ARDUINO BASED IMPLEMENTATION OF CAN PROTOCOL IN INDUSTRIAL APPLICATION

(Control of dc motor in accordance with the temperature)

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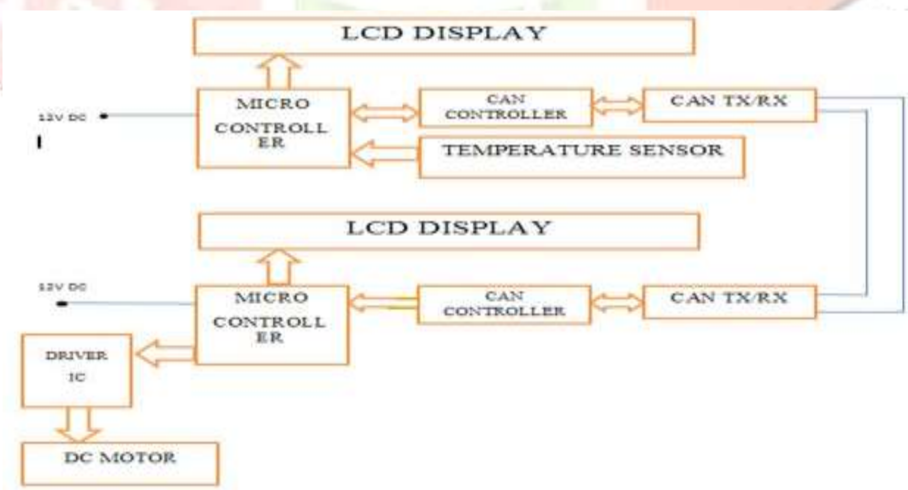
Abstract : The Controller Area Network (CAN) is a Serial, Asynchronous, Multi-master communication protocol for connecting electronic control modules in Automotive and industrial applications. The main idea is to develop a application which can handle temperature variations in a industry by using DC motor. CAN have main features like Low cost, Easy to implement, peer to peer Network with powerful Error Checking, Higher Transmission Rates 1Mbps.This project is designed to control the DC motor based on the temperature change using CAN protocol implementation .The main idea to manage DC motors according to the variations of temperature in a process industry. Mostly used in Industry and Auto Mobiles in a Hazardous Environment and is reliable.

***Index terms*: CAN Trans receiver, Arduino, DC Motor, Temperature.**

I. INTRODUCTION

Controller Area Network (CAN) was initially created by German automotive system supplier Robert Bosch in the mid-1980s for automotive applications as a method for enabling robust serial communication. The CAN protocol has gained widespread popularity in industrial automation and automotive/truck applications. This presents the development of a serial communication protocol called the CAN Protocol. Industrial automation and process control greatly reduces the need for human sensory and mental requirements as well. Most complex industrial automation processes and systems can be automated. A major advantage of industrial automation and process control is the increased emphasis on flexibility and convertibility in the manufacturing process.

II. BLOCK DIAGRAM



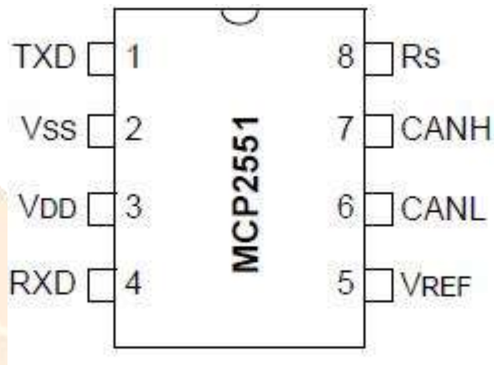
Block diagram of this project

III. ARDUINO UNO

The ATmega328/P provides the following features: 32Kbytes of In-System Programmable Flash with Read-While-Write capabilities, 1Kbytes EEPROM, 2Kbytes SRAM, 23 general purpose I/O lines, 32 general purpose working registers, Real Time Counter (RTC), three flexible Timer/Counters with compare modes and PWM, 1 serial programmable USARTs , 1 byte-oriented 2-wire Serial Interface (I2C), a 6- channel 10-bit ADC (8 channels in TQFP and QFN/MLF packages) , a programmable Watchdog Timer with internal Oscillator, an SPI serial port, and six software selectable power saving modes. The Idle mode stops the CPU while allowing the SRAM, Timer/Counters, SPI port, and interrupt system to continue functioning. The Power -down mode saves the register contents but freezes the Oscillator, disabling all other chip functions until the next interrupt or hardware reset. In Power-save mode, the asynchronous timer continues to run, allowing the user to maintain a timer base while the rest of the device is sleeping. The ADC Noise Reduction mode stops the CPU and all I/O modules except asynchronous timer and ADC to minimize switching noise during ADC conversions. In Standby mode, the crystal/resonator oscillator is running while the rest of the device is sleeping. This allows very fast start-up combined with low power consumption. In Extended Standby mode, both the main oscillator and the asynchronous timer continue to run.

