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DC Motor Protection, Control and Monitoring

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Abstract – *DC motor plays an important role in various industries. In this paper, we have present a system to provide protection, control and monitoring the condition of DC motor. We have used Arduino uno and various sensors like current, voltage and temperature sensor so, we can continuously monitor the motor condition in an app. Real time values of various parameters like current, voltage, temperature and speed can be monitored in app. The monitoring and protection can avoid various faults like short circuit fault, thermal overload and motor can give better performance.*

Key Words: **Arduino Uno, Control, Monitoring, Protection, Sensor, etc.**

1. INTRODUCTION

DC motors can be used in various industries because of their small size and high energy output. DC Motor is widely used in the industry for various application. To control motor of different areas of an industry the workers have to go there personally and switch ON or OFF the motor for several applications [1]. Sometimes the accurate and quick speed control is required for some unique application. It is again very time consuming and complicated for worker to go there and control the speed manually. Protection or maintenance is also very important aspect for the smooth operation of motor as well as the industry [2] . The monitoring of several parameters of motor like voltage, current, temperature and speed etc. by human is very time consuming process. We have studied those problems and developed the project called DC Motor Protection, Control and Monitoring.

In this paper, we have developed a cost effective protection and control system for DC motors which can be used in practice. The LM35 (temperature sensor) provides very accurate and precise protection to the DC motor. Also the other sensors used for particular application does their work efficiently and provides us useful information about various parameters of the motor on the application.

This project reduces the human work by controlling and monitoring the motors using bluetooth based application. In this project we have used the Embedded system to achieve the required goals [3]. Today everybody has that access, so every industry can easily access the application . The GUI of the application is designed such that everyone can understand and use it easily. For security purpose of system we can provide the login and password for every worker [4]. The experimental results demonstrate that this project can give improvement in traditional motor control and protection system.

1.1 Motor Protection Scheme

In the motor protection scheme, we have provided protection against over heating and over current. We have used sensor which gives accurate and precise protection to motor in abnormal or fault condition.

1.2 Motor Control Scheme

In the motor control scheme, we have provided on/ off control and speed control of DC motor. For speed control, we have used PWM(Pulse Width Modulation) technique.

1.3 Motor Monitoring Scheme

Real time values of several parameters like voltage, current, temperature and speed are sensed by sensors and uploaded to the application which gives us feature of real time monitoring of motor from one device. The values are compared with default values to determine the condition of the motor.

2. METHODOLOGY

In this paper, we have interfaced various sensors with the Arduino Uno and the DC motor to collect data of the various parameters like voltage, current, temperature and humidity to know the condition of the motor and also give protection against overcurrent and thermal overloading by providing program for that, so if the motor crosses the maximum value of current or temperature by some fault it will get automatically turn off and the alarm give signal on the application. Also we can turn on/ off motor by button placed in the application. We have used PWM for the speed control of the motor. The speed control is provided by the scroll scale in the application. Block diagram, Hardware and results are discussed below.

2.1 Block Diagram

This project system mainly contents various subsystems. This project will run if and only if all subsystems will operate smoothly. All subsystems are shown in the in block diagram given below in Fig -1.

Fig -1: Block Diagram

The block diagram shows, working of entire project as, any operator or worker can access this system using any android device having bluetooth connection. The operator will login to the application with login id and password and check the motor condition. For that purpose we use Arduino Uno which will communicate between the server and motor with the help of different sensors such as temperature sensors and current sensors.

The sensors will collect data continuously from the motor and send to the Arduino Uno. Then Arduino Uno will upload this data to the application. Thus the operator can check all the data on application and continuously monitor the motor condition. When fault occur the sensor will send the data and motor will be stop automatically.

2.2 Hardware

Hardware is major part of this system though the software programming is also important. The main component is Arduino Uno. Various sensors for particular applications are used, for temperature measurement and protection against overloading LM35 temperature sensor is used, for current measurement and protection against overcurrent ACS712 Hall current sensor is used and for the voltage measurement Arduino voltage sensor module is used. The HC-05 bluetooth module is used for the connecting application and Arduino Uno.

