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A REVIEW ON SMART GENERATOR CONTROL USING ANDROID APPLICATION

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Abstract - *As in our day to day life electricity plays an vital role. But when power failure gets occurred then there is necessity of generator. But it is necessary that it require maintaining various parameter of generator such as current, voltage, fuel level, temperature. So it require regular testing. Therefore because of that it can consume some time and also require some human effort. So to reduce that efforts, there is system which can monitors the generator and also it can start and stop the generator using android application. This paper presents the solution to reduce human effort and time. The idea behind this system is to monitor the generator wirelessly, using the famous smart phone application system Android. The implemented sensor deliver analog sensor that provide real time data about the generator's status. These data are converted and programmed through the Arduino microcontroller, which outputs the results in its digital state and then transform the output into a serial signal, transmitted to the android phone, through a router. This paper is the first step towards the combination of system and control because it revolutionizes the ideology of monitoring and displaying real time data which can be implemented in various fields depending on various needs.*

Key Words: **Wireless Monitoring, Android Application, Sensor Monitoring, Generator, Microcontroller.**

1. INTRODUCTION

This system consists of monitoring and controlling part of generator. There are various sensors available in generator which can monitor the value of fuel level, temperature, current, and voltage.

In our modern life electric generator plays an most important role to maintain the stability of power. Because the glue that holds the design of the 21st century technological dependency is extremely crucial, monitoring these generators is a major, and important issue that every factory must consider, through which each factory must have a maintenance team to check up on the vitals of the generator in a daily, hourly, and cyclic manner which requires a lot of hard work, in addition to inaccurate data readings due to the lack of automation. If the power failure occurred in colleges, industries, hospitals, educational institutes then the generator is used. In generator there are on and off manual switching is present. Here the man power is must to do this operation. For example in a factory, it have many sections and the generator placed in distance place so the process of ON the generator get some time delay, doing this by manually means, some important works get delay. This process is not suitable for all the time like any important function in a factory, because we take the time to ON the generator by the distance place.

This paper is a new application in the domain of embedding various systems, aiming for the advancement, and contribution to the technological world present, and finally to provide a smart and creative solution that can help and initiate a boost the field of wireless monitoring.

2. CONSTRUCTION

Firstly, it is necessary to check the generator condition, taking in consideration that the generator is a bit old; it was revised in a way to be able to use it with no worries. Then , the work started on the application, the fundamental block can be represent work and design of the various variable. Making sure the software part is secured and functional; the first major step is complete.

After making sure the application is reacting with the Arduino microcontroller, testing using real sensors, one at a time has began, and the results were acceptable after experiencing some errors which were diagnosed and fixed eventually. The level sensor is placed in the fuel reservoir, also the temperature sensor is placed which is used for monitoring the generator's heat.

Near the generator there is current sensor is placed, in the electronics box, and this sensor sense the current consumed from the motor on every electronic product consuming electricity. The final sensor which is used in the system is the voltage sensor. It is not actually an electronic product sensor because it was self-made. The process of building this sensor includes a 9V transformer followed by a bridge, and a filter in the end which transforms the 220v output from the generator to a 9V stable dc outcome and was scaled in order for the data to be read and accepted by the Arduino, which made the scaling process enormously essential for the success of the operation.

Afterwards, the router was programmed to be able to transmit and emit signals from 2 sides, the mobile side, and the Arduino side. The Arduino microcontroller was only

programmed to take analog input from all the sensors, scale them and send them to the router as digital values; the digital pins were programmed to get control signals from phone in order to be able to turn the motor on and off.

3. COMPONENTS DESCRIPTION

3.1 Diesel Electric Generator

A diesel electric generator is the grouping of electric generator and diesel engine to produce electrical energy as a standby source. This is a specific case of engine-generator. A diesel compression-ignition engine is run on diesel.

Diesel generators are used in many places as a standby source without connection to a power grid or as emergency power-supply if the grid fails. It has more difficult function. To evade low-load or a deficiency of power the proper size of diesel generator is used. Sizing is more complicated by the characteristics of modern electronics, specifically non-linear loads. In the size ranges of around 50 MW and above. The open cycle gas turbine is more efficient as compared to than an array of diesel engines.

Diesel and gaseous-fuel generators each offer advantages to consider when designing a standby power solution. By comparison, diesel-fuel generators provide access to backup power in remote areas that do not have a gaseous-fuel infrastructure. Gaseous fuel generator transport a higher capital cost per kilowatt of electricity than diesel fuel. Attempts to lessen this disparity, such as converting industrial diesel engines to gaseous fuel, only add engineering costs to the work.

3.2 Android

Android is used for mobile devices, it is software stack that includes an operating system, middleware and key applications. Android is a software platform and operating system, it is used for mobile devices and it can be based on the Linux operating system and developed by Google and the Open Handset Alliance. Open Android allows accessing core mobile device functionality through standard Application Program Interface calls.

