

Implementation of Fault Identification System in Wind Turbine using CAN Protocol

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Abstract- This paper is a CAN based architecture designed for the purpose of monitoring and fault diagnosis of wind turbine. CAN is a Message based protocol designed specifically for Automotive, later Aerospace, Industrial automation and Medical equipment's. CAN interface module is used to communicate the monitored parameters between the wind turbine and the control center. During the transmission of data from one node to another node disturbance occurs. To avoid these disturbances we are using CAN protocol. The project involves ARM core1 runs with CAN and LPC2148 as wind turbine unit to which sensors are connected and ARM core2 as Fault diagnose and monitoring section. A discussion about weather condition (WC) monitoring and generation voltage(GV) display is also added in this design. Data acquisition node collects the sensor data through CAN protocol.

Keywords- will module, ARMIpc2148, sensors, actuators, display

I. INTRODUCTION

Wind energy is that the most generally used resource for the assembly of voltage. Presently wind energy is employed to scale back the emission of dioxide. throughout the transmission of knowledge from one node to a different, node disturbance happens. To avoid these disturbances, to watch and to sight the fault, will protocol is employed. will could be a Message based mostly protocol designed particularly for Automotive, later region, Industrial automation and Medical equipment's. will interface module is employed to speak the monitored parameters between the turbine and therefore the management centre. Earlier, the vibration analysis, vibration signals created by the rotating elements in Wind Turbine's whose current health conditions ought to be diagnosed square measure unremarkably analyzed either by broad band based mostly ways or spectral line analysis ways. In our paper we tend to declare the system with ARM and may protocol to watch and diagnose the issues within the turbine application. The project deals with the info transmission between 2 units within the actual time with none disturbance. the info coordinated universal time is enhanced with the will protocol. ARM core1 runs with will and LPC2148 as turbine unit to that sensors square measure connected and ARM core2 as Fault

diagnose and observation section. information acquisition node collects the detector information through will protocol. Wind turbine could be a rotating computer that converts wind energy into energy leading to the assembly of electricity. Wind turbines square measure fault prone, that's they're deployed in harsh atmosphere like desert, plains excluding that complicated mechanical device system that are set distant from the center. that the probability of fault prevalence and therefore the aspect effects are a lot of, even it ends up in power off. it's necessary to develop the remote observation and fault identification system to watch the run time standing and therefore the identification of fault to enhance the potency and therefore the life time service of the turbine. turbine observation system collects the parameters like Speed, Temperature, vibration, power, voltage and current from the most elements of turbines like shaft, gear box, generator and enclosure. The advantage of mistreatment will bus within the automation is an extra worth to the system and increase its dependableness. the aim of mistreatment will bus is to change any system to speak with different system while not swing an excessive amount of load to the most controller. will bus could be a quick serial bus with the speed of one Mbps that's designed to supply AN economical, reliable and economical link between varied will systems, sensors and actuators. we tend to use will to speak between the turbine.

Proposed block diagram:

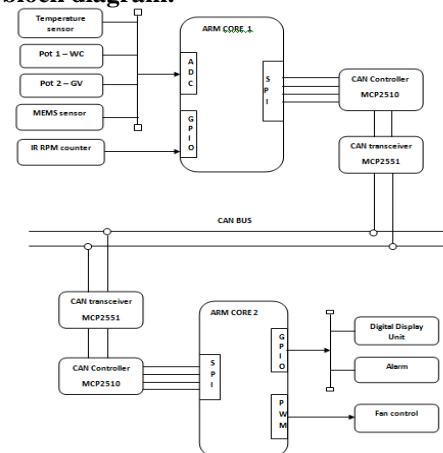


Fig.1: CAN bus – Fault identification

II. HARDWARE DESIGN

a. LPC2148 Processor:

LPC2148 Microcontroller design. The ARM7TDMI-S could be a general purpose 32-bit micro chip, that offers high performance and extremely low power consumption. The ARM design relies on Reduced Instruction Set pc (RISC) principles, and therefore the instruction set and connected decrypt mechanism square measure abundant easier than those of small programmed complicated Instruction Set Computers (CISC). This simplicity ends up in a high instruction outturn and spectacular period interrupt response from alittle and efficient processor core.

Pipeline techniques square measure utilized in order that all elements of the process and memory systems will operate ceaselessly. Typically, whereas one instruction is being dead, its successor is being decoded, and a 3rd instruction is being fetched from memory. The ARM7TDMI-S processor conjointly employs a novel branch of knowledge strategy referred to as Thumb, that makes it ideally suited to high-volume applications with memory restrictions, or applications wherever code density is a problem.

The key plan behind Thumb is that of a super-reduced instruction set. basically, the ARM7TDMI-S processor has 2 instruction sets:

- The normal 32-bit ARM set.
- A 16-bit Thumb set.

The Thumb set's 16-bit instruction length permits it to approach doubly the density of normal ARM code whereas holding most of the ARM's performance advantage over a conventional 16-bit processor mistreatment 16-bit registers. this can be potential as a result of Thumb code operates on identical 32-bit register set as ARM code. Thumb code is in a position to supply up to sixty fifth of the code size of ARM, and a hundred and sixtieth of the performance of constant ARM processor connected to a 16-bit memory system

CAN Overview:

will is most generally utilized in the automotive and industrial market segments. Typical applications for will square measure motorized vehicles, utility vehicles, and industrial automation. different applications for will square measure measure trains, medical instrumentation, building automation, home appliances, and workplace automation. thanks to the high volume production within the automotive and industrial markets, low value protocol devices square measure accessible. will provides subtle error-detection and error handling mechanisms like CRC check, and high immunity against magnetic attraction interference. inaccurate messages square measure mechanically retransmitted. Temporary errors square measure recovered. Permanent errors square measure followed by automatic switch-off of defective nodes. there's warranted system-wide information consistency.

