INTEGRATING HUMAN-MACHINE-ENVIRONMENT INTERFACE (HMEI) ELEMENTS INTO AN ERGONOMIC MOTORCYCLE TEST RIG TO REPLICATE NEAR-TO-REAL RIDING SCENARIO

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" I declared that this thesis is the result of my own work except the ideas and summaries which I have clarified their sources. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any degree. "

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ABSTRACT

In this era of critical traffic congestion, motorcycles have become one of the popular go-to vehicles. Recently, lots of researches concerning motorcycle ergonomics were studied including motorcyclist riding postures. In supporting a newly established and uniquely designed motorcycle test rig named the *Postura Motergo*, Human-Machine-Environment Interface (HMEI) elements were integrated into the test rig's setup. HMEI can be defined as the interactions between the motorcyclist, motorcycle and environment during motorcycling. The integration of the HMEI elements allows for the replication of near-to-real motorcycling experience for motorcyclist in a controlled laboratory setting. The HMEI elements that have been identified were visual, noise, wind blast, heat exposure, vibration and standard motorcycle parts. In ensuring for the appropriate devices procurement, preliminary studies on HMEI elements were performed. Several experiments were conducted to determine the average value of heat exposure, wind blast and noise level during real world motorcycling. The instruments used to record the results were a Digital Hygro-Thermometer, Anemometer and Sound Level Meter. Procurement, fabrications and several modifications were successfully made to complete the new test rig's setup. Equipment used to replicate the HMEI elements are a projector, computer, speakers, spring, industrial blower and standard motorcycle parts. A detail design layout of the *Postura Motergo's* setup arrangements was generated using state-of-the-art CATIA V5R20 software. Having these features in a motorcycle test rig setup, the Motorcycle Engineering Test Lab (METAL) is now complete with a full dimension and improved fidelity of a motorcycle research facility. In addition, the new setup had successfully won a bronze medal in the Invention, Innovation and Design Exposition 2014 (IIDEX2014) and holds two Chapters in Books in International Ergonomics Conferences. The HMEI integration has managed to

support the official establishment of the *Postura Motergo* and will become a new revolutionary motorcycle test rig for various motorcycle related research.

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