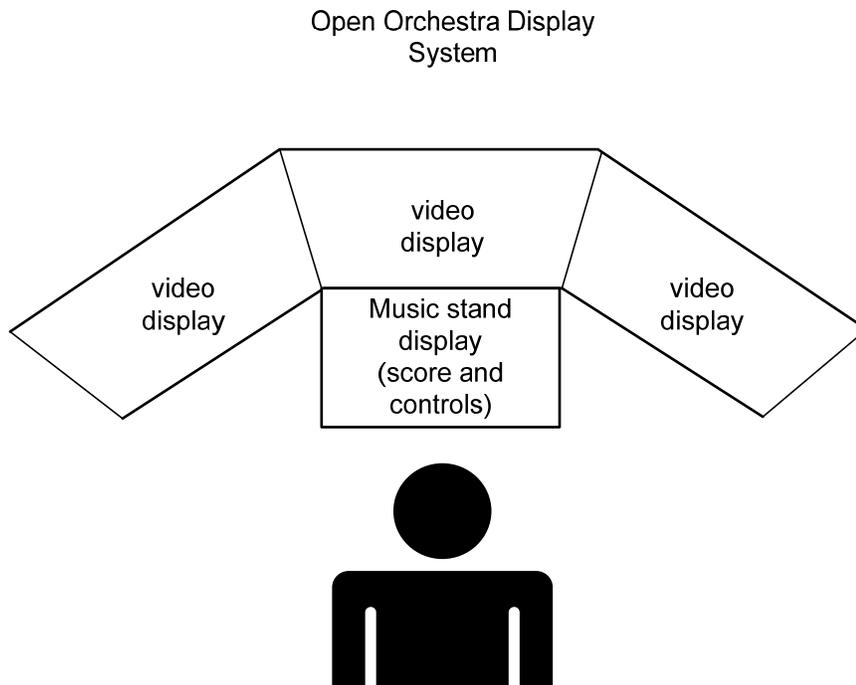


# Network-Enabled Platforms (NEP-2) Program Progress Report – August 31, 2010.

## Project NEP54: Open Orchestra Appendix 1: Revised Video and Audio Acquisition Plan

### Video Acquisition Plan

The student will see the conductor and relevant part of the orchestra on a panoramic display as would the selected musician or vocalist and will hear the orchestra with that performance removed. The student will also have a music stand display of the musical score and system controls. As described in the original SOW, the panoramic display was to consist of three 24" monitors. This has now been increased to 32" monitors to increase the immersive effect of the system.

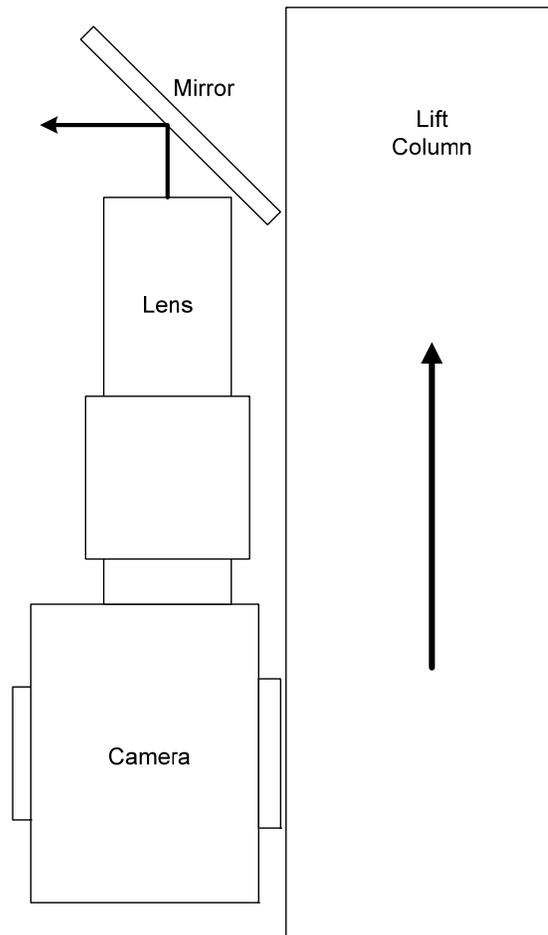


The problem with acquiring three simultaneous video streams for display in this manner is that all three cameras must be co-located where the student would be to give the correct visual perspective on each screen. This is a major challenge given the size of the high definition broadcast cameras and their lenses and the need to see objects that are very close to the student.

