen. (Figs. 6 & 7)

Fig. 6: Landscape in the Sea

Fig. 7: Puppies

4.2.2 Experiment Methods

We used an elevator in the Fujitec Research Tower for the experiments. The main experiments include psychological questionnaires to eight persons which were given to them after each individual ride, and physiological measurements which were given during their elevator ride (including measurements for two minutes before and after the rides).

The experiment factors include three levels: 1) pictures (None, Picture A and Picture B) 2) running time (1 min. and 2 min.) 3) standing positions (left and right side to the display).

As a result of our analysis, we did not see significant effects on both the levels of running time and standing positions. Therefore, we will herein refer to the results of our experiments on the picture levels.

4.3 Psychological Evaluation

4.3.1 Evaluation Items

We gave evaluation on the following items in an analogue scale:

1) Impression of elevator by using 19 adjectives.
2) Five items on subjective symptoms.

4.3.2 Results and Consideration

1) Effects on Impression of Elevator

Fig. 8 shows the effects of AV software on respective items for the elevator impression . Where the AV software was provided, the evaluation on the elevator impression was improved on many items. We observed almost no significant differences between respective AV software.

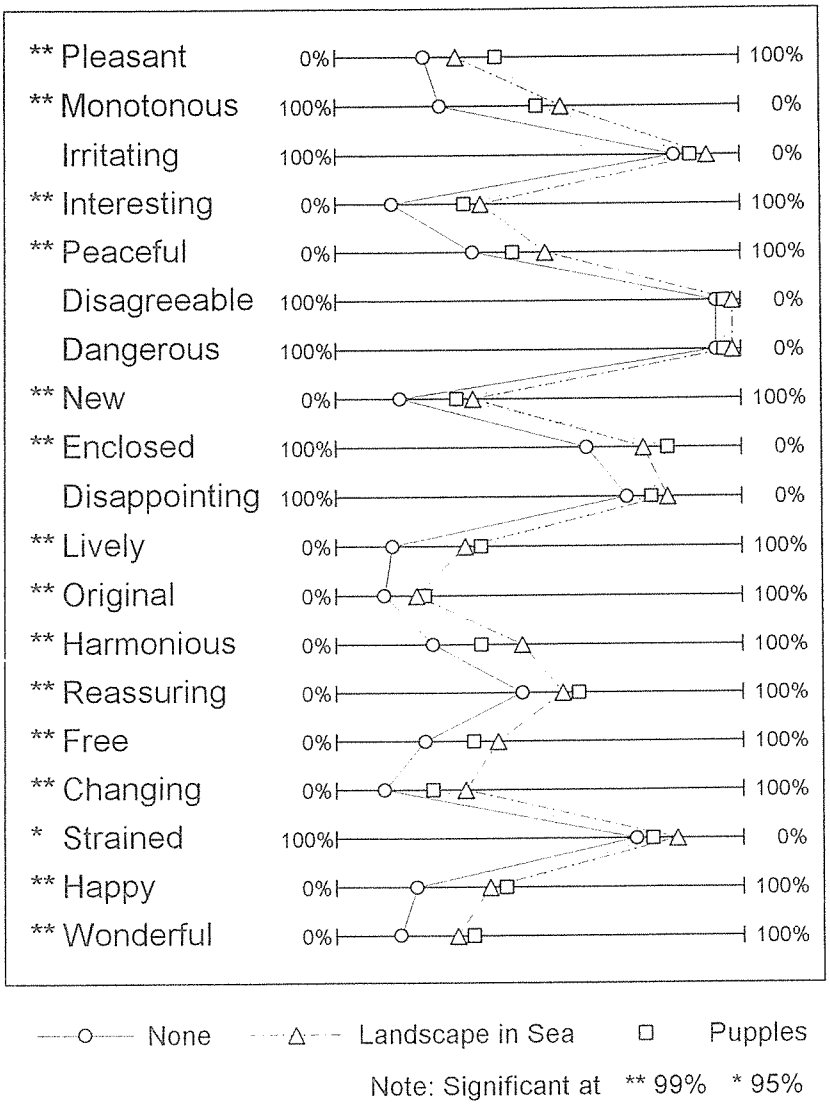

Fig. 8: Impression of Elevator according to AV Software

2) Effects on Subjective Symptoms

Fig. 9 shows the effects of AV software on respective items for the subjective symptoms. In this figure, you will note that improvement is significant in items "Felt irritating?" and "Felt boring?". At the same time, however, the index relating to eye fatigue indicates unfavorable results. This shows that we have to give further consideration to the scrolling speed of character information and types of pictures.

