

107 學年度大四工工專題摘要

第二十組	優化賽車座艙之人因設計
指導教授	李昀儒 助理教授
參與學生	104034073 鄭皓元 104034083 Williams Poe
摘 要	
Driver fatigue in motor sport racing has been an issue for both driver safety and performance. The ergonomics of a formula style driver cockpit has numerous elements that can severely impact the driver's physiological needs. The human machine interaction involves the steering system, pedal box, and the seat. These parts are the main elements in the cockpit that the human needs to interface with to control the vehicle. A poorly designed cockpit can be used for a short period with little consequence. While a prolonged operation time could result in severe consequences, whether it be driver performance or potential injury. This research project will use an FSAE competition vehicle. Limiting our design parameters to the rules of the FSAE competition will in part mimic the real automobile industry and their standards required. To mitigate injury and promote driver performance under driving conditions we researched the relationship between human and machine using the school teams 3rd generation vehicle. A series of tests were conducted using EMG (electromyography) measuring devices and a motion tracking system (OptiTrack). Prime mover muscles were measured and detected their peak magnitude for operating the steering system with fast or self-selected speed. Moreover, the prime mover muscles for pedal actuation were measured during fast or self-speeded braking. Afterward, the data collected was put into a model, by OpenSim, sat inside a simulated cockpit-vehicle assembly of the 3rd generation vehicle. Adjustments were then made to the model, changing the seat angle, steering wheel angle, distance, etc. These alterations were done while monitoring changes in the selected muscles peak magnitudes, with the goal to lower these as much as possible while keeping the cockpit assembly competition legal. By lowering the muscles needed peak magnitude, fatigue will be greatly lessened which causes the drivers' performance drop off due to fatigue to occur much later. The simulation of lowering the peak muscle activities was conducted by changing cockpit design specifications. We will be able to improve on the old cockpit design and implement the new design in next years competition vehicle.	