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Monitoring and Fault Diagnosis System for Power Station using GSM and IOT Technology

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Abstract: In earlier days, the controlling and monitoring where done through human workers. Nowadays we are working with a wide range of technologies that reduces human work in different processes. Most of the industries are adopting automation and upgrade themselves. In industry or in a power plant every system is intricate and it is slightly difficult to track on each and every system that's why we need a system that efficiently done monitoring and controlling processes, for that purpose we are proposing this system using GSM technology and iot application to increase the efficiency of the system. Convenient specific sensors are used to monitor the parameters of generator such as voltage and current whenever the fault occur and current decreases rapidly it will promptly send an SMS via the GSM wireless network. In addition to this with the help of iot application we can control the power generation by the application of Android smartphone with this system the fault can be detected in a uncomplicated way and disengage at shortest possible time.
Keywords: Monitoring, GSM technology, SMS, Iot application, Fault detected.

I. INTRODUCTION

The project aims to monitor power generation in power station and send an update over GSM network through SMS from android smartphone. Every android smartphone has a GSM modem which make able the phone to communicate with outside world. By using GSM, user is able to do audio conversations and send and receive SMS messages. Due to Fault occur in power generation can cause interruption of power supply.

The time required to detect the fault is significantly reduced ,as system provides automatically and exactly correct fault information. This increase the speed of communication.

This will save electrical equipment from damage. We used A smart GSM based fault detection so that it indicate fault occur in power generation accurately. This system is easy to install and available at very affordable price. The system uses RS 775 motor with input of 12volt 5 amp, generator with output of 11volt, node MCU ESP 8266 module, Arduino UNO, GSM module sim 900A,current sensor, relay module, power supply of 12volt 5 amp and DSNVC288 display. The system automatically detect the fault and send an update to higher officials.

The paper gives design and implementation of a distributed monitoring and manipulating system. Here we use wireless technology GSM, SMS is sent to senior executive engineer so that as soon as the possible fault detection and repair take place and power generation continues.

The microcontroller use to control a device on the basis of information given to it. On other hand after power generation the voltage is step up with the help of power transformer and power is to be transmitted. Additionally, here we use IOT (internet of Things) to control power generation by application of Android smartphone.

II. IMPLEMENTATION DETAILS

There are certain parts in our project which are dependant on each other. Functioning or command will be transferred to each part after in terms of electrical signals. The working functions of main parts are as follows :

A. RS 775 motor
B. Dynamo
C. Node MCU
D. Arduino Uno
E. GSM module sim 900A
F. Current sensor (ACS 712)
G. Relay module

H.   12volt, 5 ampere power supply
I.   DSNVC288 display
J.   Inverter (Square wave output)
K.   Transformer (12 volt to 220 volt)
L.   Load

The project is based on GSM module and iot technology. Here motor and dynamo are coupled with each other.we provide a supply of 12v to the motor. By using IOT application ,we can start and stop the motor. When there is any fault occurr in power generation, It will be sence by current sensor and fault value show on display and GSM module send an update to the technical incharge via SMS messages so that immediately fault detection and repair take place. In addition to that we use step up transformer so that power is to be transmitted.

PLANT HANDLING BY IOT: IOT is use to control power generation by application of android smartphone. Here we connect relay module and node MCU. Node MCU is popular for IOT. Relay act as a switch between electrical load and node MCU. tt has two configuration normally open (NO)and normally closed (NC).input to relay is given from pin D4.Vcc is given from 3.3V and ground is connected to ground pin of node MCU. If we give off command from Mobile then relay is in "OFF" condition and if we give on command from mobile then relay is in "ON" condition.

GENERATION ON GSM : Here we connect Arduino Uno and GSM module SIM900A.By using Arduino and AT commands ,user are able to send and receive SMS through SIM900A GSM module. To send an SMS or to receive SMS we use AT commands which is easiest way to communicate with GSM.AT commands are special commands which follow UART protocol. AT means attention commands. There are many AT commands for different functions. For example. If we sent ATD command to GSM module form ardinio, it will dial a number. Here we use software Arduino IDE.

