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Infrared Thermal Image Profiling for Gearless Hoisting Motor Condition Monitoring

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Abstract: Technology nowadays has provided different industries more efficient machinery and tools in order to improve their products and services, wherein time and other resources are needed in order to maintain them in proper condition. An example would be the machines used to operate elevators, wherein excessive strain is applied on its components, especially on the motor. In order to mitigate any major faults, condition-based monitoring is performed on the motor through various means; one of which is thermographic monitoring. Thermographic monitoring is the inspection of thermal patterns on an object's surface and assessing whether it has any irregularities in temperature in any part of it. Since there is no available objective basis of a regular and irregular thermal image of a lift system motor, it is not possible to assess the actual condition of a motor. This study then aims to create a system in analyzing thermal images of, specifically, gearless lift system motors. First, the system defines and extracts regions of interests (ROIs) that pertain to significant portions of the actual motor. Second, each ROI is then segmented into equally-sized cells/segments for relatively consistent temperature profiling, which deals with averaging pixel values, noting that certain ranges of pixel values pertain to certain ranges of temperatures. Lastly, the temperature profiles are then retrieved and tabulated accordingly by each segment, placing it in a predefined dictionary of temperature profiles. Initial profiles are then continuously integrated with new input temperatures from newly processed thermal images, if within tolerance value. This then entails the establishment of an objective ground basis of a regular-condition motor's thermal outlook. In conclusion, the results show that the computations are 99.9% accurate in comparison to the data shown in the thermography software application used. This ground basis can then be utilized in creating further intelligent systems in relation.

Key Words: condition-based maintenance; thermographic monitoring; temperature profiling