Hardware configuration and interfacing is shown in the Fig -2.

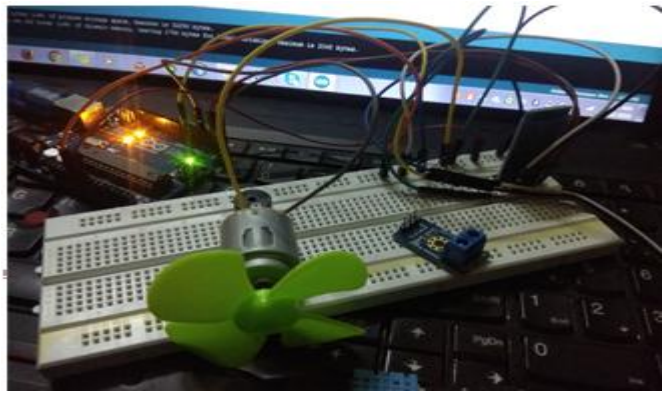

Fig -2: Hardware interfacing with Arduino IDE

2.3 Results

Real time values of the various parameters like voltage, current, temperature and humidity in the application are shown in Fig -3.

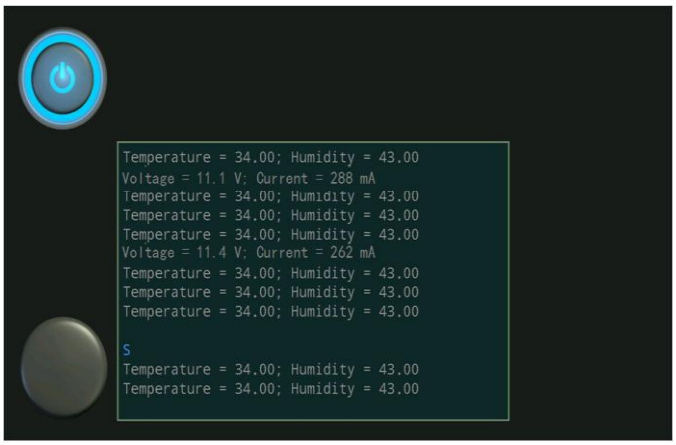

Fig -3: Real time values of various parameters

As we can see, real time values of various parameter in the application screen. Thus, we can continuously monitor the DC motor. Also there is a button provided so we can easily turn on/off the motor from application. The value of speed (in rpm) and the scroll bar for controlling the speed of DC motor is shown in the Fig -4.

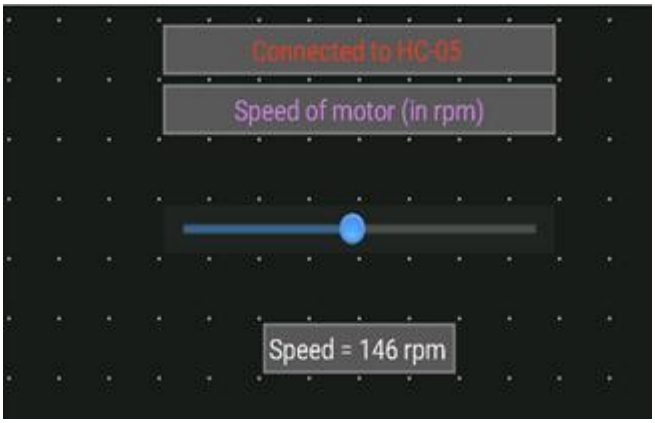

Fig -4: Speed Control in application

3. CONCLUSION

In this paper, we have introduced a system than can protect, control and monitor a DC motor through mobile application using Arduino Uno. Various parameters like current, voltage and temperature and their real-time values can observed on the screen. Protection against the overcurrent and thermal overloading is done by current and temperature sensor. Also precise speed control is achieved. All the desired objectives are completed and new protection, control and monitoring system is developed which is discussed in this paper.

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