Timeline on the CAVE Floor 6DOF Motion Platform Construction

for the

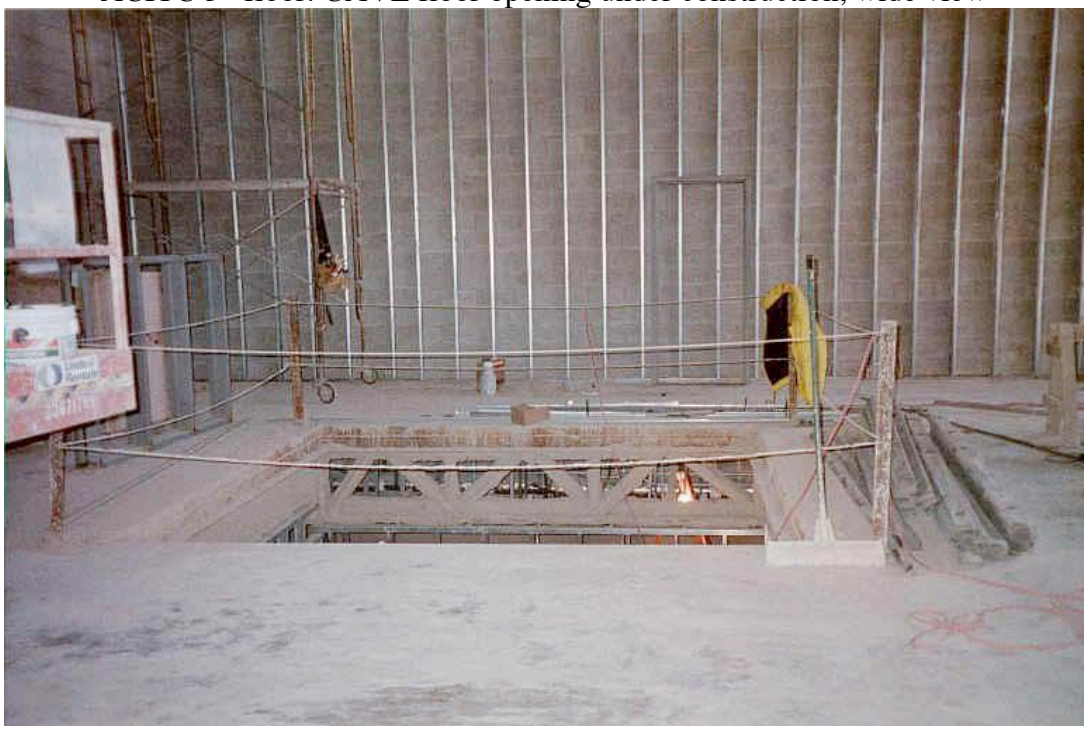
ONR Ship Crane Project

by

Lance Arsenault, John Kelso, and Ron Kriz

ACITC 3rd floor: CAVE floor opening under construction, tall view

ACITC 3rd floor: CAVE floor opening under construction, wide view



