

# Virtual Stimulus Cognitive Model for Autonomous Experience Learning

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**Abstract**—Recently, a study using virtual reality in order to provide an effective self-directed training experience has been actively pursued. Especially, in case of dangerous safety education, it is difficult to conduct practical training, so education using virtual reality technology is emerging as an alternative. This paper presents to virtual reality simulator model, and in particular, in reality, experience person to be able to experience the virtual reality through the visual and tactile experience customer electrical accidents variety might actually occur. It is what electrical safety accident prevention education that allows the immersive sense of reality and substantial, to enhance the teaching effectiveness while also ensuring the safety of, about the virtual reality simulator system.

**Keywords**— *Virtual; Learning; Cognitive*

## I. INTRODUCTION

Recently, various cognitive autonomous learning through virtual reality is being studied [1-4]. Electrical hazards, including electric shock in general, have occurred at a rate the general public as well as electricity-related workers professional not a few, but in the case of children under the age of 15 cognitive ability is reduced, especially when you can provide the cause of electrical accidents unconsciously in the course of life due to lack of experience and knowledge of electrical accidents, electrical accident actually occurs, major damage ability to handle this is insufficient If the result in many cases. Also, in the case of adults, the use of electrical equipment for various in modern life is necessary, despite the general education for electrical safety accident prevention individual contextual and systematic rows properly. It is a situation such as fire or electric shock by electricity's increased due to circumstances we cannot.

In addition, education of order to prevent electrical accidents even if carried out, in the past, audio-visual education of the image center and print distribution of text heart, such as, understanding and concentration packing education simple form the main manually there is a problem that the efficiency of education is greatly reduced degree fell.

## II. STIMULUS MODEL

To prevent electrical safety accidents caused by carelessness of the user account for a large part of life electrical accidents, in reality, an object of the present idea is to provide electric accidents many that might actually occur by doing so with the experience of being clear in five senses hands-on immersive education that is implemented as a virtual reality the types of scenarios, to stimulate visual and auditory, and tactile, to maximize the effectiveness of safety education in electrical by not only can be enhanced to provide customized electrical safety training in accordance with the hierarchy of educational subject, electrical safety accident prevention education can be secured to ensure the safety of survivors of education, provides a virtual Reality Simulator system it is intended to be.

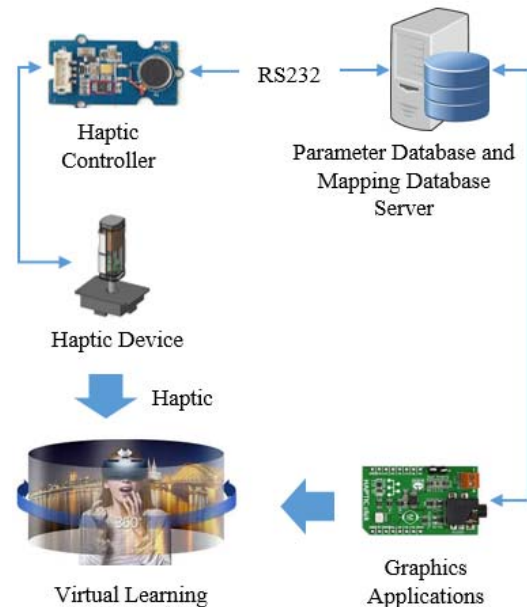


Fig. 1. Virtual Stimulus system

A main server unit that stores various data for realizing virtual reality, processing, prevention education electrical safety accidents to solve the problems described above, virtual reality simulator system receives various data from the main server unit. It is configured to include a virtual experience unit that, it provides a virtual reality to a user, to the main server unit sends the user feedback,

A database unit consisting of a database parameter that stores a mapping database that stores mapping data of various objects in three-dimensional virtual environment, stimulation parameters corresponding to the context object mapping data of the virtual environment, the main server portion of said mapping. It includes a; graphics application that appears as a three-dimensional simulation image signal that is optimized for immersive screen mapping data of various objects in three-dimensional virtual environment is stored in the database.