IV. CAN TRANSCEIVER

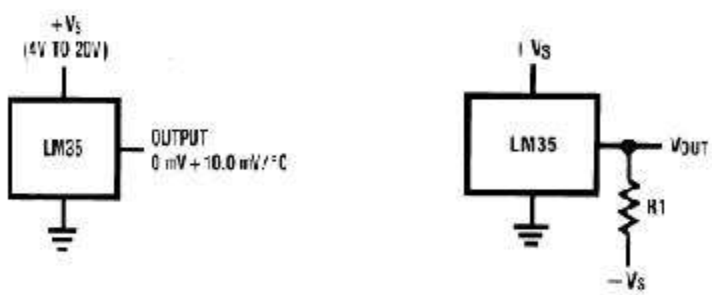
The MCP2551 is the interface between the Controller Area Network (CAN) protocol controller and the physical bus. It is primarily intended for high speed applications, up to 1 Mbps, in passenger cars. The device provides differential transmit capability to the bus and differential receive capability to the CAN controller. It is capable of transmitting and receiving both standard and extended data and remote frames.



CAN diagram

V. TEMPERATURE SENSOR LM35

LM35 series sensors are precision integrated-circuit temperature sensors whose output voltage is linearly proportional to the Celsius temperature. The LM35 requires no external calibration since it is internally calibrated. . The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to read-out or control circuitry especially easy. It can be used with single power supplies, or with plus and minus sup -plies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air.



Temperature sensor

VI. EXISTING SYSTEM

In industrial application, the CAN is implemented in control of machine DC motor in accordance with its temperature with in it . In this system, machine speed always depends on the value of temperature. While machine works if the temperature increase then the machine motor speed decreases and if temperature decreases then the machine motor speed increases that mean the speed of the machine and the temperature were inversely proportional while it is working.

Drawbacks

- Due to the continues variation in the machine speed there is a chance to decrease in the production level.
- Due to overheat of machine, there will be a chance of increase in its surroundings temperature which creates difficulty to manually interface to the machine.
- Always change in the machine speed may have the chance to decrease machine life span.

VII. PROPOSED SYSTEM

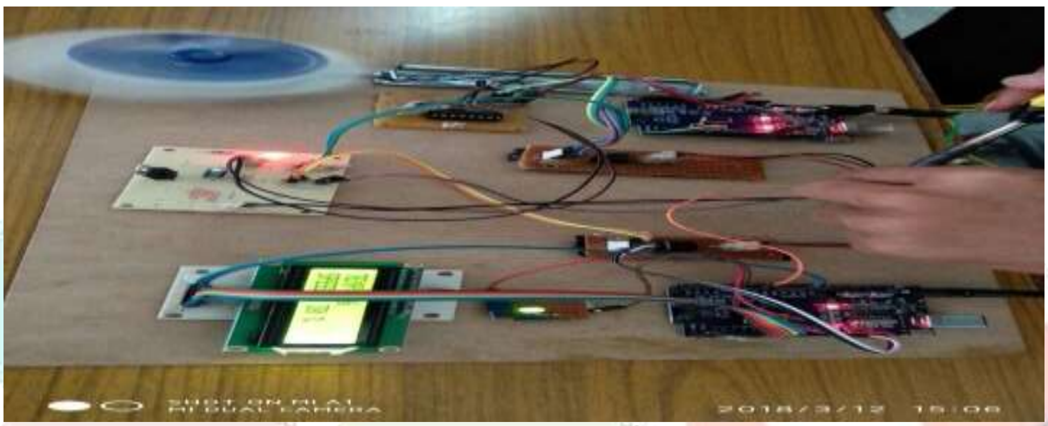
In order to overcome the drawbacks, we are proposing this project that is using DC motor as exhaust fan which is used to eliminate the heat produced by the machine. In our project we are controlling the speed of DC motor in accordance with the temperature. With this we can eliminate the heat continuously as it produced by the machine. So that we can maintain the moderate temperature over there this makes easy in manual interface. Here there is no change in machine speed as it does not effect in production variation. By that production rate is increased as compared to past existing project. Comparing to the past existing project there is a chance to increasing in life span of machine.