ACITC 3rd floor: CAVE floor substructure under construction

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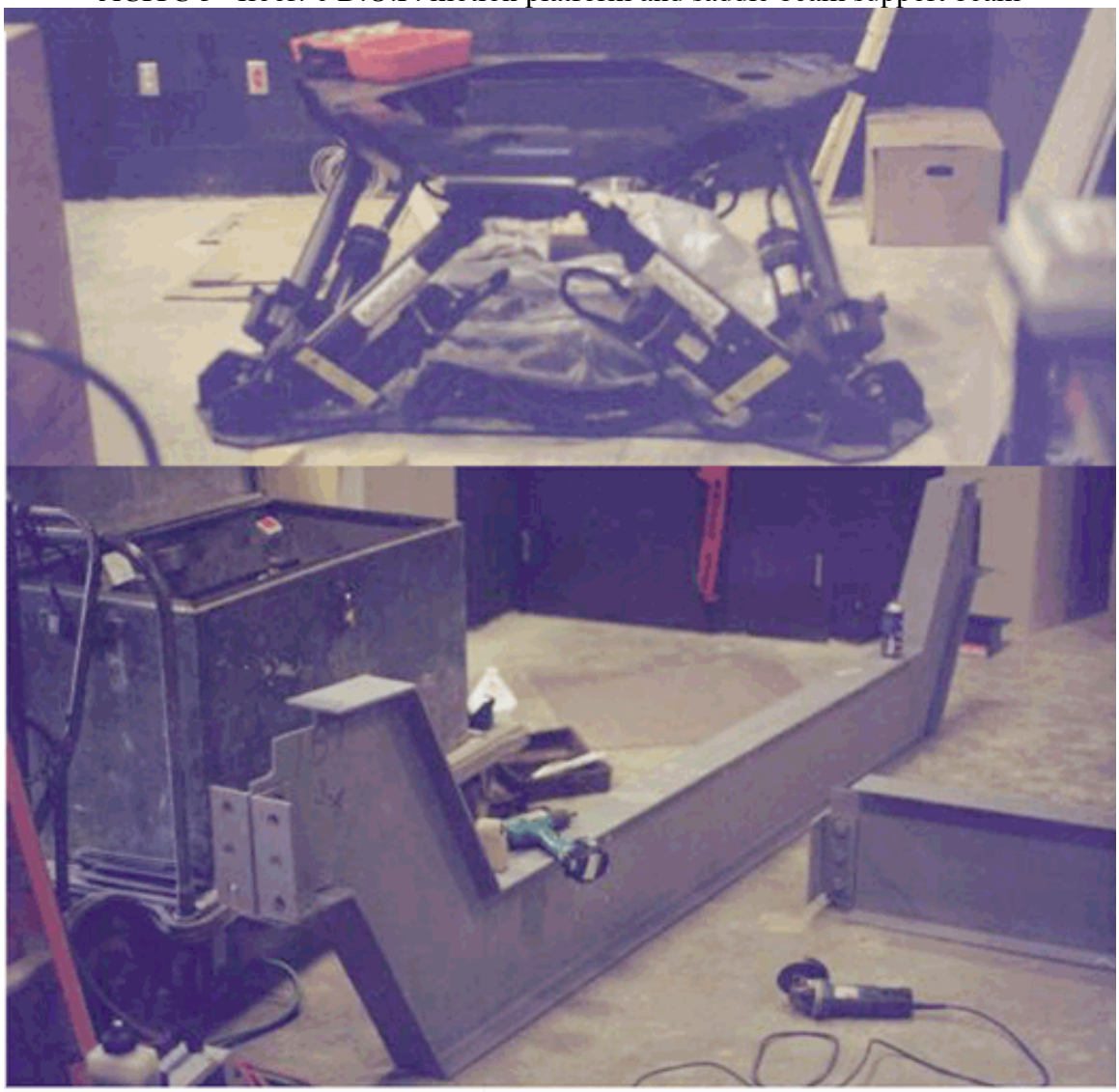
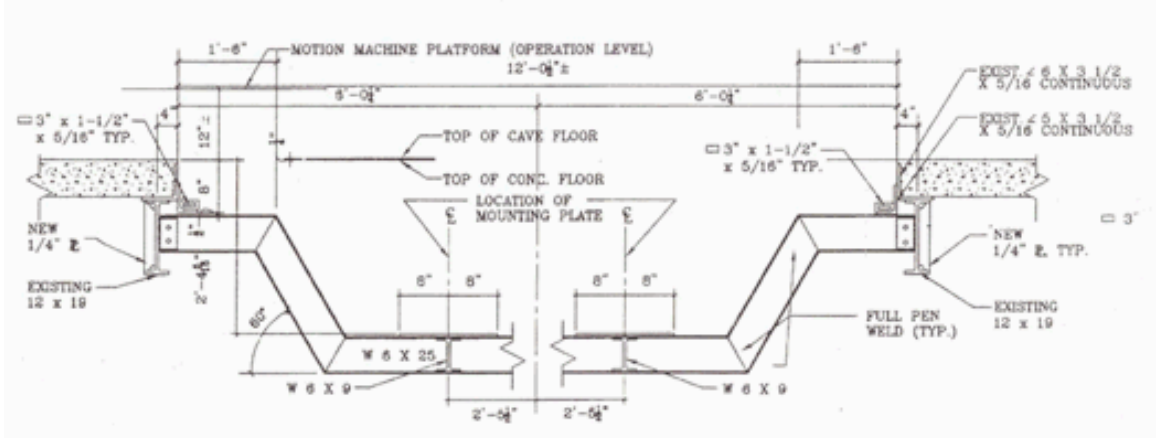
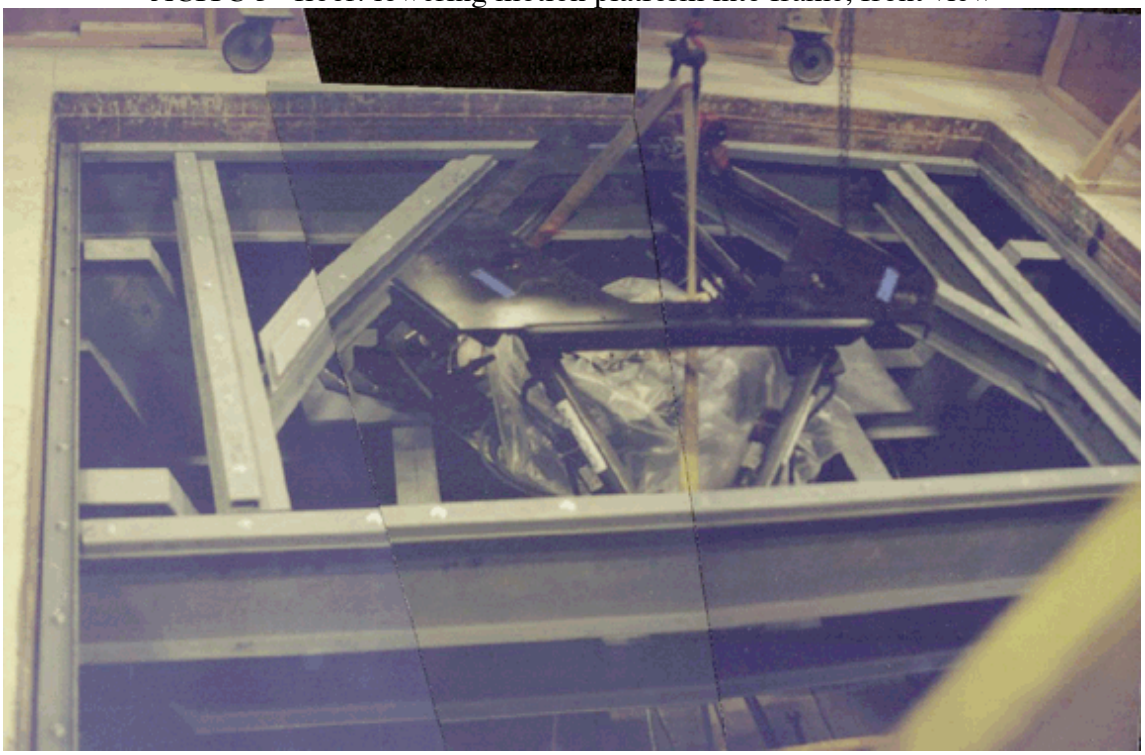
ACITC 3rd floor: 6 D.O.F. motion platform and saddle beam support beam



