**Abstract**

Vehicle simulation is a safe and practical way to examine research questions that can be performed in a physical vehicle. Supplementing vehicle simulation with practical peripherals such as an automotive instrument cluster can provide realism to the simulation environment, immersing the user.[1] The use of mechatronics in such a system is a useful tool for adding such items, therefore enhancing the authentication of the simulation environment.

Mechatronics is a multidisciplinary field that incorporates mechanical, electrical, computer, and control systems engineering to implement embedded designs.[2] Through this synergy, the incorporation of an actual automotive instrument cluster can be integrated with the motion base simulator in the New York State Center for Engineering Design and Industrial Innovation’s (NYSCEDII) vehicle simulation lab. This design lays a foundation for future instrument cluster design and simulation analysis within NYSCEDII, and adds significant realism and capability for future vehicle and driver studies.

**Research Goal**

- Integrate an actual automotive instrument cluster with NYSCEDII’s motion based simulator.
- Assist in creating a realistic environment for the user
- Increase user immersion
- Aide in increasing the validation of vehicle and driver studies

**Methods and Implementation**

**How will the system work?**

**Research and Design**

- All gauges are important[2] to recreate the environment of an automobile.
- Specific indicator lamps are pertinent to the purpose of environment recreation.

**Results**

Key design components for authentic vehicle simulation:

**Hardware Components**

- All gauges (Speedometer, Tachometer, Fuel and Engine Temperature)
- Necessary Indicator Lamps
- Pontech SV203 RC Motor Controller
- Futaba Standard Servomotors

**Software Design**

- Visual Studio 2008
- Programming Language: C/C++

**Conclusion**

- Instrument Cluster and NYSCEDII’s Motion Based Simulator are combined using Mechatronics
- Simulation environment is enhanced
- Improves user experience
- Enhances user immersion and assimilation by having gauges perform like a real instrument cluster
- Results also provide foundation for additional system components

**Future Work**

Future steps will include the following:

- Programming Servomotor Controller for simulation integration
- Instrument Cluster, Servo Motor Controller and Servo Motor amalgamation
- Implementation and Testing of combined system

**References**


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