HIERARCHICAL SYSTEM FOR DETECTING SENSOR FAILURE AND LOAD CONTROLLING USING WIRELESS MODULES

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ABSTRACT

This paper focus on monitoring sensor nodes performances comparing to its basic characteristics. The prevention of control process over failure module of sensor can be ignored by controlling the load via GSM and ZIGBEE wireless module. The sensor characteristics based upon its types and module does it measure the sensor node value and control the environment by wireless network. The paper does compose of gas, radiation, temperature, and smoke sensors. The error occurrence does it's to be detected and it will be control by the ARM controller. The performances measures does it can be monitor and also be indicated and also be control through the WSN network. The data logging of sensor monitoring and its control functions are realized through monitoring.

Keywords: Wireless Sensor Network, Sensor Parameter Instrumentation

I. INTRODUCTION

The human safety and industrial wastages is to be more concern does it's to be needed for human and resource to avoid defect over certain application process. The automation process does hold few mal functionalities provide major hazards effect to its resources. The sophisticated device that its leads to avoid the disorder functional process. The instrumentation process of sensor calibration does it's achieved by various testing process. The conditional process does satisfy its basic relevant characteristics it's to be a good device. The control strategies does it polices various technologies based upon its protocol devices. The wireless technology is to be used for industrial safety and environmental pollution control which does it to be flexible for manual usages.

II. PROPOSING SYSTEM

The system comprise of four sensors, control the industrial parameter among their application this system operates on two modes classified as failure and normal mode. In normal system operate as an predictive system only sense and monitor via wireless communication, and sensor failure calibrated reading varies does also be indicated and also be controlled via ARM controller.

2.1 Problem Formation

The three nodes node performances comparison rule f voltage divider for individual sensing unit. The temp parameter value considered as T, gas G and radiation denoted as R. the voltage divider rule

V out=V in (r1/ (r1+r2)).

The voltage level does depend on its performances of sensing nodes $P = \sum_0^2(T)/3$.

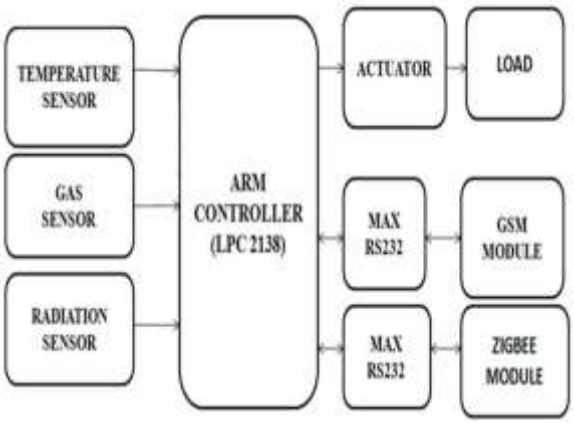
T is to be defined as the overall performances sensor T is to be obtained over than 90% of its performances.

Three types of sensor does it's vary output performances 0-2 level sensors; any one of sensor does failure does affect overall performance of system. r-denotes as output performance of the system, V out- output level of sensor.

2.2 System Design

The system view does represents sensing parameter limited 600*c-1000*c for temperature sensor, this reading does satisfies in normal mode operation, no need for control operation is to be required and variation in sensor parameter does its causes effect on resources, the signal conditioner lead to convert the sensor output voltage level into ARM controller supportive voltage level. The voltage level does it depends on internal resistive characteristics. The comprises of voltage level of calibrated voltage level does vary ARM compares and control by alerting and responses by AT command communicated via GSM and ZIGBEE module.