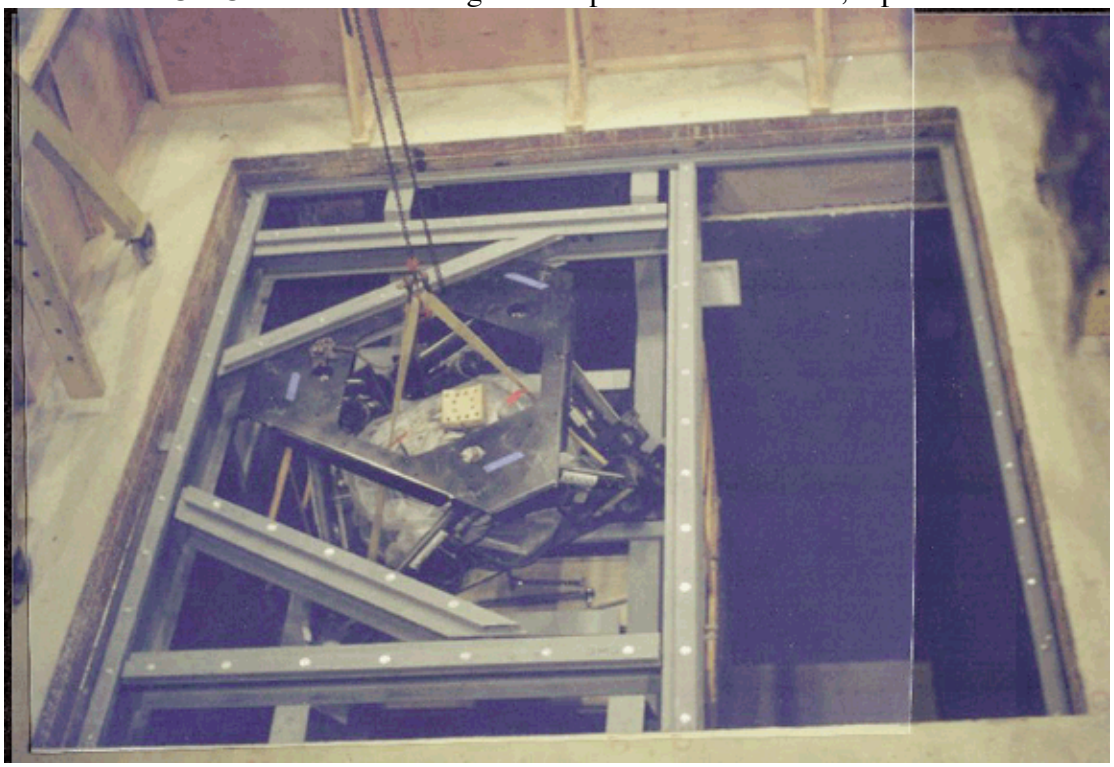


ACITC 3rd floor: lowering motion platform into frame

ACITC 3rd floor: lowering motion platform into frame, front view



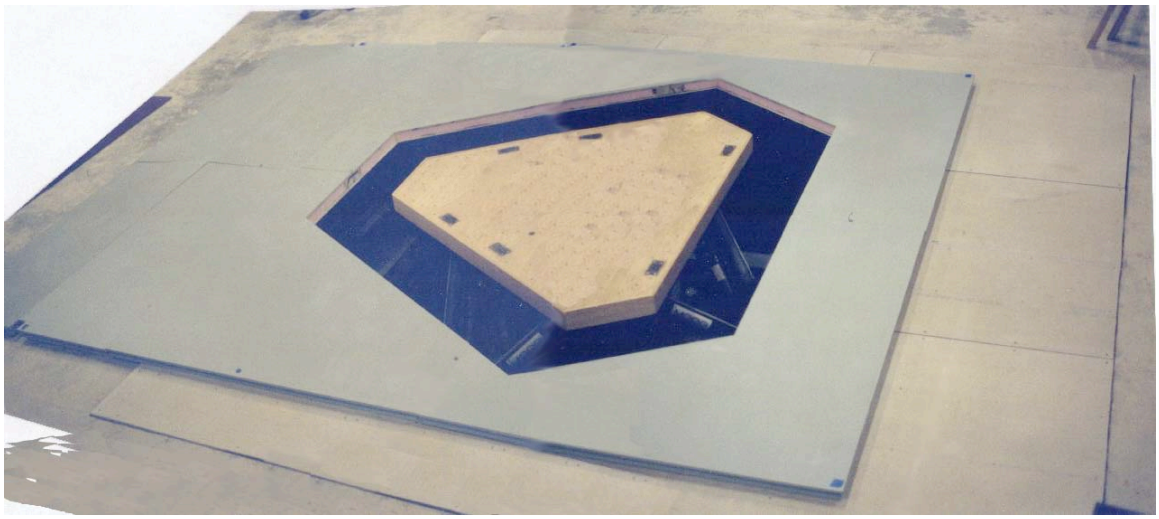
ACITC 3rd floor: lowering motion platform into frame, top view



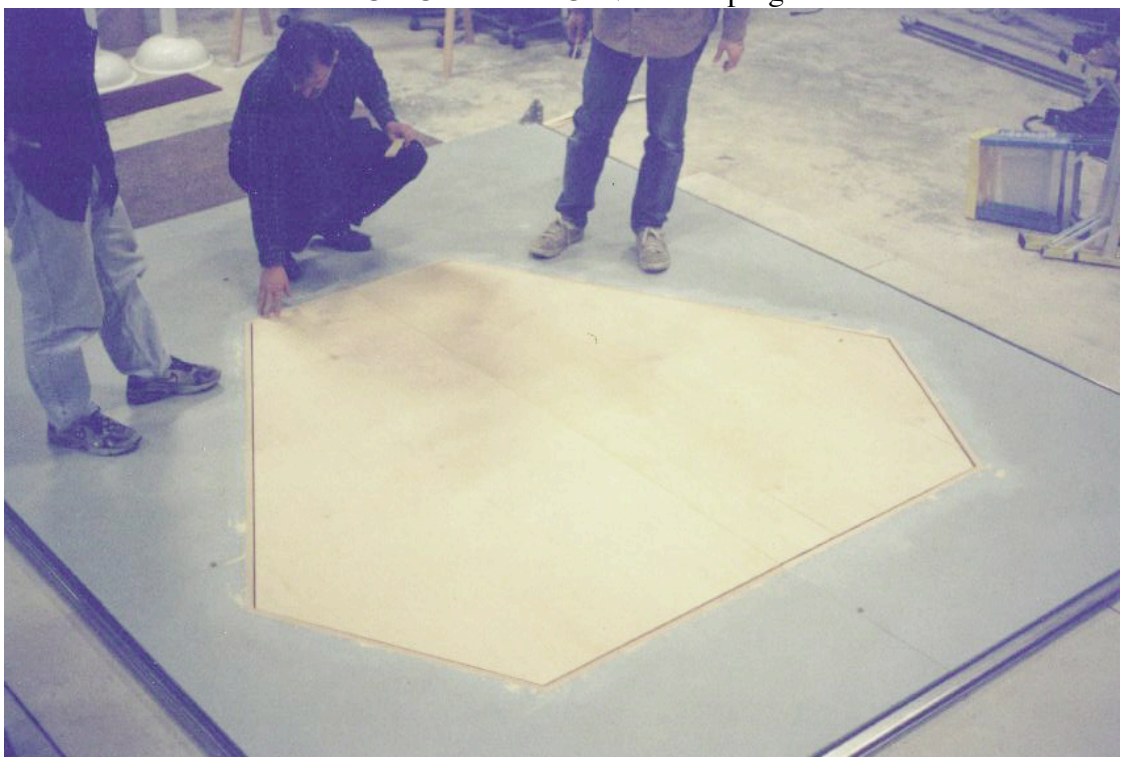
ACITC 3rd floor: framing prior to cement board

