Electric Vehicle (EV) Titles 2025

Study on Optimization of Ultrasonic Welding Process Parameters of Al-Cu Bimetallic Busbar for use in Battery Electric Vehicle (EV)

Abstract:

The battery is the power source of an Electric Vehicle (EV) and improving its operational efficiency is one of the requirements to achieve the required product performance and quality. There are numerous electrical connections in the assembly of a battery pack from cell to module and further module to the battery pack. These connections such as Tab-toTab (i.e., cell-to-cell joining to connect the battery cells in series or parallel) and Tab-to-Busbars can be made through various methods such as soldering, crimping, resistance welding, fusion welding, etc. Still, all these conventional joining methods have some mechanical, metallurgical, electrical, and economic constraints that limit the overall process efficiency. One of the factors includes poor weld quality, voids, cracks, pores, and other defects in the weld zone that affect the battery performance. The Ultrasonic Welding (UW) technique can overcome many issues that persist in conventional methods. In this work, we describe the study of the UW zone's mechanical, thermal, and electrical properties based on the mechanical and microstructural analysis using design and validation processes such as lap shear strength tests, Optical Microscopy (OM), and Scanning Electron Microscopy (SEM). Here we attempted the Ultrasonic Welding of Copper and Aluminum of different thicknesses. The thickness of the intermetallic layer in the heataffected zone could be observed with the help of SEM. Results were validated with experimental results, which can be employed to analyze battery pack performance. This study provides important insight into Al and Cu UW for electric vehicle battery assembly as a basis for future research directions in the field.

Design of an Electrical System Battery Pack case for Electric Motorcycle

Abstract:

In many industrial electric motorcycle battery packs on the market with different voltages and different charging communication systems. The advantage of the results of the battery pack design in this study is that it has the same dimensions and weight as battery packs on the market but has twice the capacity of 40 Ah so that electric motorbikes can travel farther than those in circulation.

The advent of electric vehicles, which run on electricity rather than fossil fuels, was the big breakthrough. There have been many investigations and appreciated structures as well as outcomes for wirelessly powering electric automobiles, both passively and rapidly. This might result in a more rapid acceptance of electric vehicles globally, as it is an emerging technology in automotive manufacturing that has not yet been widely used.

This paper outlines the design, development and implementation of this system. To solve the problem of battery overheating during charging while plugged in, as well as to extend the vehicle's battery life, the suggested model is employed. Batteries temperature handling is the primary concern for EVs due to the increased heat losses while plugged-in charging, which in turn reduces the battery's lifespan.

There is a considerable decrease in thermal output while using composite Battery Pack case in air cooling while charging. The proposed system's primary objective is to provide heat transfer using inductive coupling as its basis.

PROPOSED: Composite Material 3D print or Natural Fiber Composites

Performance Analysis of a 48V Battery Pack Using SoC Estimation and Cell Balancing for Electric Vehicle

Abstract:

Battery Management System (BMS) an Electric Vehicle's most crucial and essential component. The primary function of a BMS is to safeguard the battery, which provides smooth and reliable operation. A lithium-ion battery is chosen over a lead acid battery to keep the reliability and safety of the battery, but a liion battery should be operated within safely due to being extremely sensitive to high temperatures and inherently explosive, which can lead to danger. So, it is challenging to design the proper BMS for the electric vehicles. In this work, the performance analysis of the 48V battery pack has been simulated and validated by analyzing the charging and discharging characteristics of the battery and applying cell balancing technique. To validate the performance MATLAB/Simulink platform has been used. The results prove that the electric vehicle's battery life cycle, drive performance, power management, and security are successfully improved.

EXISTING : MATLAB/Simulink

PROPOSED : **Composite Material**

Functional Safety Assessment of Battery Management System of Autonomous Electric Vehicle

Abstract:

There has been an exponential increase in the usage of electric vehicles in recent years. Electric vehicles are powered by batteries for all their functions. Battery management system (BMS) helps to manage the inherent risks associated with batteries and their associated systems. Functional safety assessment of BMS plays a key role in identifying all the failure causes, associated risks and suggesting improvements in design. In this work, a comprehensive assessment of functional safety of the BMS of autonomous electric vehicle is carried out based on ISO 26262. Hazard Analysis and Risk Assessment (HARA) is used to determine the hazards and their risks. Quantitative Fault Tree Analysis (FTA) is carried out for identifying all the possible causes of failure and determine its probability of failure. Since the preliminary system architecture was not satisfying the threshold failure rate of violation of safety goal defined in the standard, some safety measures are integrated into the system. FTA is repeated for the modified system. The modified BMS meets the target failure rate as per ISO 26262, ensuring the functional safety.

Exploring Innovative IoT Solutions for Automated Battery Condition Detection in Electric Vehicles

Abstract:

In recent times, the development of Electric Vehicle (EV) batteries has become a hot topic of discussion. The existing literature clearly describes that the conventional techniques like various NB-IoT, Bluetooth module were utilized to monitor any particular parameters as well as its performance is poor. With the increase of safety concerns, it is essential to monitor the status of batteries such as voltage, current, temperature, level of charge and surrounding humidity. To facilitate this, Internet of Things (IoT) is used to send data from the device to a mobile device for analysis. This will help the user take appropriate measures to protect the vehicle from any harm. Additionally, the data can be shared with third parties to alert them if the driver is in any danger. For testing purposes, a motor load is used to discharge the battery. If the voltage drops below 5V, the relay automatically disconnects the load to ensure battery efficiency. This paper outlines the design, development and implementation of this system.

