GSM & Wireless Based Maintenance Call Priorities System

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Abstract

This project has 3 basic modules.
1. high priority System
2. medium priority
3. low priority
*   This project describes a condition based reporting technique of a multi-machine System using GSM technology. In this present approach, a dedicated microcontroller based hardware unit (DHU) has been developed to continuously measure the system. to monitor the running condition of a plant. In a multi-machine monitoring system each fault detection circuit is connected with one such DHU, which are also connected to a Pc using the rf sensor and it will send the fault alert using Global System for Mobile Communication (GSM) modem. The preliminary level of fault or abnormality in operation of each machine is diagnosed by the respective DHU and the fault or abnormalities details are reported to the pre-assigned operator through an SMS service. In extreme case, the provision of machine shut down by a return SMS is also provided.*

Keyword : - *GSM , SMS , DHU*

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1. Introduction

Electrical machines, installed in different locations in a plant, are needed to be monitoring and control for their healthy operation and smooth running of the plant. It is not always possible, rather difficult, to keep track of all the machines at a time simply by days long manual observation. On the other side, modern civilization is advancing at very faster pace with the adoption of wireless technology. The convergence of wireless technology and the embedded technology with the different transducers makes these supervisory systems more reliable, much efficient as well as cost effective one. Keeping this in mind, the present approach has been made to apply the advantages of wireless communication and embedded technology towards electrical machines condition monitoring and automation. This work describes the development of a supervisory automated reporting system for remote condition based monitoring, analyzing and control of electrical parameters of different machines of a plant or in power station, sub-station etc. so as to enhance the overall system performance using GSM (The Global System for Mobile Communication) communication. A detailed discussion on electrical drive condition based monitoring, diagnostic research and development is made for the smooth running of the machines. In Ref. the authors dealt with a state-of-the-art discussion of the electrical drive condition monitoring, diagnosis, research and development, highlighting analytical and technical considerations as well as various issues related to different failures. Among different parameters of induction machine monitoring of stator voltage, stator current, rotor speed are most important for early detection of fault in the machine. Speed and winding current estimation is helpful to determine the mechanical stresses like bearing failure or shaft failure, turn to turn short circuit, cracked/broken rotor. Continuous current monitoring to obtain the running condition of an induction machine is important and has been discussed in. Now-a-days wireless and mobile communication is the major tool that can be used to provide the information to the operator or concerned authority for their supervisory control. These issues of mobile communication technology in the recent years have been extensively used indifferent form in different application areas. The application of less expensive but more powerful microcontroller will lead this data acquisition system more simple. The convergence of microcontroller based hardware with the wireless communication system (like GSM, GPRS) is becoming very popular choice to the researcher's and scientists for such type of fault detecting, reporting, diagnosis and control applications. In this scheme, a state-of-the-art standalone Dedicated Hardware Unit (DHU) is developed using microcontroller for monitoring the machine parameters like instantaneous voltage, current and speed of a machine in a typical plant. The DHU is responsible for measuring the machine basic parameters and controlling the supply to the motor and hence DHU is located at the machine site with one card per

machine basis. The card is also interfaced with GSM modem for GSM based wireless accessing. There will be multiple cards for multiple machines system. Each DHU compares the measured value with pre-set or limiting values of the above mentioned parameters and if any abnormalities are detected an SMS is generated and is sent to the pre-located mobile or central station. The receiver may then send a return SMS requesting the details of the abnormalities. Upon receiving this request the details of the fault are then sent through another SMS by the DHU and it will take the appropriate action as per the content of the return message.

2. Literature Survey:

Aswin Sayeeraman and Ramesh (2012) have proposed the secure car parking and reservation system using wireless technology. Parking lot vacancy is identified using infrared sensors and vacancy detail is transmitted to PIC Microcontroller through Zigbee communication .Reservation module includes GSM modem which is interfaced with a coordinator system. The user can book their parking spots through SMS. It provides higher level of security for the vehicles parked in the respective parking spot. This system reduces the traffic and congestion in finding the available parking spots, and is cost effective and highly secure.

Choi et al. (2006) has proposed ubiquitous home network using wireless PAN (personal area network). The wireless PAN technology has attracted more attentions over traditional wired home network devices such as Ethernet, PLC and Home PNA since it requires no cabling work. The home server will be combined with robot to provide functionalities identical to current home service robot as well as to implement more effective and spontaneous server. In this work embedded board has proposed as a home server for an efficient control of internal information and conditions of house from remote location and virtual home robot server using Zigbee sensor network.

Zualkernan et al. (2009) implemented an open-architecture for a remote monitoring embedded system called the Info pods System. This architecture is based on ZigBee based controller. The architecture allows multiple family members to simultaneously monitor their home appliances as well as external Internet resources using low cost, stand-alone hand-held mobile wireless devices. The proposed architecture can be easily integrated with existing smart home systems. The architecture is implemented and demonstrated in the context of an existing Java-based smart home.

Jinsoo Han et al. (2009) has proposed remote controlled energy-saving room architecture in order to reduce standby power consumption and to make the room easily controllable with an IR remote control. To proposed system consists of a automatic standby power cut-off outlet and a ZigBee controller with IR code. The proposed system consists power outlet monitors the power consumption for a predetermined time and completely cuts-off the power supply. When power is below the threshold, this power outlet has a function of changing the threshold power, which enables any kind of home appliances to be applied to the power outlet.