ACITC 3rd floor: framing with cement board

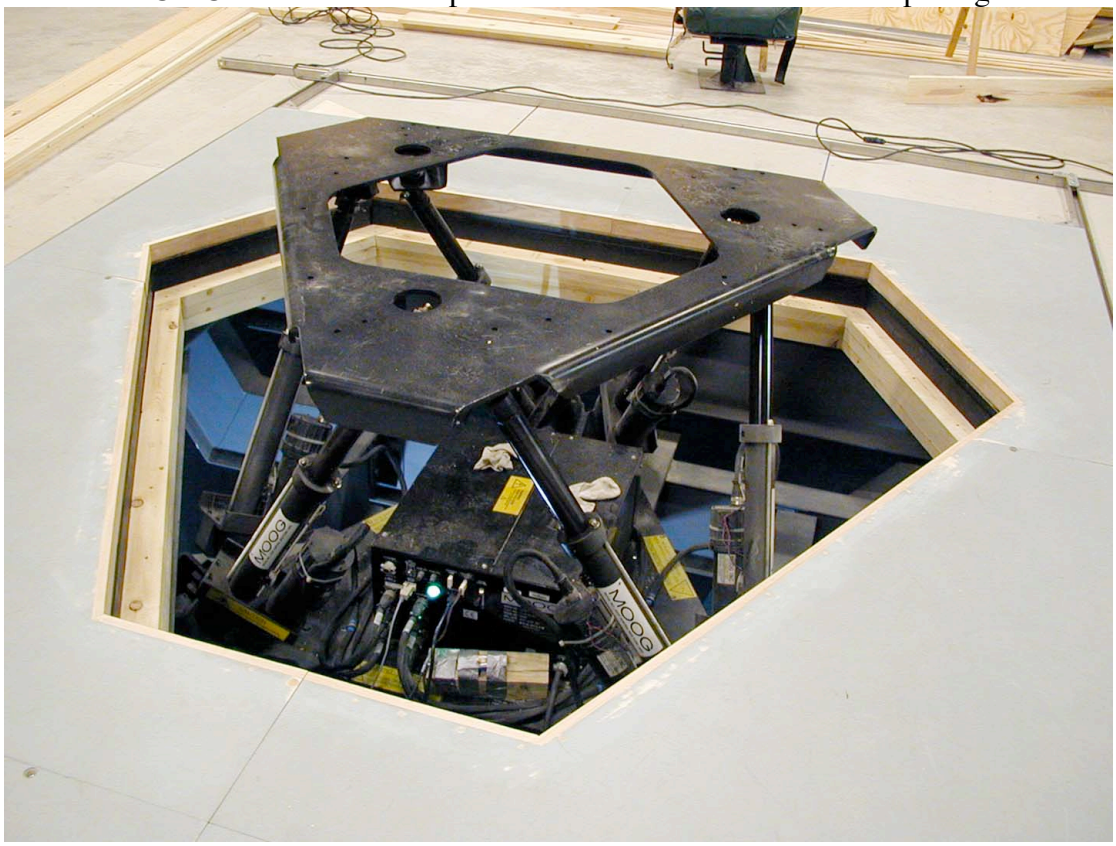
ACITC 3rd floor: CAVE floor cutout with chair mount