VIII. WORKING

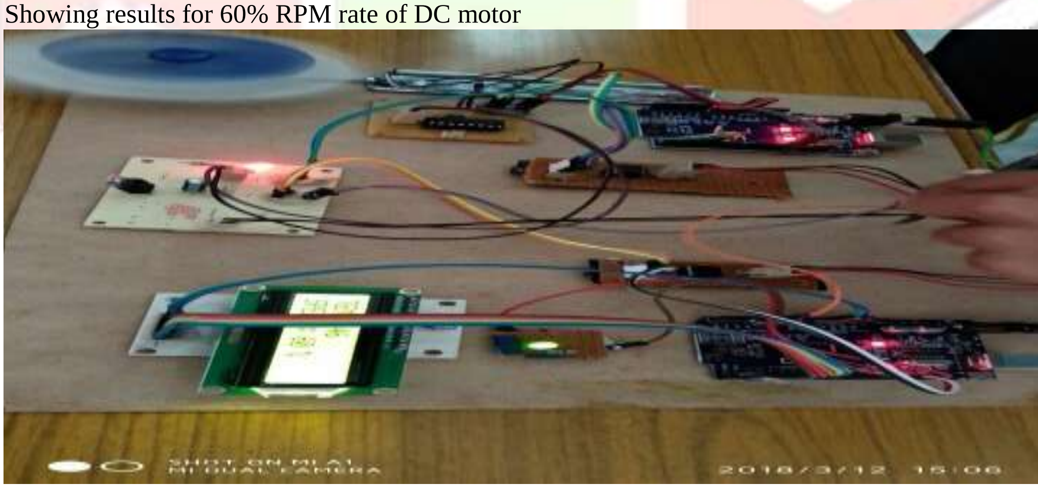
As machine starts working, it produces heat. After it reaches to 36 degree centigrade till 45 degree centigrade, DC motor which we are using as exhaust fan to eliminate heat starts rotating with 30% of its RPM rate. Then after as temperature exceeds 45degree centigrade to 60 degree centigrade, the speed of motor increases to 60% of its RPM. Later, greater then the 60 degree centigrade machine stops working and motor speed increase increases to its maximum i.e., with 100% RPM rate and as the temperature varying to normal then there will change in motor speed. Indication of machine in ON and OFF state is indicated through LED indicator. Automatically machine starts working after it reaches below 60 degree centigrade.

IX. RESULT

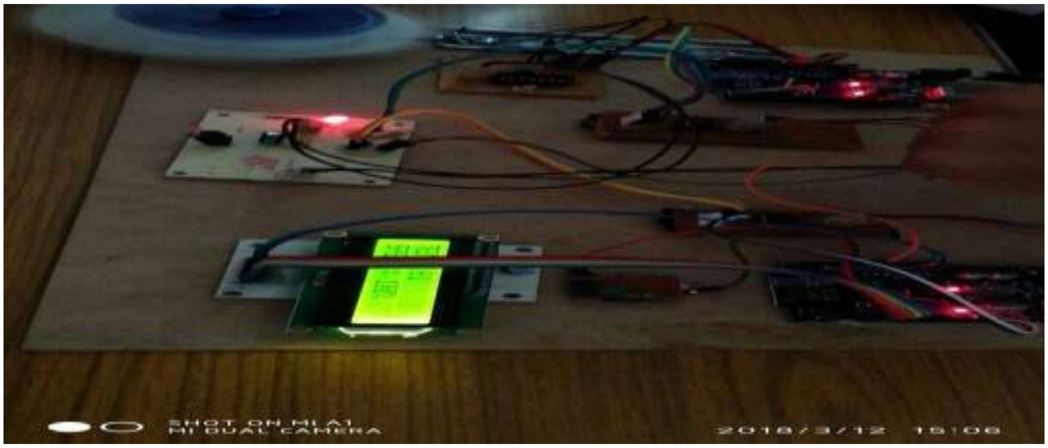
- Showing results for 30% RPM rate of DC motor



- Showing results for 60% RPM rate of DC motor



- Showing results for 100% RPM rate of DC motor.



X. CONCLUSION

In this work, implementation of CAN protocol has been proposed. This system is control DC motor with respect to Temperature. The whole system is advanced, reliable and convenient. This design improves the real-time performance of the user to industrial automation, and is conducive to the realization of the unattended goal, and promotes the development of data transfer .CAN is ideally suited in application requires in large number of shot messages with high reliability in rugged operating environments because CAN in message based but not address based, it is especially well suited when data is needed in more than one location and system wise data consistency is mandatory.

XI. REFERENCES

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