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Patent Search

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Abstract:

The present invention introduces an intelligent system for real-time temperature prediction of a DC motor using a Random Forest regression model deployed on an Arduir Mega microcontroller. The system measures key operating parameters of the motor—such as voltage, current, and rotational speed—and uses these values as input featu the trained Random Forest model to estimate the internal temperature of the motor, eliminating the need for a physical temperature sensor during normal operation. The Random Forest model is trained externally using data gathered under different load and speed conditions, after which it is converted into code suitable for execution on tl Arduino platform. During operation, the microcontroller evaluates the predicted temperature and performs necessary control actions, such as reducing the motor speed c shutting it down when excessive heating is anticipated. This predictive approach provides early thermal protection, enhances motor reliability, and enables a low-cost emb machine learning solution suitable for industrial automation, automotive systems, robotics, and other applications requiring intelligent motor monitoring.

Complete Specification

Description:The invention presents an intelligent temperature prediction system for a DC motor using a Random Forest regression model deployed on an Arduino Mega microcontroller. The system is composed of the following key components:
1. DC Motor
A conventional DC motor whose thermal condition must be monitored and controlled during operation to prevent overheating and ensure long-term reliability.
2. Arduino Mega
A microcontroller that executes the embedded Random Forest model. It continuously acquires real-time operating data—such as voltage, current, and motor speed—an uses these inputs to estimate the internal temperature of the motor.
3. Motor Driver (e.g., L298N)
A driver module responsible for controlling the motor's speed and direction. It receives commands from the Arduino based on the predicted temperature values to ensu safe operation.
4. Random Forest Model (Trained Offline)
The machine learning model is trained in an external computing environment using datasets that include voltage, current, speed, and actual temperature readings. Once trained, the Random Forest model is converted into code compatible with the Arduino platform and uploaded for real-time inference.
5. Temperature Sensor (Used Only for Training)
During the data collection and model training stage, a temperature sensor is employed to capture actual motor temperature values. After the model is deployed, the sen

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