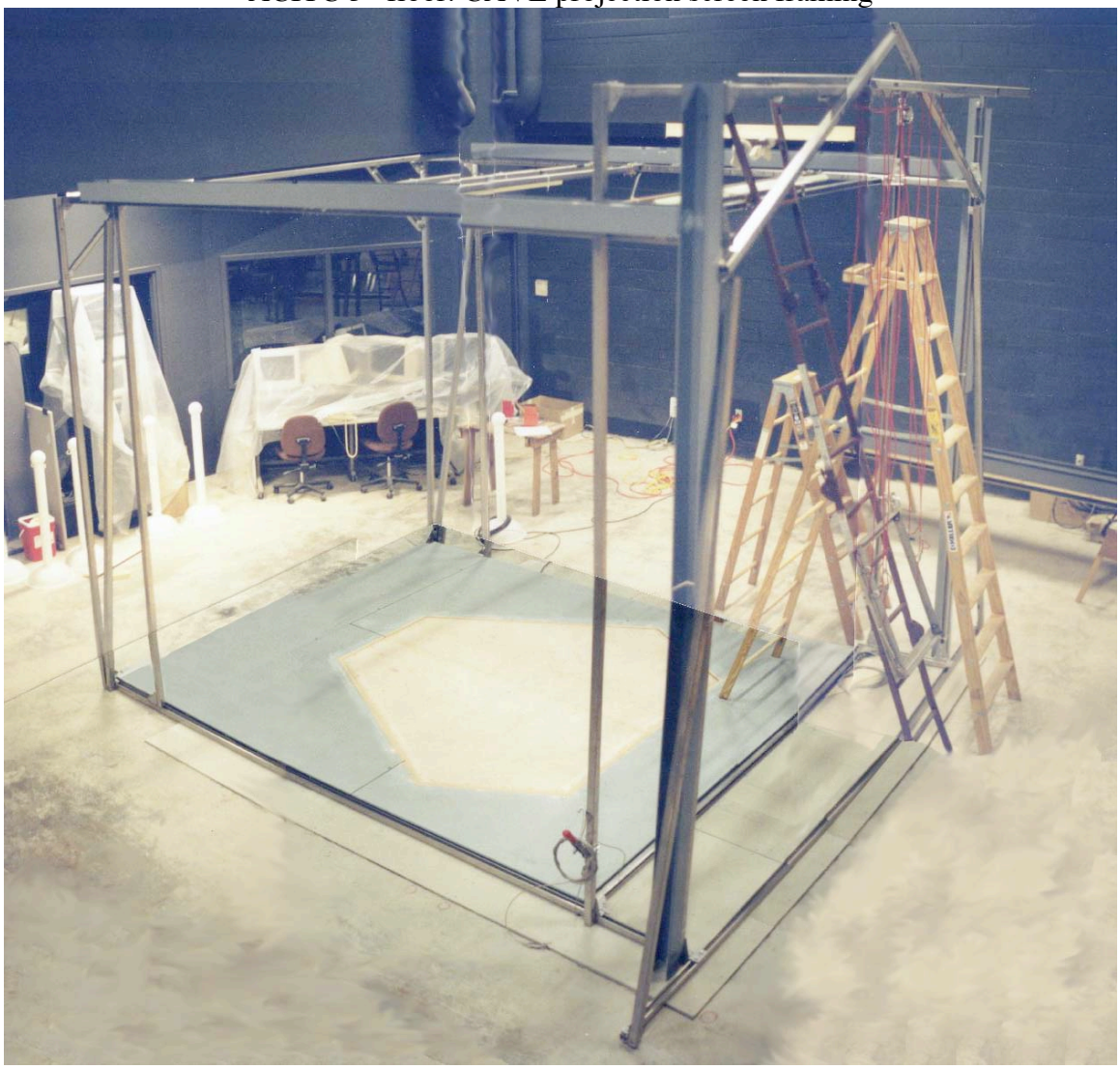
ACITC 3rd floor: CAVE floor plug



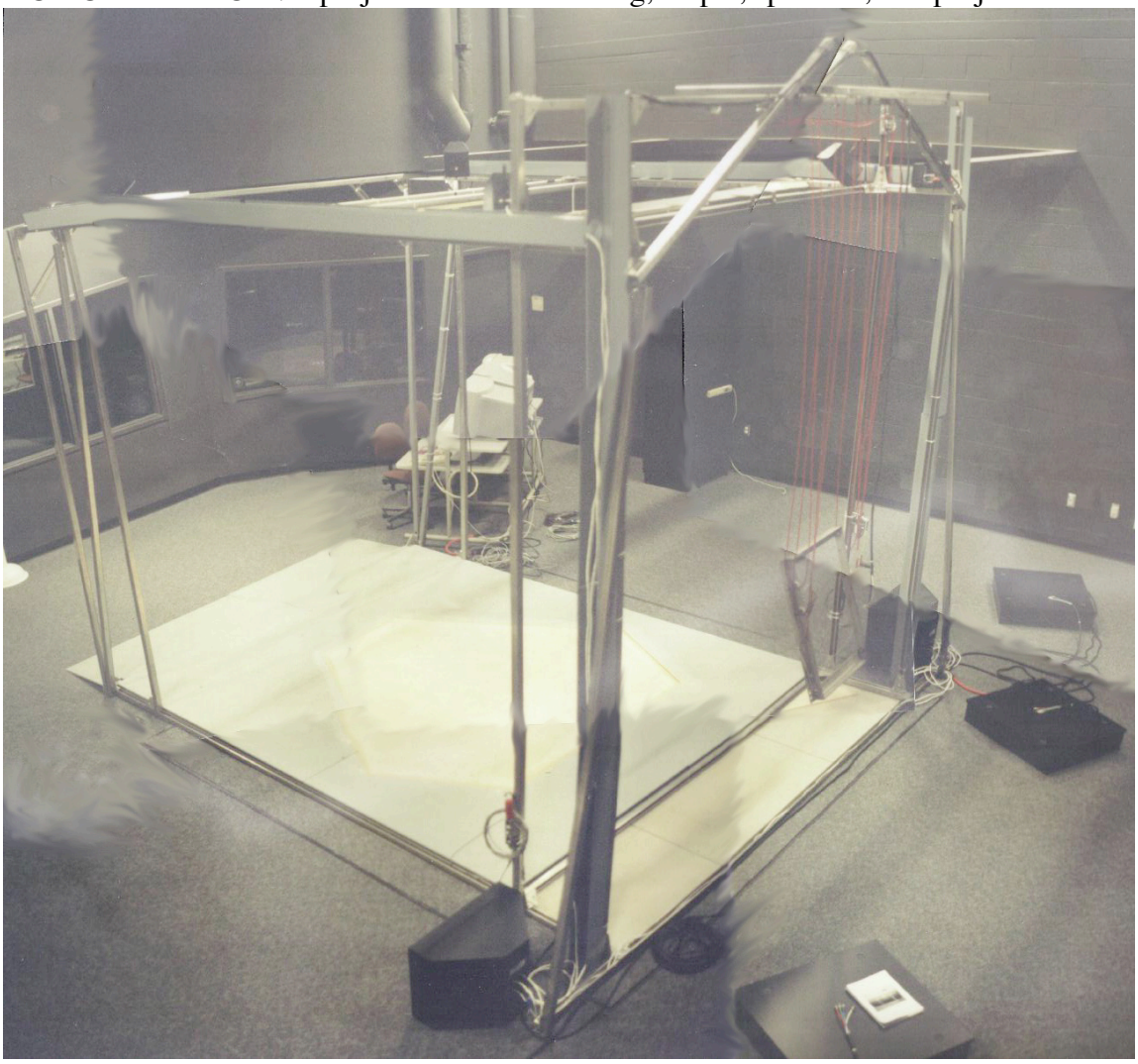
ACITC 3rd floor: motion platform extended thru cave floor opening



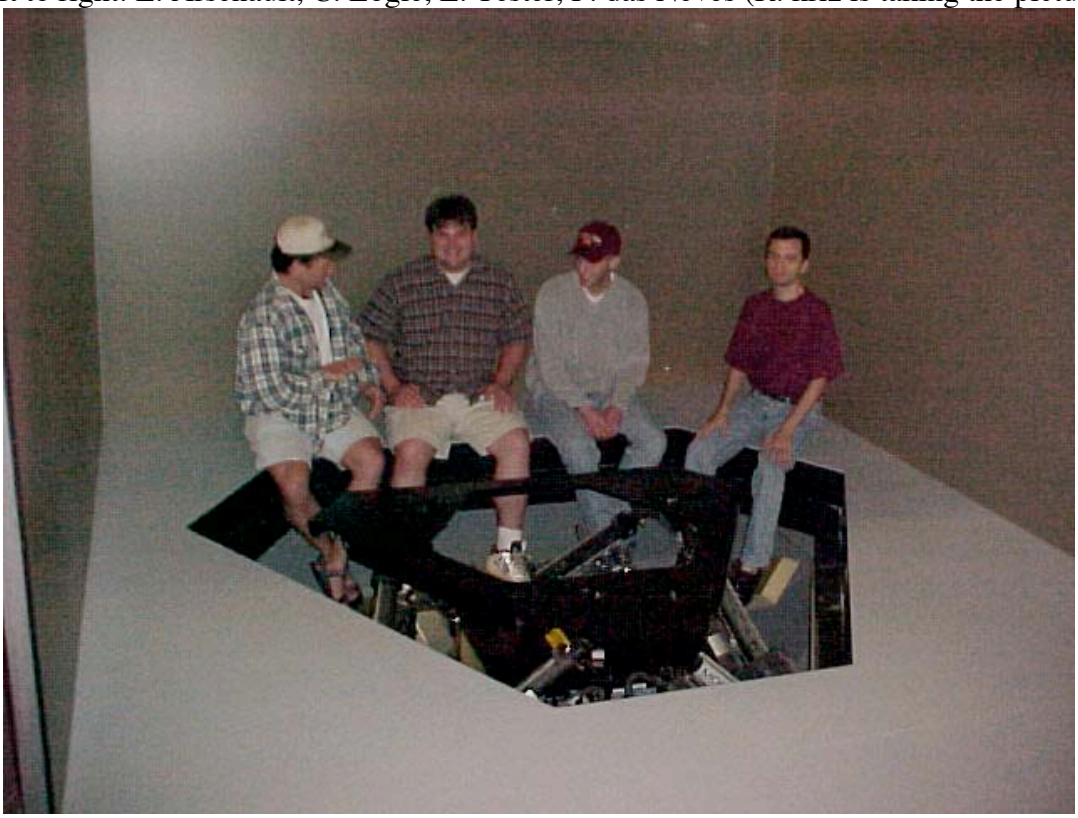
ACITC 3rd floor: CAVE projection screen framing



