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Industrial Appliance Monitoring System and Remote Data Acquisition with Self Monitoring

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Abstract: *The Electrical Power Systems Are Highly Non-Linear, Extremely Huge And Complex Networks. On The Other Hand, All The Developed And Countries Have Not Sufficient Supply Of Power. This Project Focuses The Detection Of Power Failure And Takes Reflex Action To Solve The Problem With Help Of GSM Communication. The Power Failure Will Be Detect By Relay, And It Communicates To Microcontroller To Alerts The Authorized Person. In Addition To That, Parameters Of Generator Like Fuel Level, Oil Level, Temperature, Battery Status, Etc., Are Monitored And Communicated To Authorized Person. The Acquired Parameters Are Processed And Recorded In The System Memory. If There Is Any Abnormality In Their Process, According To Some Predefined Instruction And Policies That Are Stored On The Embedded System EEPROM Then GSM Alerts To Concerned Person Immediately.*

Keywords: *Microcontroller, Temperature Sensors (LM35) GSM Modem (SIM 300), Fuel Level (PH606), Oil Level (R Series),*

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I. Introduction:

The Use Of Generators Has Become A Very Common In Almost Every Passive Infrastructure Companies, Industries, Hospitals, Townships Etc. While Using These Generators A Number Of Challenges Are Faced By The User Such As Maintaining The Quality Of Grid Power, Asset Protections, Generator Maintenance, Capturing Real Time Data, Remotely Monitoring Of The Generator, Fuel Theft Monitoring, Data Collection Analysis Issues, Human Dependency Etc. The Generator Monitoring System (GMS) Is Designed Specifically For Emergency Power Generators To Monitor Engine Operations And Detect Pre-Alarms Or Failures. This Insures You Of Increased Generator Availability And A Rapid Response To Service Problems. The GMS Monitors The Power Generators Placed At The Remote Areas And Increases Its Efficiency By Monitoring The Various Parameters Of Generator, Reporting Critical Problems Minimizes Downtime And Maximizes Availability By Sending Generator Failure Messages Instantly To You For Diagnosis And Emergency Service Dispatch If Required. It Works On GSM Technology, GMS Can Monitor Various Parameters Such As External Power Supply, The Battery Voltage, Fuel Level, Etc. This System Provides Ideal Solution To The Problems Caused In Situations When A Wired Connection Between A Remote Appliance/Device And The Control Unit Might Not Be Feasible. The Project Is Aimed To Analyzing And Testing The Use Of Mobile Phones To Remotely Monitor An Appliance Control System Through GSM Based Wireless Communication.

II. Sensor Used In Monitoring System-

A. Temperature Sensor

In This Project Used LM35 Temperature Sensor. The LM35 Series Are Precision Integrated-Circuit Temperature Sensors, Whose Output Voltage Is Linearly Proportional To The Celsius (Centigrade) Temperature. The LM35 Thus Has An Advantage Over Linear Temperature Sensors Calibrated In ˚ Kelvin, As The User Is Not Required To Subtract A Large Constant Voltage From Its Output To Obtain Convenient Centigrade Scaling. 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. Low Cost Is Assured By Trimming And Calibration At The Wafer Level. The LM35's Low Output Impedance, Linear Output, And Precise Inherent Calibration Make Interfacing To Readout Or Control Circuitry Especially Easy. It Can Be Used With Single Power Supplies, Or With Plus And Minus Supplies. As It Draws Only 60 µa From Its Supply, It Has Very Low Self-Heating, Less Than 0.1˚C In Still Air. The LM35 Is Rated To Operate Over A −55˚ To +150˚C Temperature Range, While The LM35C Is Rated For A −40˚ To +110˚C Range (−10˚ With Improved Accuracy). The LM35 Series Is Available Packaged In Hermetic TO-46 Transistor Packages, While The LM35C, LM35CA, And LM35D Are Also Available In The Plastic TO-92 Transistor Package. The LM35D Is Also Available In An 8-Lead Surface Mount Small Outline Package And A Plastic TO-220 Package.