## Camera Rig Design

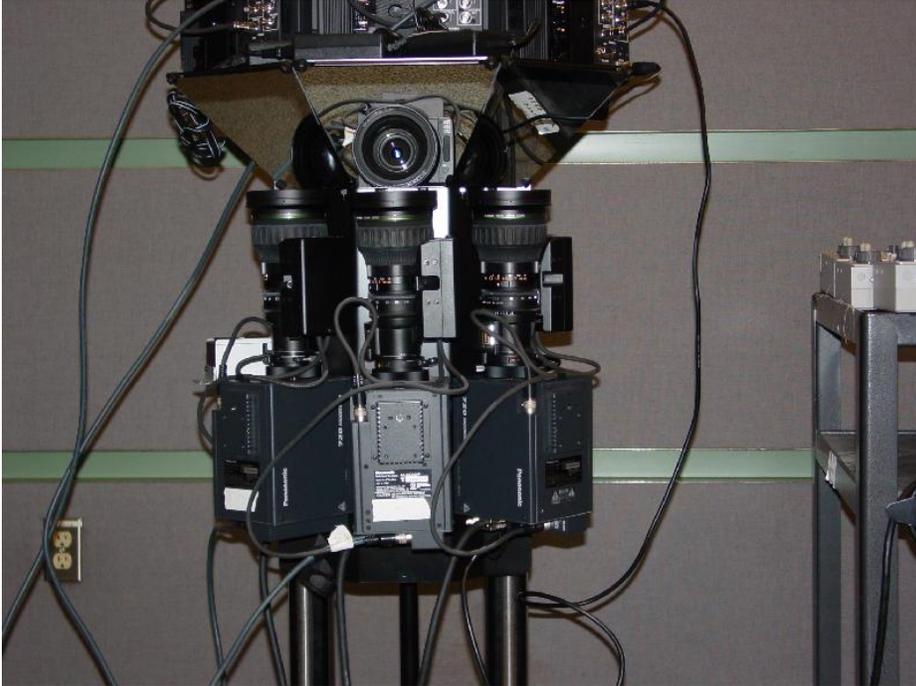
The answer is to point the cameras vertically toward the ceiling into a front surface mirror mounted at a 45 degree angle to allow all three cameras to see what they should see if they were all co-located where the student's head would be. The cameras are mounted on a central lift column which is placed where the student would be.

Side View of Camera, Lens, Mirror and Lift Column  
(camera mount, monitor platform and column legs removed)



The camera lift column can be raised and lowered depending on whether the student would normally be sitting or standing to play a particular instrument. Similarly the workstation used by the student to view the panoramic video will be able to be raised and lowered to the correct position.

The three cameras are mounted vertically on the lift column so that they are pointing into three mirrors that are positioned to see what the student would normally see if the student's head is just behind the mirrors.



The lift column is mounted on a base with casters for easy movement to different positions without the need to re-align the cameras.



## Simultaneous Video Recording

The plan is to video record the jazz band and classical orchestra performances from six different positions representing six different instruments. There is also an introductory recording from the conductor's position so that the student can see the entire band or orchestra before choosing their instrument.

The jazz band recording at McGill's Pollack Concert Hall shows the camera rig in the conductor's position with recording equipment and monitors at left. The large monitors show what the student will see.