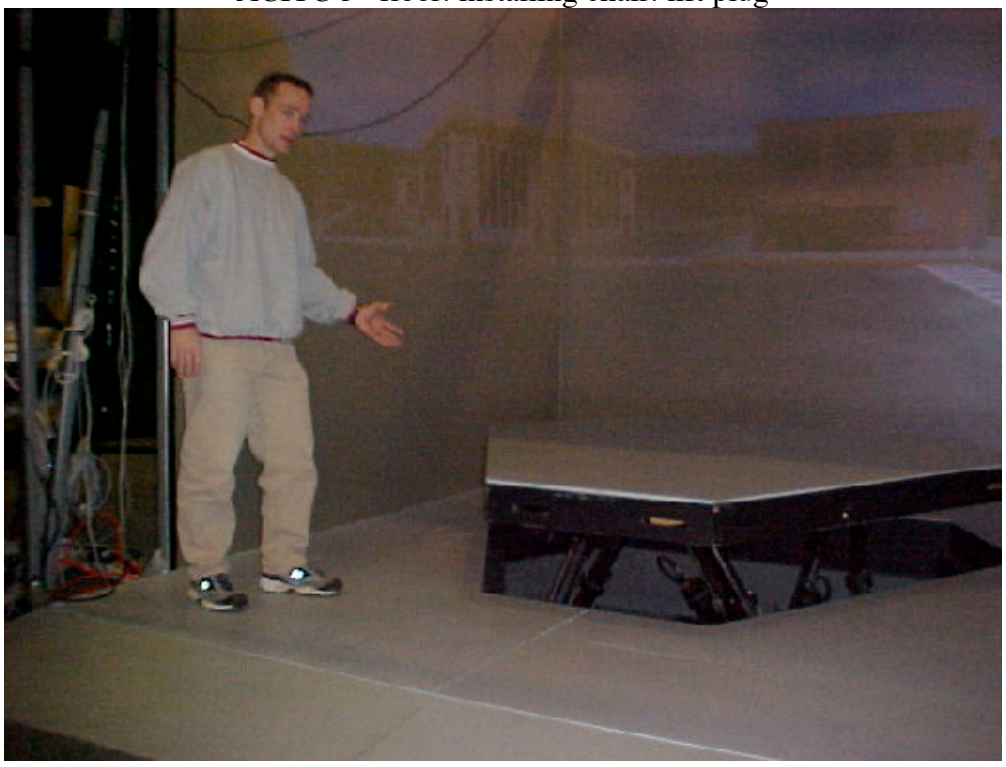
ACITC 3rd floor: CAVE projection screen framing, carpet, speakers, and projector stands



ACITC 3rd floor: projection screen installed --- Celebration!!!!
Left to right: L. Arsenault, C. Logie, E. Tester, F. das Neves (R. kriz is taking the picture)

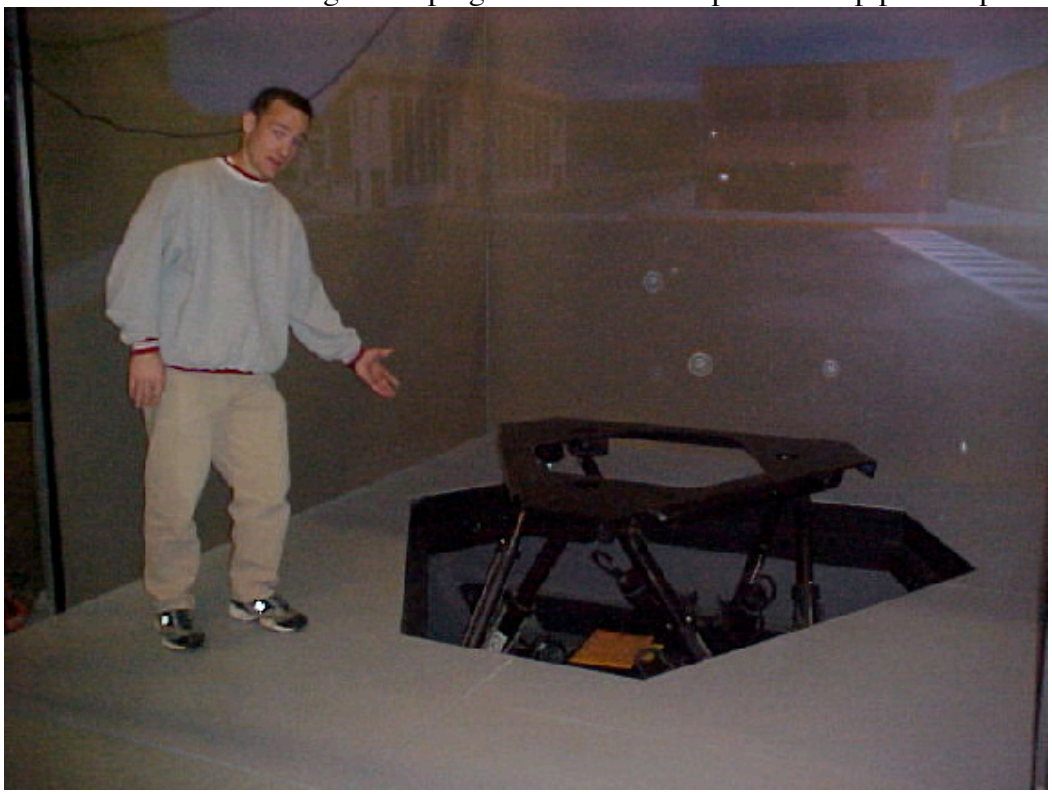


ACITC 3rd floor: installing chair: lift plug



ACITC 3rd floor: installing chair: remove plug

ACITC 3rd floor: installing chair: plug removed motion platform top plate exposed