Features

- Calibrated Directly In ˚ Celsius (Centigrade)
- Linear + 10.0 Mv/˚C Scale Factor
- 0.5˚C Accuracy Guarantee Able (At +25˚C)
- Rated For Full −55˚ To +150˚C Range N Suitable For Remote Applications
- Low Cost Due To Wafer-Level Trimming
- Operates From 4 To 30 Volts N Less Than 60 µa Current Drain
- Low Self-Heating, 0.08˚C In Still Air N Nonlinearity Only ±1⁄4˚C Typical

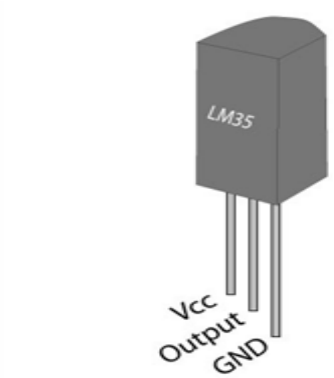


Fig . Temperature Sensor

Pin Description:

Pin No	Function	Name
1	Supply Voltage; 5V (+35V To -2V)	Vcc
2	Output Voltage (+6V To -1V)	Output
3	Ground (0V)	Ground

B. Oil Level Sensor

The R-Series Liquid Level Sensor Features Fully Integrated Electronics Is Light Weight And Has No Moving Parts To Provide Excellent Long Term Reliability. The Sensor Is Manufactured To Your Length Requirements And Is Suitable For Operating Temperatures Up To $+125^0$c. Combined With A Configurable 0-5v Analogue Output And SAE 5-Bolt Mounting Flange, The R-Series Sensor Is Compatible With A Broad Range Of Liquids, Designed To Meet The Needs Of Motorsport Engineers In A Dependable And High Performance Package.

C. Fuel Level Sensor

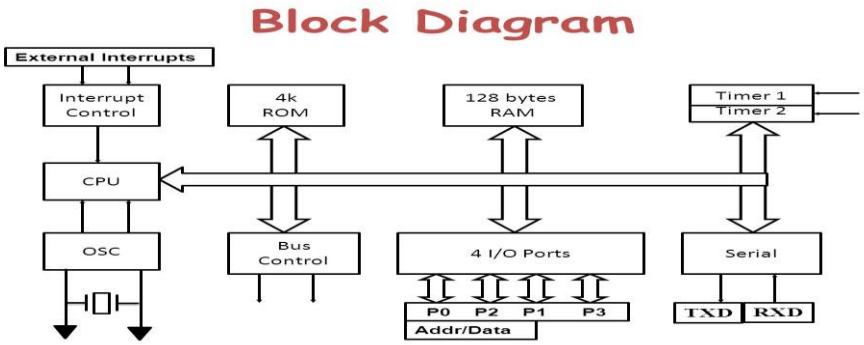
Level Sensors Detect The Level Of Liquid And Other Fluids And Fluidized Solids, Including Slurries, Granular Materials, And Powders That Exhibit An Upper Free Surface. Substances That Flow Become Essentially Horizontal In Their Containers (Or Other Physical Boundaries) Because Of Gravity Whereas Most Bulk Solids Pile At An Angle Of Repose To A Peak. The Substance To Be Measured Can Be Inside A Container Or Can Be In Its Natural Form (E.G., A River Or A Lake). The Level Measurement Can Be Either Continuous Or Point Values. Continuous Level Sensors Measure Level Within A Specified Range And Determine The Exact Amount Of Substance In A Certain Place, While Point-Level Sensors Only Indicate Whether The Substance Is Above Or Below The Sensing Point. Generally The Latter Detect Levels That Are Excessively High Or Low.

D. Relay

A Relay Works As A Switch In The Area Of Electrical Switch. Many Relays Use An Electromagnet To Mechanically Operate A Switch, But Other Operating Principles Are Also Used, Such As Solid-State Relay. Relays Are Used Where It Is Necessary To Control A Circuit By A Separate Low-Power Signal, Or Where Several Circuits Must Be Controlled By One Signal. The First Relays Were Used In Long Distance Telegraph Circuits As Amplifiers: They Repeated The Signal Coming In From One Circuit And Re-Transmitted It On Another Circuit. Relays Were Used Extensively In Telephone Exchanges And Early Computers To Perform Logical Operations.

A Type Of Relay That Can Handle The High Power Required To Directly Control An Electric Motor Or Other Loads Is Called A Contactor. Solid-State Relays Control Power Circuits With No Moving Parts, Instead Using A Semiconductor Device To Perform Switching. Relays With Calibrated Operating Characteristics And Sometimes Multiple Operating Coils Are Used To Protect Electrical Circuits From Overload Or Faults; In Modern Electric Power Systems These Functions Are Performed By Digital Instruments Still Called "Protective Relay".