3.3 Sensors

i. Arduino LM 35

The LM35 is used for the measurement of temperature. The LM35 is placed in the generator which is used for the temperature of generator. LM35 is use to evaluate temperature with an electrical output. LM35 is an integrated circuit. It operates for biasing voltage of +4 volts to +40 volts and has sensitivity of 10 mV/°C. One of the advantage of LM35 is, the temperature measured more accurately by this sensor than any other device like thermister. The other benefit of LM35 is it can generates higher output voltage when compared with that of thermocouples and may not require the amplification of the output voltage.

ii. 412 Arduino Current

412 Arduino current sensors used for sensing current. It has the advantage that, it is easy to install in the system. The 412 Arduino current sensor is compatible with virtually any electric device because of its ability to sense the current draw of whatever is plugged into it, and in a very flexible manner.

iii. 412 Arduino Level

The sensor surface metal processing, can extend its service life. Insert it into any liquid container, and then read it using the AD convertor. It helps in all liquid mixtures through sending analog signals providing information to the sensor's current status. In addition, it maintains a steady output for long periods of time.

iv. Voltage Self-Made

There is no any requirement for a physical voltage sensor in the system, through which a simple placement of a transformer followed by a bridge and a filter can transform the high voltage of the electric generator, to a small, scalable voltage that can be sensed by the Arduino. Upon simple calculations, a reading can be set due to scaling facts.

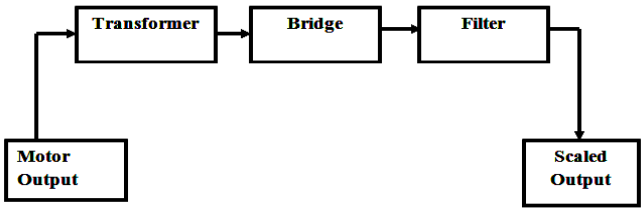

Fig -3.3: Self-Made Voltage Sensor

4. PROCEDURE

This system fundamentally consists of two parts, the controlling part, and the monitoring part; describing how the application controls the electrical generator, and offers a range of monitors to help keep the user up to date with the significant aspects that affect the functionality of the generator.

The control that this paper offers to the user is the ability to start and turn off the generator in case of malfunction or when being present in a remote location without the need to be near the generator allowing the user easy access to generator and providing more security. The monitoring part allows the user to keep in touch with the major components that the generator acquires to operate properly, the fuel level, its temperature, in addition to keeping the user on a minute to minute basis.

4.1. Design

The four sensors are directly connected to the Arduino microcontroller, in addition to pins from the digital side of the Arduino connected to relays implemented in the generator, making it possible to initiate the generator once the start button is pushed, a signal will be sent from the phone to the router all the way to the Arduino's control digital pins where it will be switched from 0V to 5V which 221 will turn the relay on allowing the battery of the generator to close the circuit thus turning the generator on. After this step is complete, the 4 sensors will be connected to the application by sending real time values to the Arduino, and the latter will transmit them, after turning them into digital values, to the router which in turn will emit them through WiFi to the phone insuring live feedback of the generator's vital signs. Moreover, if any sign gets out of the normal range the phone will receive a notification, warning the user to check up on the generator. Afterwards, if the user wants to turn off the generator, all what is necessary to be done is to press the STOP button where a control signal will be transmitted from the phone to the Arduino, following the same concept as the START button and a normally close relay will open allowing the generator to turn off.

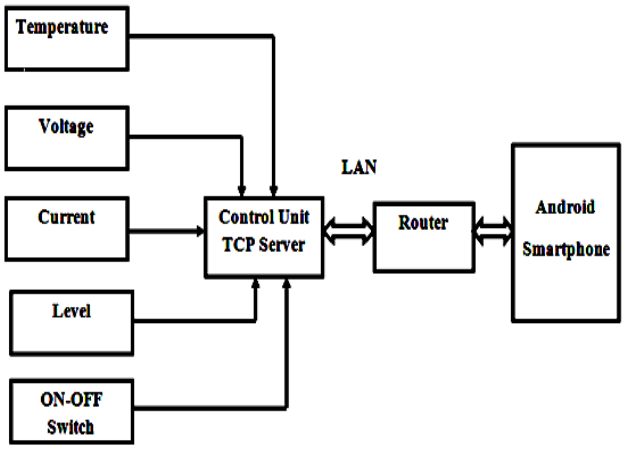

Fig -4.1: Block Diagram of Smart Control Generator by using Android Application

5. CONCLUSION

The important of this system is to contribute to the world as an advanced monitoring and control system, as it can be produced in other form to reflect different needs. This system assembled a mixture of system and dedicated them to a real issue were people related to the industry are facing, the idea doesn't widespread in the world and will insure more productivity and make human life easier. As the Android application used it is very easy to handle this system. Because of this application the time and human efforts get reduced.

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