III. BLOCK DIAGRAM



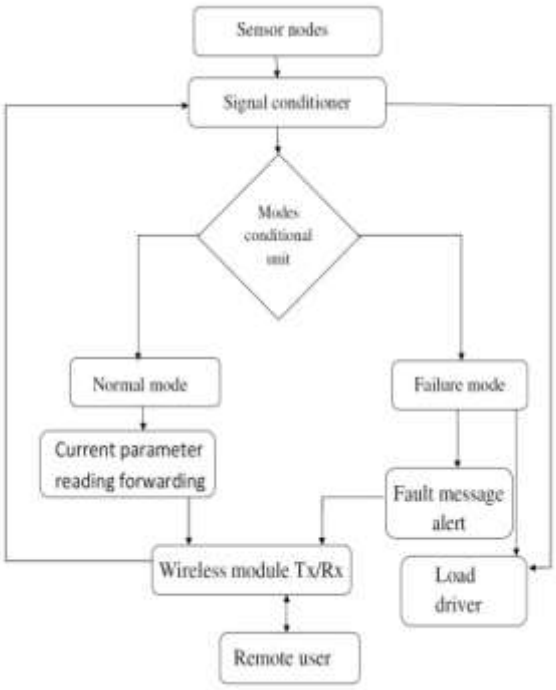
Controller Station

The controller system consists of three sensors such as temperature sensor, gas sensor, and radiation sensor, ARM controller, actuator, serial access port max rs232, GSM and ZIGBEE wireless module.

The base station acts as a remote station which can control through the wireless network. The additional innovate technology can improves performances of the system. The system performances can be determined based up on its transmission and reception of controlling message. The network does serve the communication with high speedy network based upon high transmission rate.

The system operates in two modes normal and failure modes, in normal mode the gas, optical and temperature parameter does to be monitor via LCD display. The sensor failure occur the load turns towards off stage and buzzer alert will be indicated, and also the control message will be send to the base station and base station send a at command to the controller station. The AT commands does specify the control operation for the load by the ARM controller. The ARM controller drive's the relay with the help of relay driver. The relay switch turn the load towards ON or OFF control based upon its control signal.

IV. FLOWCHART

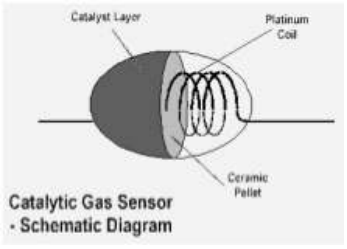


V. BASE STATION

The base station does also be a remote station which control the load through the ARM controller which sends AT command instruction to the ARM controller the station does its specifies wireless technologies and control the load by inter process communication.

5.1 Gas Sensor

The MQ 06 gas sensor is to detect the gas leakages within the surroundings. The leakage gas content like methane, butane, harmful gas is to be observed by the sensor.



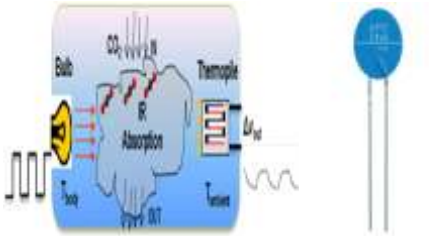
Sensor Principle

The CO2 gas is more specific absorption for heat and IR. The coefficient does it utilizes the variation in the sensor filament. The resistivity varies does cause variation in output voltage level.

Gas Sensor

5.2 Temperature Sensor

Temperature sensor thermister measure the temperature level with in the resources. The temperature level does it's to be measure and controlled by the ARM controller. The specific temperature is to be calculated and measurement error occurs does be detected and indicated by the controller.



Temperature Sensor

5.3 Radiation Sensor

The radiation sensor used to detect the radiation of light sources the higher radiation does causes the sensitive affect to our human. The photo transistor sensor does sense the light radiation over the environment; the photo transistor converts optical sources into voltage sources. The resistance parameter variation does it's to be measured and controlled via controller station.

5.4 Microcontroller

The ARM controller does specify compactable configuration for this system and it's more comfortable for real time applications. The ARM LPC 2138 specifies 10 bit ADC and DAC, 16 bit/32 bit controller. It also includes SPI, IC and SSP serial interface.