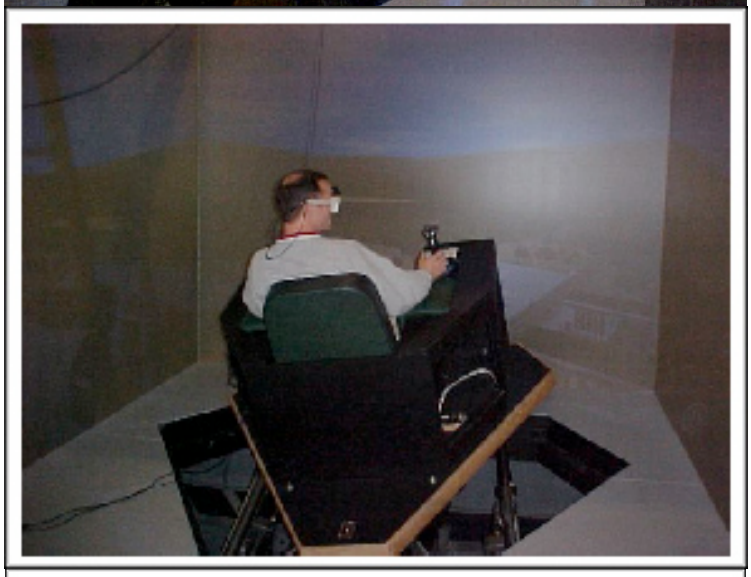


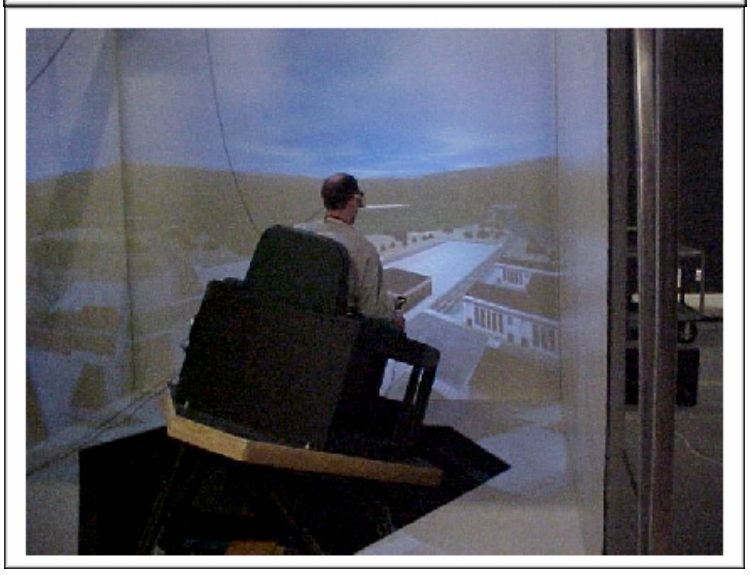
ACITC 3rd floor: installing chair: move chair into CAVE

ACITC 3rd floor: installing chair: move chair into position

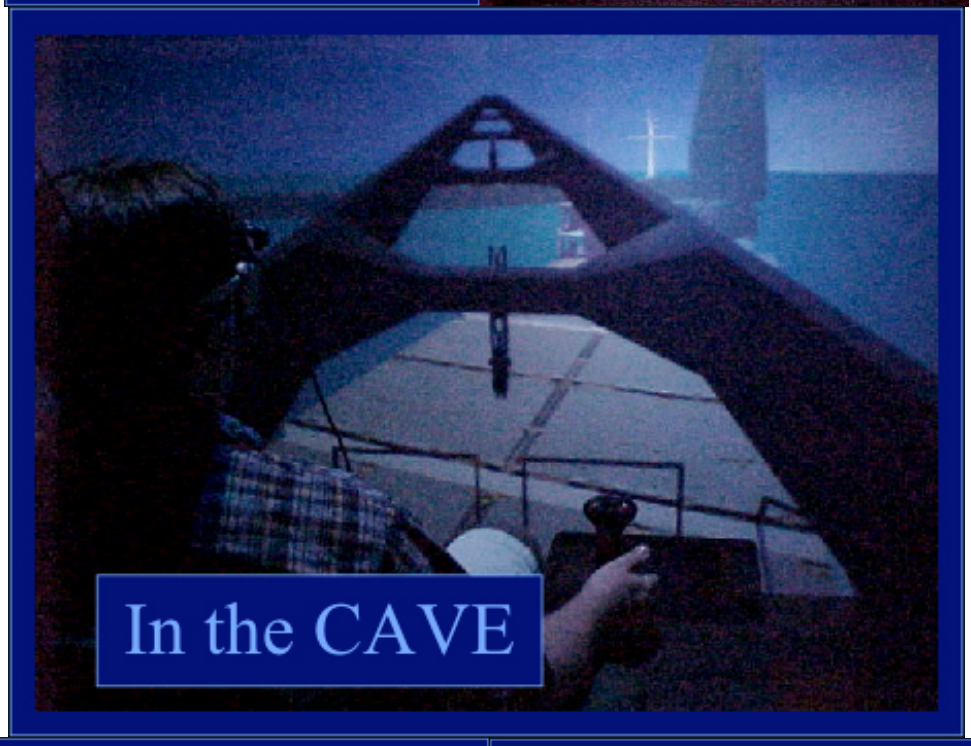
ACITC 3rd floor: installing chair: bolt chair onto motion platform

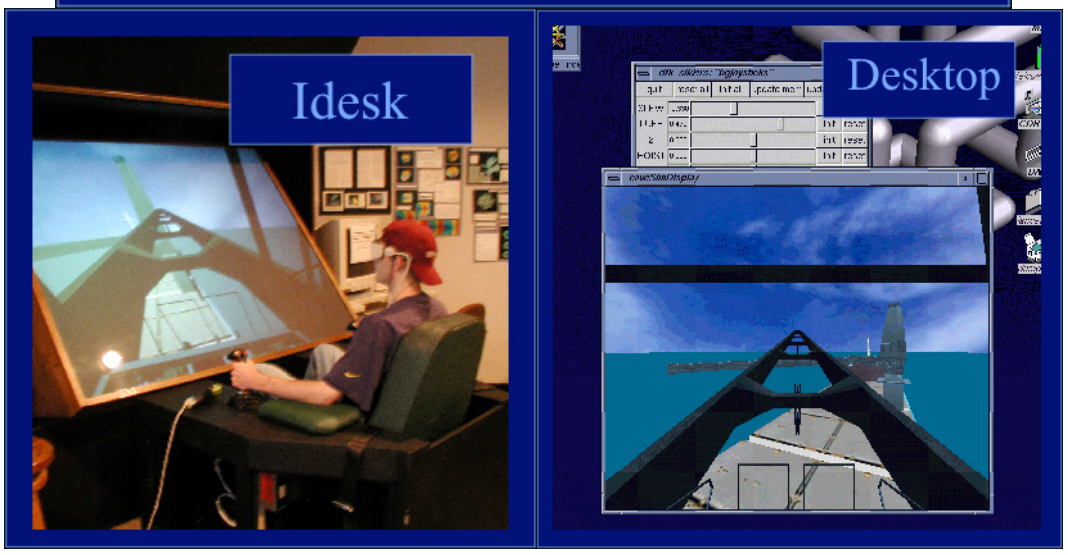
ACITC 3rd floor: installing chair: climb into chair, “fasten your seat belts”