Virtual experience portion described above, and forms a curved surface with a panoramic type viewing angle of  $360^\circ$  less than  $180^\circ$ , immersive to display to the outside by receiving a three-dimensional simulation image signal from the graphics applications of the haptics for receiving the stimulation parameters to send and receive data via the serial communication type and screen, and the graphics application, in synchronization with each other, corresponding to the situation of the virtual to the graphics application is implemented from the parameter database is characterized in that it comprises; Haptic Part consisting haptic device that provides the user with physical stimulation corresponding to the stimulation parameters by the control and the controller, the haptic controller according to the stimulation parameters.

### III. SIMULATION

By using immersive screen over  $180^\circ$  viewing angle of the common people to drive the simulator system to provide a realistic sense of realism excellent, the present model, so that the user can immerse the curriculum to be able as well to, by providing with a tactile stimulation corresponding to the situation that is display immersive screen, with experience cognitive clear rich through sensory organs, the actual user is effective to be able to increase the educational effect excellent.

Further, by allowing save the mapping data of the various objects of various three-dimensional virtual environment mapping database portion, the present model provides the user the occurrence of a variety of accidents that occur in real life. In addition to allowing experience, by saving to classify the stimulation parameters stored through research in brain parameter database portion, tactile that is optimized in accordance with such user age and conditions are reproduced in the virtual reality. There is another advantage to be able to be able to provide a stimulating Na, while ensuring the highest priority user safety and to the electrical accident prevention education customized.

Here in after will be described in detail with reference to the drawings a specific embodiment of the present model.

Figure 1 is a block diagram of a virtual reality simulator system of electrical accident prevention education according to the present model.

Referring to Figures 1, main server unit that stores various data for realizing virtual reality, processing, Virtual Reality Simulator system electrical accident prevention education according to the present model, the main server and includes a virtual experience unit receives various data and provides a virtual reality to a user, transmits the main server unit, user feedback. At this time, the main server unit, graphics applications database unit for storing various data is displayed as a video signal by processing the graphic data related said database unit.

In Graphics application, the data provided said database unit, a variety of objects in three-dimensional virtual environment to implement via a virtual reality scenarios electrical accident being programmed by the containment is a map data associated with, and mapping data of this is that as data is modeled by graphics operations of the computer and stored in a compressed mapping database.

Is rendered on the video signals from the graphics applications described above, mapping data of various objects in three-dimensional virtual environment that is stored in the map database is transferred the virtual experience portion.

Virtual experience portion described above, immersive screen is equipped to be able to receive a video signal such that, the exposed virtual reality visual user, immersive screen above, intended to be a liquid crystal display device or the like (LCD), it's forms a curved surface in particular, rather than forms a flat surface such as a display device a general. It is characterized, it is to have a panoramic type viewing angle over  $180^\circ$  viewing angle of the people is desirable. In this case, the image is composed of a curved surface display device panoramic type optimized undistorted the immersive screen to be exposed. Warping the graphics application, etc. Warping Technology by applying, to become the rendering process that the mapping data. Thus, by setting the configuration of a curved surface display device panoramic type  $360^\circ$  less than  $180^\circ$  viewing angle immersive screen, the exposed image that is optimized for this user Simulator System. The effect is amplified further realism and realism while educated through and allow immersed deeper into the virtual reality they appear.

Haptic Part that provides a virtual reality to the user, but the Haptic Part is, to the user, especially it will provide a tactile virtual reality. That is, in response to electrical safety accidents of various occur in situations such as those implemented in a virtual reality, and generates vibrations or electrical stimulation to the user. At this time, in the course of transmission to generate vibration or electrical stimulation to the user the Haptic Part are synchronized in time with the virtual reality visual that is exposed above immersive screen it is very important. For example, if you are doing an electrical accident prevention education scenario of virtual reality that implements the risk of electric shock, to match when you exposed the image of the moment when the user touches the outlet and wires immersive screen above. It should be to feel the electrical stimulation to the user via the above Haptic Part exactly in time. Therefore, the synchronization process between the