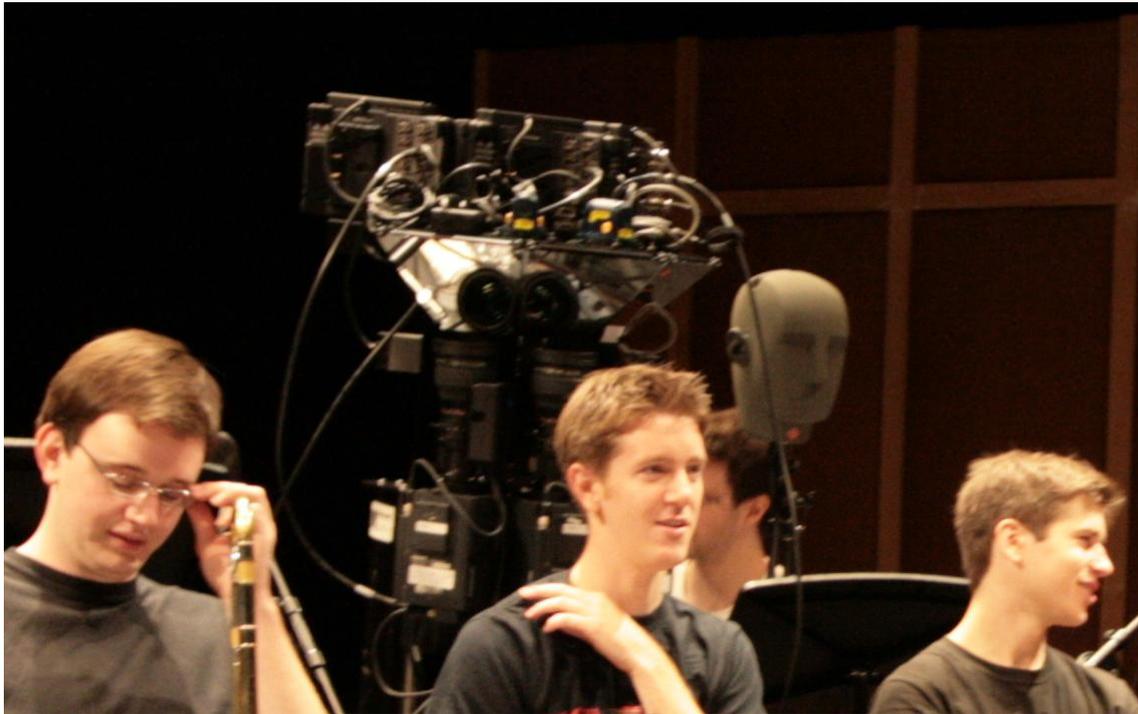


Due to delays in designing and building the camera rig at McGill, those tasks were transferred to a Canadian supplier, Melnik Resources Ltd. Two rigs were built, one for use at McGill and the other at UBC. Two rigs require a total of six cameras and six video recorders.

Although the CIRMMT research centre at McGill has six high definition broadcast cameras, it only had three high definition digital video recorders. Arrangements were made to trade two other videotape recorders no longer being used by CIRMMT for an additional three high definition digital video recorders with only the cost of shipping being charged to the project.

## Audio Acquisition Plan

The plan is to have one audio recording for each instrument position. The musician in that position does not play. Instead a dummy head binaural stereo microphone records what that musician would hear. The dummy head resembles the human head and has two microphone capsules built into the ears. It is shown to the right of the camera rig which in this case is replacing the first trumpet player.



All of the other players in the orchestra are recorded in a close perspective so that each audio track can be isolated with a minimum of leakage into the audio tracks of other players. This enables the audio tracks to be mixed so that they can either mimic the sound heard by the dummy head at that musician position or the sound heard by the conductor and audience.

The musician in that position will later be recorded playing alone in a sound studio while listening to the original recording on headphones. The student who later uses the system to replace that musician is able to turn that audio track off or on to either play that part or hear a professional playing that part.

All scenarios are recorded as stereo group stems (with or without a given instrument). The software player looks for the correct files and plays them from a remote server to the user's workstation. The workstation provides means for choosing the stems to listen to and to adjust the balance between them. Reverberation and ambience are added in post-production process to create correct auditory perspectives (sense of relative distance and size between groups of instruments).