

Intelligent Battery Control Mechanism for Electric Bicycle

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Transportation is a basic requirement of humans. Currently, fossil fuels are the main source used in automobiles, and the trend is moving towards electric vehicles, which is more environmentally friendly. Battery is one of the main components in an electric vehicle. This paper aims to introduce an intelligent battery control system which integrates a dual battery mechanism and four riding modes. Two lithium-ion battery packs with 48V and 16AH each are used. Full electric, paddle assist, neutral and continuous charging are the four driving modes. The paddle assist mode is implemented with new control mechanism, and continuous charging is a new concept to E-bicycles. An alternator is used as an energy harvesting mechanism. The state of charge of each battery pack is automatically detected and the pack with lower state of charge is assigned to store the energy harvested from regenerative mechanism. The battery pack with higher state of charge is allotted to drive the bicycle. The system will automatically interchange the role of each pack when the driving pack reaches to its acceptable minimum state of charge. The proposed system will allow both battery packs to charge or discharge within its full nominal range which is not linear. Thus, it allows an increase in per charge travelling distance. The inter connection between subpacks are controls through a relay panel based on voltage readings. Finally, the bicycle was subjected to road trials under three riders with different weights. The proposed system helps to cover 41.6km under electric mode and covers 49.4km in paddle assist mode. Bicycle needs to cover 61km in continuous charging mode to fully charge the battery.

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