graphics application and main server unit that transmits a video signal immersive screen. At this time, it is connected to a communication protocol that can move data synchronization between the graphics applications and haptic controller. In this present model is implemented using a serial communication method. Meanwhile, the haptic device, the said device generates the vibration and electrical stimulation response to a control signal of the haptic controller me to be visible to a user, but electrically generated when the that as well as not to threaten the safety of the user stimulus Na is too strong, strength is too small, the effect of actual experience is willing to prevent it from falling is required. Also, if you do not provide a change in size, such as electrical stimulation generated the haptic device as well, such as by the age of the user, there will be an effective education and safe for children and the elderly. Therefore, based on the study of brain or, calculate the stimulation threshold age that experts in the field corresponding to various situations, storing the data, parameter database the database portion. This allows you to settings such as age and health of their own before users can start training, you enter the virtual reality, mapping of the various objects of a three-dimensional virtual environment from the map database according to the situation after you have rendered to send graphics application of the data, and now exposed to the video to the user through the immersive screen, etc. If electrical stimulation of education progress is required, extracts the parameters from the database the stimulation parameters in accordance with the age and health of the user and situation corresponding to the graphics application.

Haptic Part according to one embodiment of the present model joystick capable haptic controller, user operation in hand, buttons for operation and various settings, electrical stimulation generating device for generating the required electrical stimulation, the power required to drive the Haptic Part, and includes a switch for controlling the operation of the Haptic Part. In this case, electrical stimulation unit for receiving the electrical stimulation of a predetermined size from the electrical stimulation generator to stimulate the user's hand, the joystick, the oscillation of constant magnitude solenoid diverse vibrating motor for generating, the pattern of vibration, and includes a cable to transfer data and various signals.

Stimulation by vibration generated from the joystick above likewise under the influence Parameter Database graphics applications described above, control is the haptic controller.

The Haptic Part may be configured so that it can be put in the hands of the user running the training with the joystick stimulation of the vibrating and non-electrical stimulation, joystick above. it is an example and to provide a thermal stimulation using a heating device. Further, not only serves to transmit the various stimuli in the hands of the user performing the educational user while watching immersive screen, joystick is a virtual reality on can be configured to function as can be controlled and the progress of the scenario and the direction to be moved is desirable. In this case, the signal by the control of the joystick is to drive the simulator system status that is fed back the graphics application via the haptic controller corresponding to be expanded by to become, without performing the educational passively according to the

instructions the user has determined uniformly, it is possible to experience various situations based on the determination of the self-actively.

#### IV. CONCLUSIONS

In reality, the present model provides substantial while ensuring the safety of people who experienced so as to experience the virtual reality through the visual and tactile experience customer electrical accidents variety might actually occur prevention education in electrical safety incidents that allows immersive and realistic, to enhance the education effect, what about the virtual reality simulator system,

A main server unit that stores various data for realizing virtual reality, processing, and receives various data from the main server unit provides a virtual reality to a user, the present model, wherein the user feedback. It is configured to include a virtual experience portion for main server unit transmission,

And database unit consisting of a database of parameters that stores the mapping database that stores the mapping data of the object and three-dimensional virtual environment, the stimulation parameters corresponding to the context object mapping data of the virtual environment, the main server part, to the mapping database It includes a graphics application that is displayed as a three-dimensional simulation image signal that is optimized for immersive screen mapping data and object three-dimensional virtual environment is saved,

Virtual experience portion described above, and forms a curved surface with a panoramic type viewing angle of 360 ° less than 180 °, immersive to display to the outside by receiving a three-dimensional simulation image signal from the graphics applications of the haptics for receiving the stimulation parameters to send and receive data via the serial communication type and screen, and the graphics application, in synchronization with each other, corresponding to the situation of the virtual to the graphics application is implemented from the parameter database is characterized in that it comprises; Haptic Part consisting haptic device that provides the user with physical stimulation corresponding to the stimulation parameters by the control and the controller, the haptic controller according to the stimulation parameters.

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