3. Proposed System:

In today's fast & demanding work production loss is not acceptable to management in automobile/manufacturing industries. In automobile/manufacturing industries for assembly line after breakdown the existing process of calling maintenance operator / officer is like a fire fighting activity on a random call by production operator. Thus it is erratic, operator dependent, error prone & unsafe process. In breakdown (Equipment fault) condition maintenance operator / officer can't recognize the priority of breakdown i.e high or low. In this process operator randomly goes on any stage and checks the breakdown & help the production officer / production worker. This leads to production loss because operator can't identify the high priority maintenance call for breakdown repair. In this process valuable manpower resources are wasted / underutilized.

Innovative Solution:

After breakdown of equipment or any fault on assembly stage production officer / production worker will press the push button available on stage (High, Medium, Low & general) as per priority of fault or maintenance call, system will send the SMS like
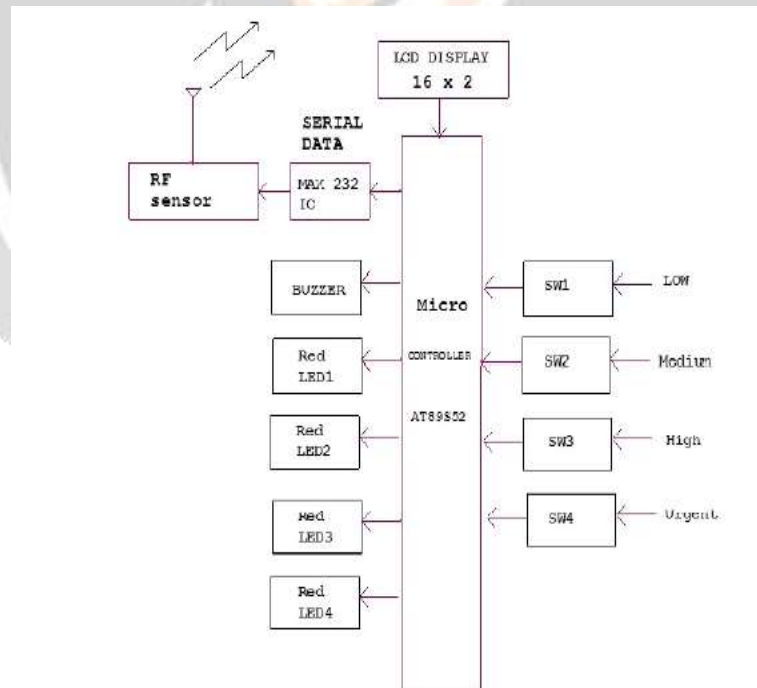
4. Block Diagrams of System:

4.1 Block Diagrams for RF Modem at PC Side:

The following figure show basic block diagram of our system in which we have used microcontroller as heart of system and all other transducer are the peripheral of our system.
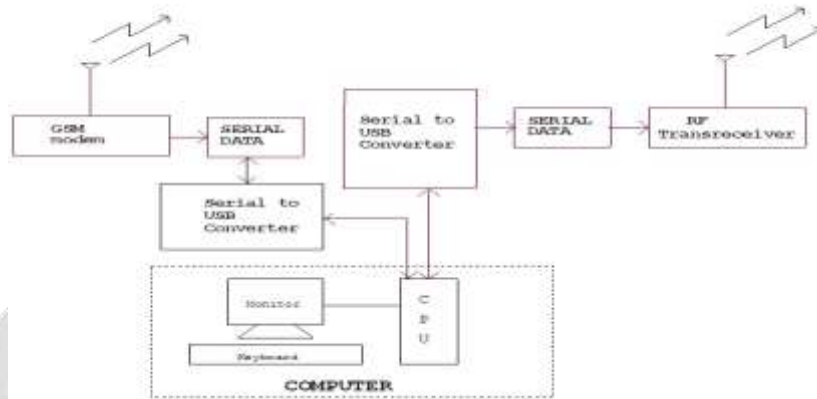
4.2 Block Diagrams for Receiver:

5. Detail Working of System:-

Input side:

Input side includes industrial push buttons & and wireless transmitter module. System takes inputs like (High, Medium, Low & General) priorities of fault / maintenance call And sends the signal towards the receiver side wirelessly.

Central Processing Unit:

CPU includes the wireless receiver module & Microcontroller. Wireless receiver receives data which is sent from transmitter side & gives to microcontroller. Microcontroller identify the priority of the fault send it to the SCADA(PC) side. If general fault / maintenance call is occurred, then microcontroller itself operate the / turn On the buzzer for audio indication to maintenance department.

Industrial PC:

It includes the visual basic software which is used for the fault data recording & future analysis. It gives commands to the GSM module.

GSM Module:

GSM module sends the SMS to officers as per user setting & also as per the programmed fault priority.

6. Conclusion

This project presents a novel expert system for troubleshooting and solving industrial problems and faults. After implementation of this concept one expert application software will be developed. The user or trouble shooter of the software will definitely get immense help to solve problem and fault thus save time and cost.

7. Future Scope:

- The project has been developed by considering the future need of the energy requirement.
- The present model of the project can be used for the domestic purpose. The developed model can be used for the large fault detection.
- The system will able to detect fault automatically.

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