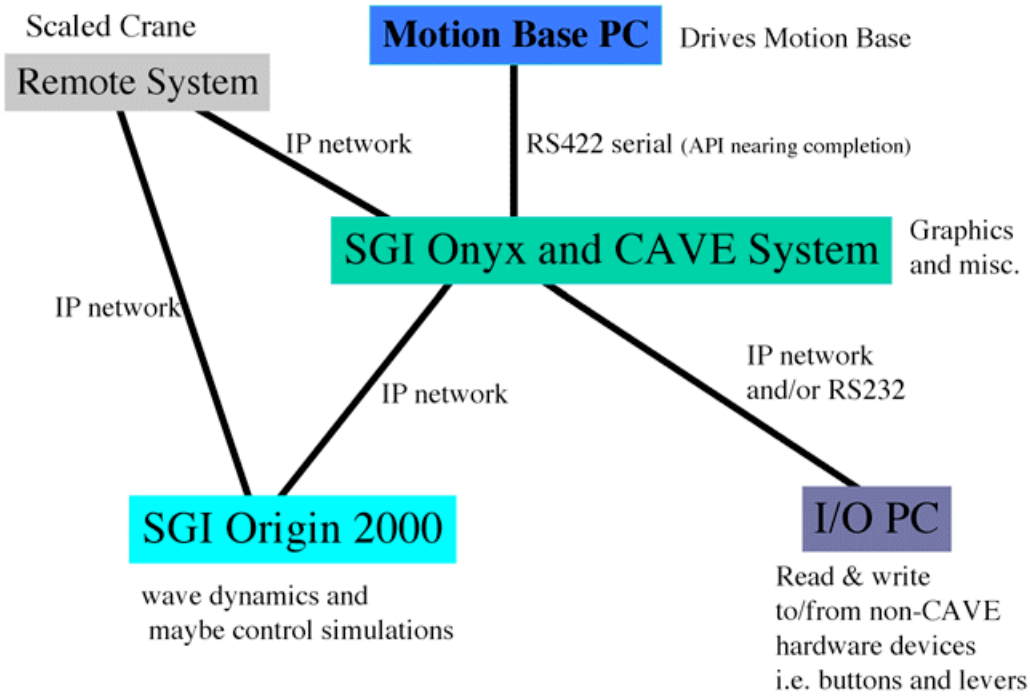


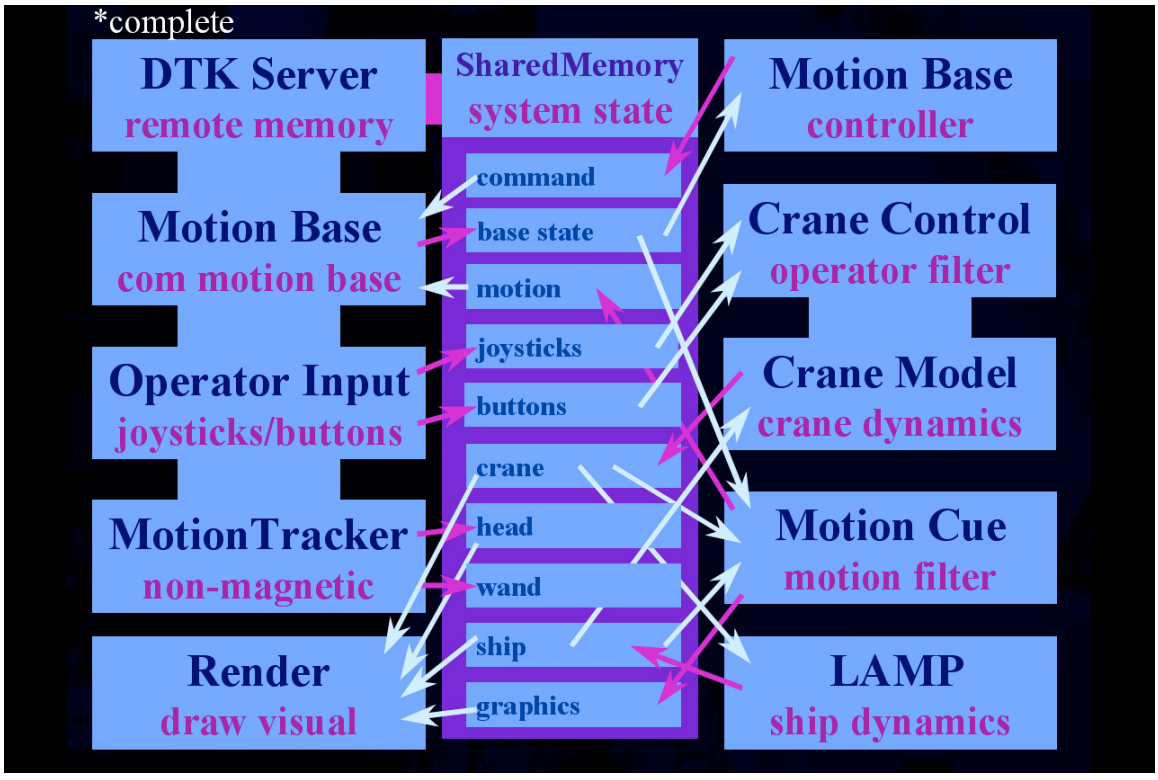
ACITC 3rd floor: installing chair: simulated ship crane: CAVE->Idesk->desktop





Computer Systems Connectivity





Virtual Reality Simulation of Ships and Ship-Mounted Cranes

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Virtual Reality Simulation of Ships and Ship-Mounted Cranes

Mohammed F. Daqaq

(ABSTRACT)

We present a virtual simulation of ships and ship-mounted cranes. The simulation is carried out in a Cave Automated Virtual Environment (CAVE). This simulation serves as a platform to study the dynamics of ships and ship-mounted cranes under dynamic sea environments and as a training platform for ship-mounted crane operators. A model of the (Auxiliary Crane Ship) T-ACS 4-6 was built, converted into an OpenGL C++ API, and then ported into the CAVE using DiverseGL (DGL). A six-degrees-of-freedom motion base was used to simulate the actual motion of the ship. The equations of motion of the ship are solved using the Large Amplitude Motion Program (LAMP), while the equations of motion of the crane payload are numerically integrated; the interaction between the payload and the ship is taken into consideration. A nonlinear delayed-position feedback-control system is applied to the crane and the resulting simulation is used to compare the controlled and uncontrolled pendulations of the cargo. Our simulator showed a great deal of realism and was used to simulate different ship-motion and cargo transfer scenarios.

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