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Smart Design Controller for M2/M3 Category Electric Vehicle

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Abstract: *This article describes how to design a complete e-bike control system using the Arduino UNO microcomputer. This circuit is mainly used to control brushless DC motors. Normally, when designing a power supply inverting circuit, you would check the voltage on a resistor to sense the current and send that data to the CPU to complete the current control system. However, when the controller is used with high power levels, the high current causes power loss. A remedy for this problem is to sense the current based on the resistance of the MOSFET tube and feed the signal into a differential amplifier to make the signal accurate. Finally, let's make the controller usable with the aluminum base board.*
The development of vehicle control technology EV electronic control unit (ECU) and the key to raising the level of EV design determines the direction of optimization control of vehicle performance. Vehicle control is analyzed by building the control system overall structure of the control system of distributed pure electric vehicles, in order to realize the rational coordination of the vehicle within the integrated control system based on modular thinking. Control Network Design Operating Principles and Functional
Realization as a Pure Electric Vehicle The control system provides a theoretical basis for performance evaluation. for performance evaluation.

Keywords: IOT, Smart Device, Smart Monitoring, Social Services, Web Application, Electric vehicles, Vehicle control system, Vehicle controller

I. INTRODUCTION

1.1 Literature Survey and Technological Survey

[1] G Yang, J Zhang, Y Liang (2007): "Design of Control System for Integrated Motor Controller of Electric Vehicle", Vehicle Control Based on On-Board Instrument Control to Display Real-Time Operating Status, Vehicle Information, and Notify Vehicle We will inform the driver of the situation. CAN bus communication- based vehicle status monitoring technology for operating status parameters such as engine speed, speed, remaining battery capacity, current, and the above data via an intuitive display in the vehicle's instrument cluster, at the same time, the two-way enhance sexuality.

[2]Chun Hu, Gulong Xiao, Zhengping Gong, Guo Wu, Zhuanlong Guo (2013): "Short Circuit Protection Circuit Design": A Brushless DC Motor (BLDCM) for LED Power Supply Has Large Output Torque, Low Noise and High Efficiency , and excellent stability, it is used in various industrial control situations.

[3]L. Wang, (2009) : "Key technologies and development prospects of electric vehicle". Research on automobile industry, no. Distributed control system based on modular construction; improve the correlation between each subsystem of the vehicle. The system can be divided into two layers: the whole car controller and the secondary controller. As shown in Figure 1, among them, the whole car controller (VCU) as the top processing information and publish the instructions, the secondary controller in the Motor controller vehicle combination Instrument and Battery Management System as the subsystem of the independent Management and monitoring of the respective Control object. Real-time state parameter subsystem at all levels will be collected by CAN bus to realize sharing information exchange to VCU, then by VCU information comprehensive, at all levels to implement the controller between the centralized and decentralized control, information interaction function.

[4]Shi JT, Pan F, Luo F L. (2014) : "Modeling and Simulation Analysis of Brushless DC Motor Control System[J]. Mechanical Engineering & Automation", Brushless DC motor basic control principle is based on the motor installed in

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the Hall sensor signal logic state, real-time access to the motor rotor position information and feedback to the microcontroller, the microcontroller according to the real-time Hall signal to the drive circuit to issue different PWM wave control Signal, through the inverter circuit to the motor coil to form a rotating magnetic field to drive the motor rotor continuous rotation.

1.2 Problem Definition

In early electric vehicles with DC motors, simple variable resistance controllers controlled vehicle acceleration and speed. In this type of system, most of the energy from the battery was wasted as energy lost in the resistor. All available power was used only at high speeds. These types of regulators always drew maximum current and power from the battery. High resistance was used to reduce the current to the motor when full power was not needed at low speeds.

1.3 Aim of project

- To design and implement the IOT based monitoring system by using various sensor and central processing microcontroller, internet Wi-Fi device.
- To provide more features and GPS mobile connectivity. Sending live data to cloud website and alert message to owner.
- To design IOT based smart controller for all category electric vehicle with smart monitoring system, consume less power, provide high torque speed, Web based application, mobile connectivity
- To design smart controller for drive 12v to 48v motor.
- To design smart controller for sense the temperature, tire monitoring pressure, battery percentage life, and with RF id card to on/off system.