Development of Polymer Composite Battery Pack Case for an Electric Vehicle

ABSTRACT

The evolution toward electric vehicle nowadays appears to be the main stream in the automotive and transportation industry. The required battery pack is a big, heavy, and expensive component to be located, managed, climatized, maintained, and protected. This paper develops some engineering analyses in material of some possible solutions that could be adopted. The possible consequences on the position of the vehicle center of gravity, which in turn could affect the vehicle drivability, lead to locate the battery housing below the passenger compartment floor. This solution is also one of the most interesting from the point of view of the battery pack protection in case of a lateral impact and for easy serviceability and maintenance. The integration of the battery pack's housing structure and the vehicle floor leads to a sort of sandwich structure that could have beneficial effects on the body's stiffness (both torsional and bending). This paper also proposes some considerations that are related to the impact protection of the battery pack, with particular reference to the side impacts against a fixed obstacle, such as a pole, We manufacture our battery cases from BASALT fiber, PP sheet 3 mm and glass fiber in the form of sandwich composites material using Epoxy. The excellent properties of the fiber composite construction make the battery enclosure a supporting element of the vehicle structure.

Development of graphene nano-composite fibres for improving the toughness of thermoset composite

ABSTRACT

We report on the development of phenoxy-graphene nano-composite fibres for improving the toughness of thermoset composites. In this paper, a systematic experimental investigation into the underlying mechanisms of graphene nanoplatelets (GNP) reinforcement of Natural and Synthetic fibres prepared via hand layup compression molding metod using Epoxy.

Development of the Polymer Composites with natural fibers and fillers like Graphene Nanoplatelets (GNP composites) as a sustainable alternative material for some engineering applications, particularly in aerospace applications and automobile applications are being investigated. Natural fibre composites such as ABACA mat, SISAL mat and JUTE mat appear more attractive due to their higher specific strength, lightweight and biodegradability and low cost. In this study, ABACA mat, SISAL mat and JUTE mat with Filler Materials Of Almond Shell/ graphene Nano platelets /SiC Nano particles are reinforced epoxy composites are prepared and their mechanical properties such as tensile strength, flexural strength, Hardness and impact strength are evaluated.

Intelligent Solutions for Automated Battery Condition Detection with water cooling system for Electric Vehicles

Abstract

The advent of electric vehicles, which run on electricity rather than fossil fuels, was the big breakthrough. There have been many investigations and appreciated structures as well as outcomes for wirelessly powering electric automobiles, both passively and rapidly. This might result in a more rapid acceptance of electric vehicles globally, as it is an emerging technology in automotive manufacturing that has not yet been widely used.

This paper outlines the design, development and implementation of this system. To solve the problem of battery overheating during charging while plugged in, as well as to extend the vehicle's battery life, the suggested model is employed. Batteries temperature handling is the primary concern for EVs due to the increased heat losses while plugged-in charging, which in turn reduces the battery's lifespan.

Currently, electric cars mostly employ air-cooled systems to cool the battery, which isn't ideal for EVs due to the added size and weight. Water cooling is another option for cooling systems; it's already used in internal combustion engines but isn't very effective in electric vehicles since charging the battery produces too much heat. There is a considerable decrease in thermal output when we employ wireless charging technology. The proposed system's primary objective is to provide heat transfer using inductive coupling as its basis.

Intelligent IoT Solutions for Automated Battery Condition Detection with Wireless Charging System for Electric Vehicles

Abstract

In recent times, the development of Electric Vehicle (EV) batteries has become a hot topic of discussion. The existing literature clearly describes that the conventional techniques like various NB-IoT, Bluetooth module were utilized to monitor any particular parameters as well as its performance is poor. With the increase of safety concerns, it is essential to monitor the status of batteries such as voltage, current, temperature, level of charge and surrounding humidity. To facilitate this, Internet of Things (IoT) is used to send data from the device to a mobile device for analysis. This will help the user take appropriate measures to protect the vehicle from any harm. Additionally, the data can be shared with third parties to alert them if the driver is in any danger. For testing purposes, a motor load is used to discharge the battery. If the voltage drops below 5V, the relay automatically disconnects the load to ensure battery efficiency. This paper outlines the design, development and implementation of this system. To solve the problem of battery overheating during charging while plugged in, as well as to extend the vehicle's battery life, the suggested model is employed. Batteries temperature handling is the primary concern for EVs due to the increased heat losses while plugged-in charging, which in turn reduces the battery's lifespan.

The advent of electric vehicles, which run on electricity rather than fossil fuels, was the big breakthrough. There have been many investigations and appreciated structures as well as outcomes for wirelessly powering electric automobiles, both passively and rapidly. This might result in a more rapid acceptance of electric vehicles globally, as it is an emerging technology in automotive manufacturing that has not yet been widely used. We cross-validated our Intelligent Wireless Charging System

(IWCS), a wireless power transmission charging circuit for electric vehicles, with the Classical Charging System (CCS) to assess the efficacy of the proposed model.