BLOCK DIAGRAM:



Relay Driver Circuit

The Circuit Used For Driving A Relay Can Be Termed As A Relay Driver Circuit And It Can Be Designed Using Various Integrated Circuits. These Relays Are Needed To Be Driven For Activating Or To Turn ON. So, Relays Require Some Driver Circuitry To Turn ON Or OFF (Based On The Requirement).The Relay Driver Circuit Can Be Realized Using Different Integrated Circuits Such As ULN2003, CS1107, MAX4896, FAN3240, A2550, And So On. Here, In This Article Let Us Discuss About Relay Driver Circuit Using ULN2003. Before Discussing In Detail About A Relay Driver Circuit, Let Us Know About IC ULN2003

RELAY DRIVER IC ULN2003:

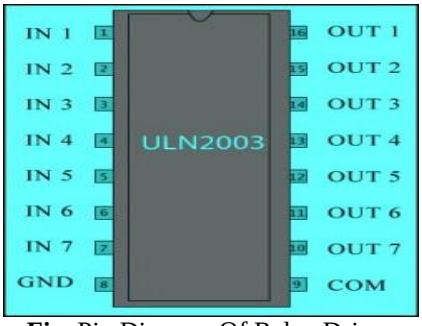


Fig. Pin Diagram Of Relay Driver

III. Discription Of Proposed Method

The System Has Two Parts, Namely; Hardware And Software. The Hardware Architecture Consists Of A Stand-Alone Embedded System That Is Based On Microcontroller A GSM Handset With GSM Modem And A Driver Circuit. The GSM Modem Provides The Communication By Means Of SMS Messages. The SMS Message Consists Of Commands To Be Executed. The SMS Message Is Sent To The GSM Modem Via The GSM Public Networks As A Text Message With A Definite Predefined Format. Once The GSM Modem Receives Negative Signal From The EB Supply, It Sends The SMS To The User Consisting Of Non-Availability Of Power Supply, Fuel Level, Temperature Of The Coolant, Etc.

The User Can Decide Whether To Switch The Generator On/Off And Issue The Command. Based On The Message, The Commands Sent Will Be Extracted And Executed By The Microcontroller. In This Case, If The EB Power Supply Resumes, Again The User Is Made To Know The Status Of On-Site.

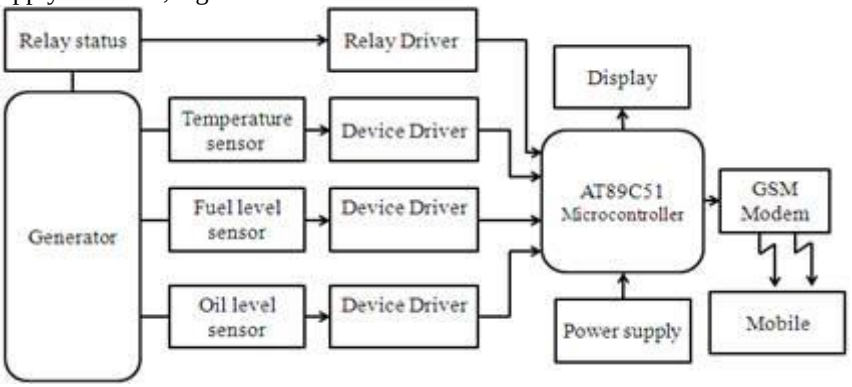


Fig. Block Diagram Of Proposed System

This GSM Modem Can Accept Any GSM Network Operator SIM Card And Act Just Like A Mobile Phone With Its Own Unique Phone Number. Advantage Of Using This Modem Will Be That You Can Use Its RS232 Port To Communicate And Develop Embedded Applications. Applications Like SMS Control, Data Transfer, Remote Control And Logging Can Be Developed Easily. The Modem Can Either Be Connected To PC Serial Port Directly Or To Any Microcontroller. It Can Be Used To Send And Receive SMS Or Make/Receive Voice Calls. It Can Also Be Used In GPRS Mode To Connect To Internet And Do Many Applications For Data Logging And Control. The SIM300 Is A Complete Tri-Band GSM Solution In A Compact Plug-In Module. Featuring An Industry-Standard Interface, The SIM300 Delivers GSM/GPR S900/1800/1900Mhz Performance For Voice, SMS, Data And Fax In A Small Form Factor And With Low Power Consumption.

