

Energy Management and Control of Electric
Bike Using Hybrid Power Source

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DECLARATION OF THE CANDIDATE & SUPERVISOR

I declare that this investigation done by me is the dissertation which has not been incorporated with any other previous material submitted for a degree or diploma in any university or institute of higher learning and also it suits the best of my knowledge and belief. This does not include the content of any other sources made previously except the acknowledgement in the text.

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The above candidate has carried out research for the Masters Dissertation under our supervision.

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(Dr. AGBP Jayasekara)

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ABSTRACT

Fuel sources for modern transportation systems are getting pricey and negatively affect the environment which lead to increase the demand for electric vehicles. Energy storage systems in majority of electric and hybrid vehicles are based on battery storage devices. Nevertheless, battery based systems have several issues that caused by high peak power demand which could resolved by high power density batteries .However, high power density batteries are much more expensive which lead to increase the overall cost of the vehicle.

Proposed Hybrid system (HESS) which connected to exciting electric bike consist of super capacitor bank ,DC to DC converter, motor controller, Battery bank and BLDC motor.DC to DC converter positioned between supercapacitor bank and battery bank, which pumps required energy to the supercapacitor bank,in order to maintain a greater voltage value than the battery terminal voltage. In most riding occasions in a control manner.

Only when battery voltage equal to the capacitor bank voltage at continuous bulk energy demands, battery connected to the Brush less DC-Motor which Maintain a relatively fixed load profile. Further, regenerative energy generated by braking is also fed to the battery indirectly via capacitor array, thus, battery pack isolated from frequent power demands which caused to reduce number of charge discharge cycles hence, increase the lifetime of the battery.

Finally, Test results clearly indicate, this Hybrid energy storage system has enormous benefits compared to Electric bikes such as reduction of overall power consumption of the battery , enhance quick acceleration , increased travelling range per single charge and decrement of per kilometer cost. Further, HESS system more energy efficient, more cost efficient and smooth in running compared to current electrical bikes in the market which makes HESS bike good choice for future higher speed electric bike industry.

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