The will protocol uses Non-Return-to-Zero or NRZ bit committal to writing. For synchronization functions, Bit

Stuffing is employed. there's a high information transfer rate of a thousand kilobits per second at a most bus length of forty meters or one hundred thirty feet once employing a twisted wire combine that is that the most typical bus medium used for will. Message length is brief with a most of eight information bytes per message and there's an occasional latency between transmission request and begin of transmission.

The bus access is handled via the advanced serial prescript Carrier Sense Multiple Access/Collision Detection with Non harmful Arbitration. this suggests that collision of messages is avoided by bitwise arbitration while not loss of your time. There square measure 2 bus states, referred to as "dominant" and "recessive". The bus logic uses a "Wired-AND" mechanism, that is, "dominant bits" (equivalent to the logic level "Zero") write the "recessive" bits (equivalent to the logic level "One") as long as all nodes transmit recessive bits (ones), the Bus is within the recessive state.

As presently jointly node transmits a dominant bit (zero), the bus is within the dominant state The will protocol handles bus accesses in line with the conception referred to as "Carrier Sense Multiple Access with Arbitration on Message Priority". This arbitration conception avoids collisions of messages whose transmission was started by quite one node at the same time and makes positive the foremost vital message is distributed initial while not time loss.

Temperature sensor:

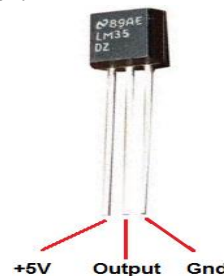


Fig.3: Temperature sensor LM35

TheLM35 pin diagram is shown within the figure a pair of .As a temperature detector, the circuit can scan the temperature of the encircling atmosphere and relay temperature to United States of America back in degrees Celsius. The LM35 could be a low voltage IC that uses close to +5VDC of power. this can be ideal as a result of the arduino's power pin offers out 5V of power. The IC has simply three pins, a pair of for the ability provide and one for the analog output. The output pin provides AN analog voltage output that's linearly proportional to the Celsius (centigrade) temperature. Pin a pair of offers AN output of one mV per zero.1°C (10mV per degree). therefore to urge the degree worth in Celsius, all that has to be done is to require the voltage output and divide it by 10- this offer out the worth degrees in Celsius.

b. Lcd show

Liquid crystal displays (LCDs) have materials that mix the properties of each liquids and crystals. instead of having a temperature, they need a temperature vary at intervals that the molecules square measure virtually as mobile as they might be during a liquid, however square measure sorted along in AN ordered type kind of like a crystal.

**c. Mems technology**

MEMS accelerometers square measure one in every of the only however conjointly most applicable micro-electromechanical systems. They became indispensable in industry, pc and audio-video technology. This seminar presents MEMS technology as a extremely developing trade. AN measuring instrument is AN mechanical device that measures acceleration forces. These forces could also be static, just like the constant force of gravity actuation at our feet, or they may be dynamic - caused by moving or vibratory the measuring instrument.

RPM Controller by mistreatment IR Sensor:

IR transmitter and receiver may be obtained at low worth. Their form is appearance precisely the same as diode. to tell apart between transmitter and receiver, the transmitter invariably are available in clear diode whereas receiver is black in color. aside from that, there's conjointly receiver that's wont to develop specific frequency IR, 38kHz. For your info, 38kHz frequency IR is usually utilized in remote. IR transmitter can emit infra-red once hopped-up. you'll be able to connect the IR transmitter sort of a diode along side a current limiting electrical device. this limiting electrical device is employed to forestall an excessive amount of of current passing through the transmitter and burnt it. i'm mistreatment 330 ohms electrical device for the IR transmitter.

Potentiometer:

The Potentiometer indicates weather conditioandGeneration voltage. All rotary potentiometers have 3 terminals ANd an adjustable shaft, as shown within the image below.

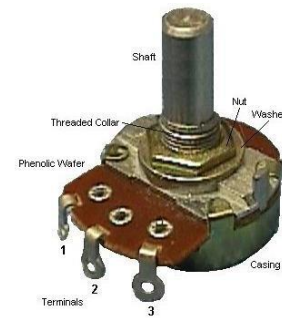


Fig.3: Potentiometer

In a normal potentiometer configuration, Terminal one would be assigned because the ground, Terminal a pair of would be the wiper (output), and Terminal three the input. the bottom and input terminals square measure placed at either finish of a (typically circular) resistive part; the wiper might slide on the element whereas creating contact with it. By turning the shaft, the wiper will vary the device's resistance from ground (no signal) to input (maximum signal). Basic potentiometers — even those delineated as "full-turn" square measure capable of 270 degrees (or close to 3/4 of a turn) of rotation.

III. CONCLUSION

This project is enforced in 2 sections. initial one famous runs with ARM as master node and another as traditional ARM information acquisition node to that sensors square measure connected. Communications between 2 nodes square measure accomplished through High Speed will communication. Sensors connected square measure temperature, speed, and Alcohol sensors. The master node collects of these info through will network and stores in 3 sessions. to accumulate the results, various session switches square measure provided at the master node. These results may be monitored on show.

IV. REFERENCES

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Author profile

Mr. Jakkula Thirupathi was born on March 09 1995, completed his graduation in Electronics and Communications Engineering from CMRCET. Currently he is pursuing his M.Tech in Embedded systems from St. Martins Engineering College. His areas of interest include data analyzing and communication systems.



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