GSM MODEM (SIM300)

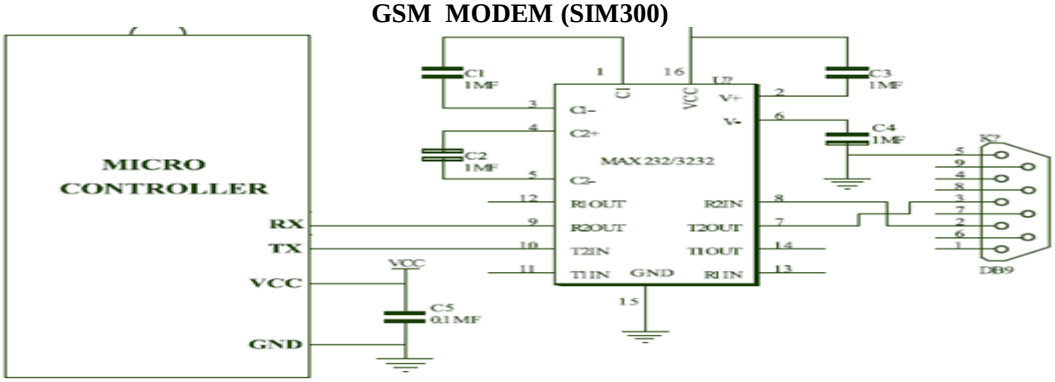


Fig. GSM MODEM

Flow Chart And Algorithm:

Algorithm :

Step 1: Start The Program
Step2: To Initialize The System
Step 3: Get Hardware Software For Relevant Application
Step 4: To Monitoring The Generator Status And EB Power And If Any Abnormal Conditions Occur It Is Automatically Intimated To Authorized Person
Step 5: If New SMS Received On Mobile And Go To Step3 Else, Go To Step1
Step 6: Receive SMS
Step 7: Check SMS Pattern
Step 8: Control The Device Based On Status And Operator Can Making A Decision
Step 9: Notify End User
Step 10: Go To Step1

Flow Chart:

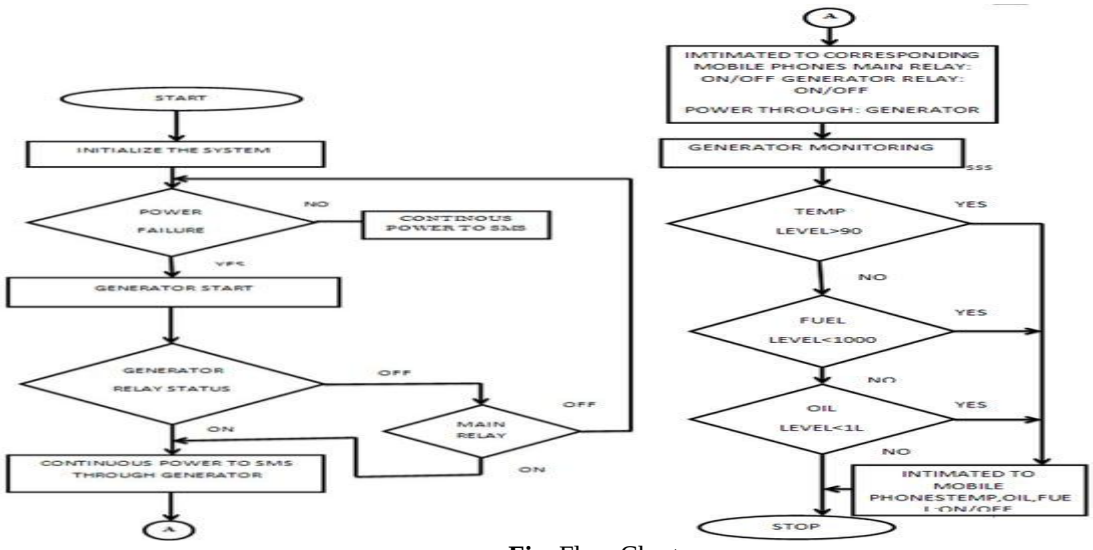


Fig. Flow Chart

IV. Conclusion:

Generator Are Used In Every Industry And Big Institutes To Provide Power Supply Absence Of Main Line Power Supply. Through This Proposed Work We Came To Know About Protection Of Generator In Case Of Failure. This Project Is Immense In The Ever Changing Technological World. It Allows A Greater Degree Of Freedom To An Individual To Effect Via GSM. In Particular The Suggested System Will Be A Powerful, Flexible And Secure Tool That Will Offer This Service At Any Time, And From Anywhere With The Constraints Of The Technologies Being Applied. This Proposed System Provides The Immediate Solution For Objectionable Failure Of Generator Using GSM Communication.

Future Scope:

This Proposed System Can Modified With IOT. With The Help Of IOT Less Power Can Consume With 0.08 Power Factor. Generator Can Control With Help Of Microcontroller. With The Help Of This Can Be Utilised Power More Efficiently. Power Losses Can Minimise.

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