The ARM controller is more efficient than PIC. 5V is needed for PIC, but ARM can operate in 3.3V the power consumption is very less in this type of controller and also its can interfaces serial interface device like usb directly with in it. PWM does also be inbuilt within it.

5.5 Max Rs 232

The MAX RS 232 is a serial communication interface between controller and GSM; ZIGBEE protocol the serial synchronous interfaces does achieve the communication between the controller, remote station (Base station) vice versa.

5.6 Gsm :(Global System for Mobile)

The gsm is a network used for global synchronous communication. The gsm can communicate the controller which receives indication and send AT command instruction via GSM network.

5.7 Zigbee

The zigbee is a wireless protocol, operates in the 2.4 GHz (ism) radio band the same band as 802.11b standard, Bluetooth, microwaves and some other devices. It is capable of connecting 255 devices per network. The specification supports data transmission rates of up to 250 kbps at a range of up to 30 meters. Zigbee technology is slower than 802.11b (11 mbps) and Bluetooth (1 mbps) but it consumes significantly less power.

5.8 Actuators

The relay is used to control the electrical load by driver circuit's act as switch. The ARM controller sends AT commands to the driver circuit. the control signal transferred up to 3.3v the driver converts and control up to 12v level. relay switch requires high voltage level based on driver switches ratings e.g. 12v, 24v 230v etc.

The relay switch does switch the load input power to ON or OFF stages based on the control input from the controller.

5.9 Load

The dc motors used as an load alternatively can use solenoid valve, Electrical load does it's to be control by the driver and ARM controller. The exhaust fan and solenoid valve does close and control the pollution over the environment.

The controller station does indicate via wireless network to the base station and control the electrical load by instruction of remote user. The ARM does intimate to the base station and responses user AT command via wireless technologies. The control strategy does used to protect the human, environment, and possessive materials.

5.10 Mobile

The mobile is a device which communicates between the control station and remote user. The error occurrences indicated via short message service from the control station and response messages from the base station. The mobile node is service is to be enabled by the network service provider; the network service provider does provides various services via GSM technology. It provides confidentiality, privacy, authorization, and authentication services over network.

5.11 Personal Computer

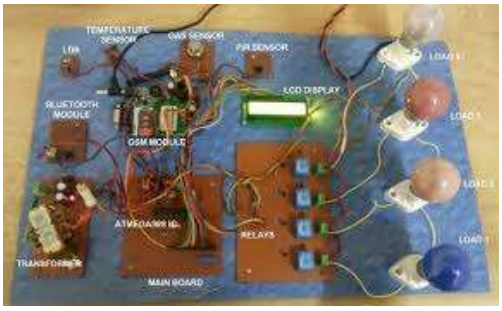
The personal computer used to monitor the gas, temperature, radiation sensor values. The zigbee is a wireless protocol which communicates between personal computer and the controller.

VI. HARDWARE TOOL DESCRIPTION

The failure detection system programmed in embedded C language using KEIL C software. The hex code for source programming is to be developed and ready for dumping on the loader kit. The proteus tool used to design the circuit and PCB design is to be made for system design. The PROTEUS 8.2 tool performances overview of circuit diagram. The hex coding is to be loaded in the ARM controller and hardware kit has been checked by its design performances.

- ✓ KEIL C
- ✓ PROTEUS 8.2(PCB ISIS Tool)

VII. HARDWARE



Hardware Output

The sensor failure does it to be detected and control via zigbee and mobile wireless technology. The load can be controlled the indicator lamp can switch off state by instruction AT command message to the ARM controller. The message is to be send through wireless technology. The command does indicate to drive the load to ON or OFF state of required load.

VIII. CONCLUSION

This paper prefers about the sensor failure and environment control over industries. The failure absorption mode of operation does it's to be detected to avoid mal function process over a resources. The pollution can be prevented from hazard effect to be rectified by detection of sensor. The wastage of raw material can also be avoided by alerting and controlling process.

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