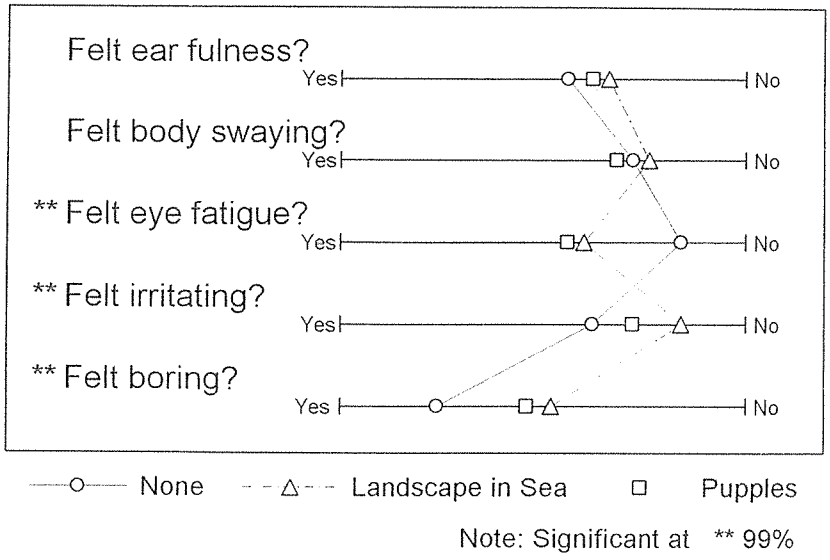

Fig. 9: Subjective Symptom according to AV Software

4.4 Physiological Evaluation

4.4.1 Measurement Items and Physiological Indexes

In the physiological study, we measured electroencephalogram(ECG). For evaluating the results, we made and used index of: EEG β wave's power ratio based on the measurement thus obtained. For details, please see the Reference 1).

4.4.2 Results and Consideration

Increments in EEG β wave's power ratio show concentration of attention, increase in the arousal level, and physiological stimulation. Decrements in the ratio means decrease in the arousal level and physiological sedation.

Fig. 10 shows the comparison of EEG β wave's power ratio for respective software. In either cases of presenting software "Landscape in Sea" and "Puppies", the EEG β wave's power ratio is higher than those of not presenting the software. It suggests that the AV system will work as good stimulation, thus activating and stimulating the passengers' brain. As a result, this will have refreshing effect on passengers within the elevator car, which tends to be monotonous.

We could see no significant difference resulting from the software difference. We saw the same results in the psychological evaluation. It can be analyzed that the software we used in the experiments were prepared and selected under the concept of improving passengers' impression of the elevator.

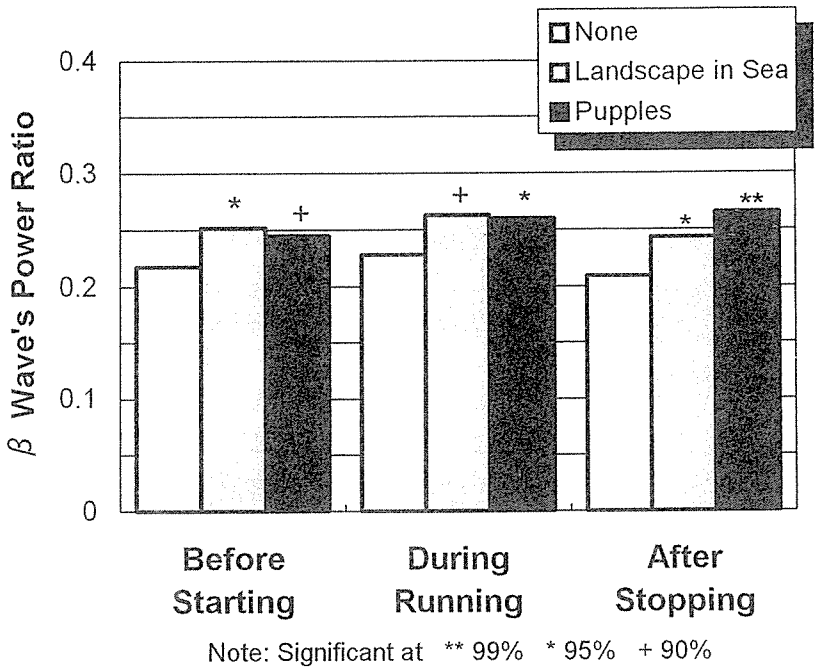

Fig. 10: β Wave's Power Ratio according to AV Software

5. CONCLUSION

We have developed the AV system in order to improve the enclosed space in elevator cars, and through the psychological and physiological evaluation experiments, we had significantly better evaluations on the elevators with the AV system than conventional elevators without the system as stated above.

As elevator rides become more comfortable, it will surely affect the impression on the whole building more greatly. We will further study the use of buildings and elevator systems, and develop our research on adequate AV software in order to fully realize the effects obtained through our experiments this time.

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BIOGRAPHICAL NOTES

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