

Type of presentation: Poster

**IT-10-P-1846 A Remote Control/Observation System and an Operation Support System for the Ultrahigh Voltage Electron Tomography**

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The 3MV ultrahigh voltage electron microscope (UHVEM) at Osaka University has been widely used for electron tomography (ET) of thick specimens, taking advantage of high penetration power of incident electrons. Since a large number of images should be taken in the experiments for ET, it is desirable that even in a remote control/observation mode, the image recording can be done automatically from a remote laboratory. To meet this requirement, a remote control/observation system with an automatic-image-recording support function has been designed for the 3MV microscope.

An overall diagram is shown in Figure 1. Therefore we developed the item such as follows about a operation support system.

(1) high-precision specimen-tilting, (2) automatic focusing, (3) automatic correction of a sample position, (4) automatic correction of brightness, and (5) automatic sequence control for imaging (Figure 2(left)). With respect to the automatic focusing, a new type of technique has been developed, which an optimized focus condition is determined from the image sharpness. The technique is able to provide the optimized focus condition with higher accuracy.

The developed system is useful for combination with the remote control/observation system which is separately developed using high definition image transfer technique and remote operation software. Image observation with the microscope is carried out using a high definition TV with 1125 lines/scan (Full HD video). The full HD video data can be transmitted with only a quite limited bandwidth by using H.264 codec. Namely, it is possible to transmit an image even in the Internet environment. We do not need global IP address for connection because we use cloud service. Consequently, it becomes possible to perform ET experiments from a wider range of remote laboratories in the world that have the Internet environment. Figure 2(right) is an example of automatically performing tomography observation by combining the developed system with the remote control/observation system.

We have developed the efficient system to reduce the labor task on which researchers expended substantial time and effort in experiments.

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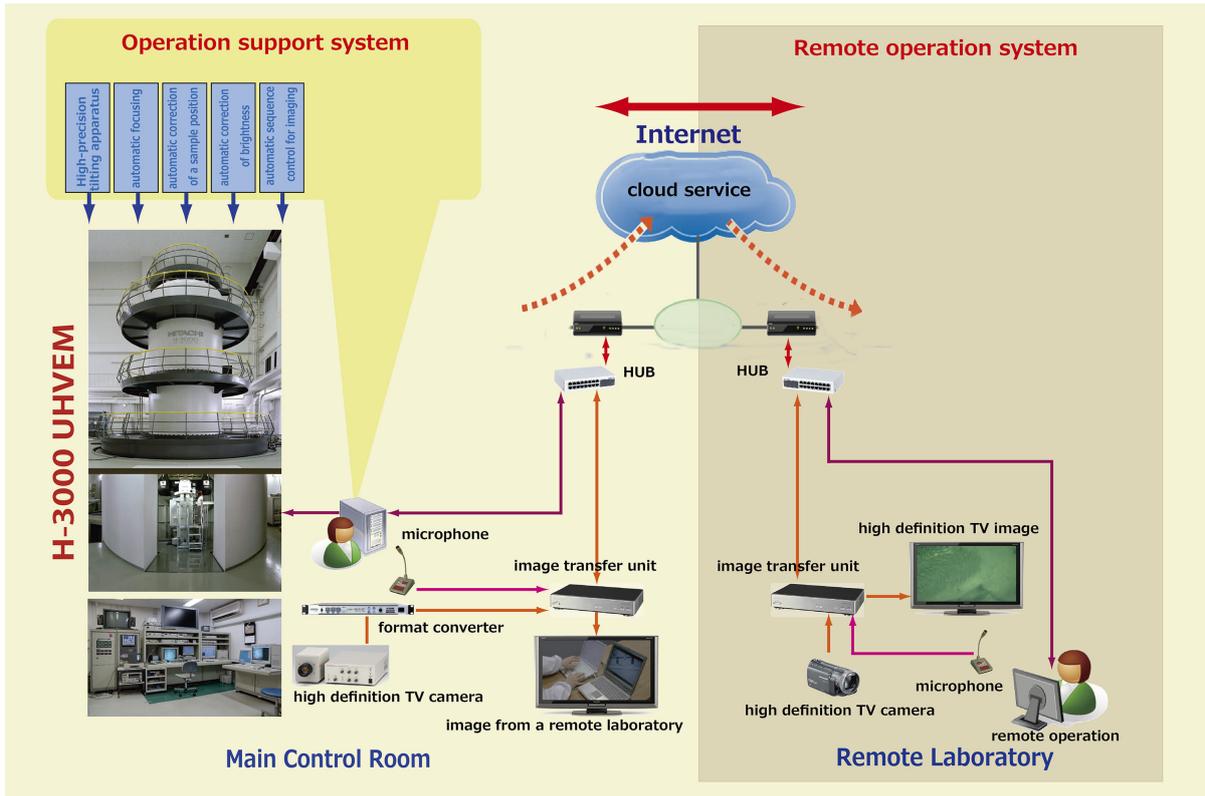


Fig. 1: An overall diagram

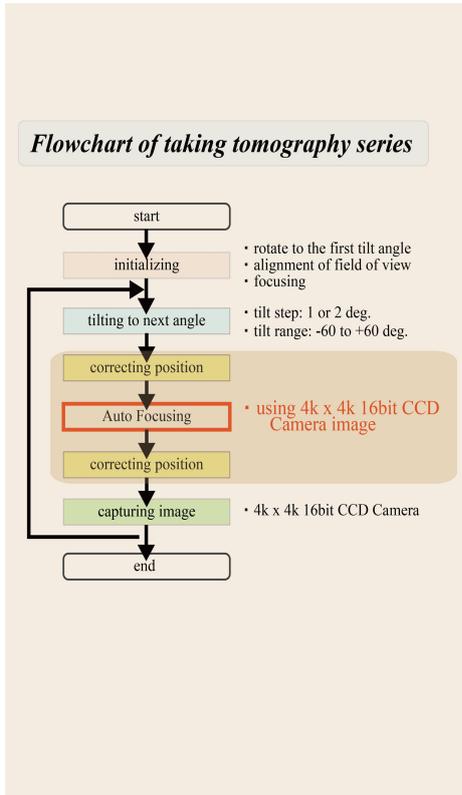


Fig. 2: Automatic sequence control for imaging (left), An example of automatically performing tomography observation by combining the developed system with the remote control / observation system (right)