When there is any fault in power generation Arduino will communicate with GSM module and GSM module will generate a message like power failure occur, power is back. This types of messages are generated and will be send on android smartphone via SMS messages
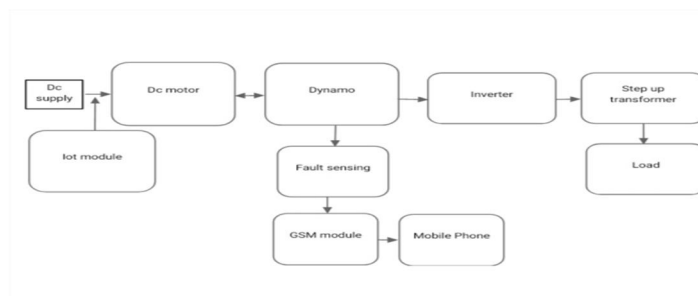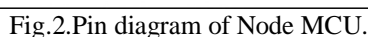
III.METHODOLOGY

Fig.1. Block diagram of GSM and IOT application

This paper is discuss about the monitoring system which is used to help in detecting the unusual fault signals and send an alert SMS to the higher officials by using GSM network and with the help of iot (internet of things) we can easily turn on and turn off the power generation part. In this project we give priority to the reliability of the system and efficiency of the system the main attribute of this project is to take automatic decision making.

We categorize our system into three parts first part is the data collector part in this part we acquired the data of dynamo with the help of using appropriate specific sensors the second part is the data processor the value of the current will display on DSNVC288 display, the microcontroller starts comparing incoming values with the preset values, if current sense is less than pre set current and then the load will be turn off and this data will be processes via microcontroller. The third part is the communicating part, the display connected to the GSM module GSM module will send an alert SMS to the higher officials. And with the help of iot which is operate using nodemcu esp8266 module we can turn on and turn off the motor. After the communicating part we place and inverter for the conversion of DC to AC and then with the help of transformer we assured that it will transmit the power to the load.

IOT MODULE: Iot is a concept that it will connect devices through internet and collect and transfer the data over wireless network. By this system we can get accurate perception of information in any field. By programming the nodemcu esp8266 we can smoothly access the iot application by using Android smartphone and get the desired results.

Fig.2.Pin diagram of Node MCU.

Node mcu is an open-source iot platform it has inbuilt microcontroller and Wi-Fi so it can be easily programmable we can store the data of sensors by using Wi-Fi. Node mcu works on Arduino IDE software it it has 30 pin layout. It have 4 power pin: Vin pin and three 3.3 pins, GNG it is a ground pin, ADC channel: Embedded with 10 bit precision SAR ADC, UART pins, SPI pins, SDIO pins, PWM pins, control pins : EN, RST, WAKE. This chip contains crucial elements of computer that are CPU RAM networking (Wifi) and modern operating system.

We control a DC motor over a Wi-Fi with one relay module using node mcu. Relay module is connected to the node mcu by using jumper wires. We prepare programming in arduino IDE software and form a page to control the turn on and turn off operation of the motor and this programming is uploaded in the nodemcu to get the desired results.

GSM MODULE: GSM module is the medium of communication over wireless network, it can transmit the data as well as voice simultaneously by using GSM to the utility mobile phone. In GSM there is a antenna which is used for searching for proper network and also there is a SIM slot in which we can insert the sim for continuity of communication. Whenever the fault occurred in the system the system send and message through the mobile phone and it gives the information about fault and location of the fault using GSM module.

Fig.3. Interfacing diagram of GSM and Arduino

This is the This is the interfacing diagram of GSM and arduino UNO, In Arduino Uno, the main part is the microcontroller Atmega8, there are 14 digital pins to connect the output, such has LED, LCD, relay module etc. and analogue pins to connect input such as sensors power supply pin and ground pin. There is a power Jack to give power to Arduino, and there is a USB port to upload program. We can upload the program in arduino by using suitable software which is Arduino IDE. Arduino pin D1 is connected to the GSM pin RXD and Arduino pin D10 is connected to the GSM pin TXD through the program we gave the input to the the pin D9 and D10 and we will get the output through the GSM module in this way we get the results.

IV.CONCLUSION

To make the world a better place it is essential to reduce the suffering of living human being. This paper represents our assistive system for the industrial purpose which offers fault detection using GSM and Iot technology. It brings something new for a better surveillance.

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