Force Dynamics

Force Dynamics Employs Galil Controller For Greater Realism in Motion Simulator Car Racing

The DMC-2143 enables a realistic, high-sensory race car experience.

There's no doubt the latest racing games for X-Box 360 and PlayStation can provide a fun, relatively "realistic" experience, but for those dreaming of what it actually feels like to be a jet pilot or Indy race car driver, look no further than the Force-Dynamics' Motion Simulator Systems (MSS). The experience is so realistic you can actually feel the G-forces against your body during acceleration, and bounce to every nook and bump on the road. You'll even shake to the vibrations of the engine as it revs up.

This high degree of sensitivity and flexibility in movement, as well as the more realistic feeling it provides, is what differentiates the MSS from other simulators. According to David Wiernicki, President of Force-Dynamics of Trumansburg, New York, "The feel is about five or six times stronger, overall, than street driving."

The intelligence behind all this sensitive and realistic motion is a Galil multi-axis motion controller. The Galil DMC-2133 3-axis Ethernet motion controller is used in Force Dynamics' 301 3-axis platform which provides +/- 30 degrees of roll, pitch and heave motion. The DMC-2143 4-axis controller is used in the 401CR 4-axis model which adds 360 degrees of unlimited yaw motion. The 360 degrees of spinning motion gives the driver the sensation of what it feels like when turning a hard corner, or when they're about to spin or fishtail out of control. Both models use gravitational forces to mimic the sensations of acceleration and deceleration by pushing the driver back in the seat when speeding up, and then against the seatbelt when hitting the brakes.

The Position Absolute mode of the DMC-2143 is used to ensure that each of the four axes arrives at the exact position at the right time. The simulation software, running on a separate PC, provides data such as where and how quickly the car or plane is moving while a second computer converts the simulator data into real-time position commands for each axis of the DMC-2143 motion controller. All position commands are sent to the DMC-2143 in ASCII UDP over Ethernet, with a fast update rate that allows for the quick response times. In addition, the Galil controller is easy to program. "We just plug the Galil controller in and it goes. We don't have to think about it," said Wiernicki.

The combination of the Galil controllers and the Force Dynamics actuators, allows the MSS to achieve 700 lbs of thrust, enabling 2g of vertical acceleration and 18 inches per second of linear motion. The result is a frequency response of about 10 Hz to in-game events, heightening the sense of realism.

"Because our simulators can physically recreate engine vibrations, pavement texture, and high frequency suspension vibrations in real time with appropriate software, riders get to experience something that is as close to the real thing as possible," said Wiernicki.

The continuous 360 degree spinning motion of the 401CR takes the realism to new heights. One can rotate "forever" without winding up and experience a highly synced, one-to-one ratio between the vehicle display and simulator rotations void of any washouts or inverse forces. This is critical for recreating such sensations felt while spinning out or while taking on a long corner at breakneck speeds.

With all the intense realism, Wiernicki knows it is important to minimize any incidence of motion sickness. To do so, Force Dynamics designed the 401 to have low latency of about 60 msec between the visual and actual motion that the operator sees and feels.

Because the 301 and 401 models feature an open support application programming interface (API), they are not married to any specific software, so they can be rigged, just like a peripheral to a PC, with the latest, most popular online racing games available. In addition to thrilling professional level race car enthusiasts, Force Dynamics has been retrofitting its MSS for entertainment, military and flight applications, with one simulator already receiving FAA approval for training. ■

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