1.4 Objectives

The main objectives of this project is to design and develop Modern controller to adjust speed and acceleration by an electronic process called pulse width modulation(PWM). Switching devices such as silicone-controlled rectifiers rapidly interrupt (turn on and turn off) the electricity flow to the motor. High power (high speed and/or acceleration) is achieved when the intervals (when the current is turned off) are short. Low power (low speed and/or acceleration) occurs when the intervals are longer.

1.5 Methodology and Tools

- In this project we develop smart controller for M2/M3 category for electric vehicle. With this type of smart system, we sense the temperature for motor and battery also providing the mobile connectivity to consumer and also measure the tire pressure.
- We also able to drive 12v to 48v motor in this controller and all the vehicle parameter data sending the cloud and consumer can access vehicle parameter through cloud.
- We create cloud system to shows the live location of electric vehicle.
- We connect TFT display to show all the reading like speed, battery life, modes of power, WIFI connectivity GPS system.

1.6 Project Specifications

Hardware requirements:

- Arduino UNO 16 MHz
- Battery Temperature sensor
- Motor Temperature sensor
- Tire Pressure Sensor
- Hall Effect Sensor (speed Measurement)
- Wife Sensor
- RF ID Card

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- Battery life Measurement Sensor
- GPS Sensor
- 48v motor and battery
- Throttle

Software requirements:

- Arduino IDE
- Server (Thing Speak)
- Embedded C, C++

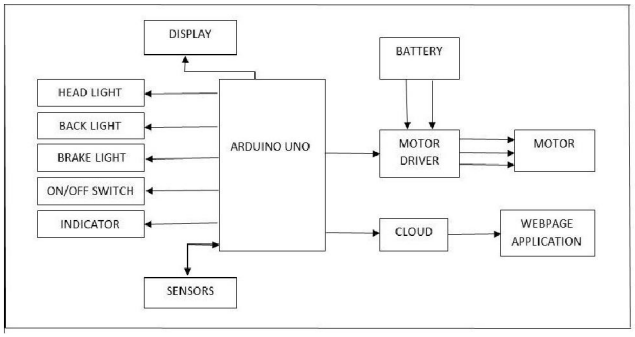

Fig.1 Block Diagram

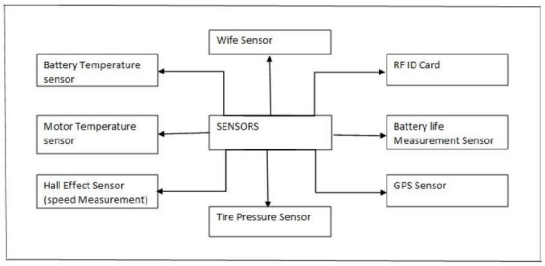

Fig.2 Sensors Block Diagram

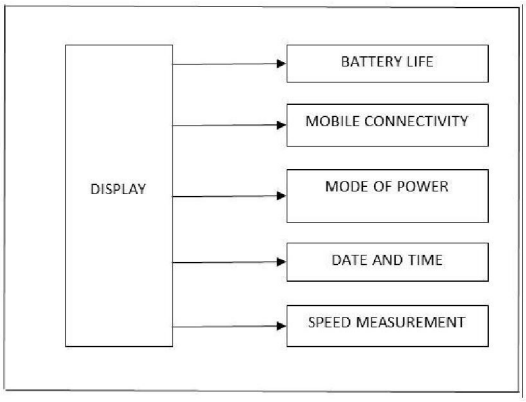

Fig.3 Display Block Diagram

1.7 Advantages

- IOT based monitoring system by using various sensor and central processing microcontroller, internet Wi-Fi device.
- More features and GPS mobile connectivity. Sending live data to cloud website and alert message to owner.
- IOT based smart controller for all category electric vehicle with smart monitoring system, consume less power, provide high torque speed, Web based application, mobile connectivity

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- design smart controller for drive
- 12v to 48v motor.
- smart controller for sense the temperature, tire monitoring pressure, battery percentage life, and with RF id card to on/off system
- Industrial application
- EV application

1.8 Applications

- Industrial application
- EV application
- M2/M3 category vehicle application

1.9 Conclusion

The main purpose of the system is to developed smart system for electric vehicle which is able to drive 12v to 48v range of motor and also providing display panel to consumer to access and see the all the parameter data on screen. With these type of system controller consumer less power and provide high torque speed as compare to all vehicle. We also sending vehicle related information to cloud server and provide web application to consumer.

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