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Protection of Power Grid with the Help of the Consumers

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Abstract: ***Synchronisation of different types of gird with many types of generation unit is known as Power Grid Synchronisation. The generation units which synchronised with gird they have to run on a fixed range of Voltage and Frequency, but if there is overloading at any generation unit then the Frequency and Voltage of generation unit will fluctuate and the generation unit of that particular area have to suffer and it can occur complete blackout in every area because Grid is Synchronized with each other. So, it is important to disconnect that particular unit to save the whole gird. After disconnecting abnormal generation unit from the grid, demand from the other remaining generation unit will increase and it will occur the low voltage condition at the time of peak demand. To avoid the condition of low voltage, the consumers will receive an Email notification about the problem and ask for their cooperation to not use the heavy load until they get the mail about the condition backs to the normal.***
Keywords: Include at least 5 keywords or phrases

I. INTRODUCTION

In power grid synchronization there are many types of grid and generation units are synchronised with each other. The synchronization of generation units to the grid, because the demand of electricity is increases day by day and a single generation unit are not able to fulfil the demand of the consumers. But when the generation units synchronised with the grid then they all has to run on same Voltage and Frequency. If the Voltage and Frequency of any generation unit will fluctuate above the considered limit then chance of Grid Failure and Blackout will possible. For this type of problem there is a microcontroller-based project which connected to the sensors and these sensors are used to sense the Voltage and Frequency of generation unit. The output of sensors is going to microcontroller and the limited range of Voltage and Frequency are already programmed to the microcontroller and if the value of Voltage and Frequency exceed the range then for the protection of the grid that generation unit will be disconnected from the grid with the help of the relay. After the disconnection of the generation unit, burden on the remaining generation units will increase and at the time of peak demand they fail to fulfil the demand of the consumer and low voltage condition will occur. To avoid the low voltage condition, the cooperation of the consumers is very important, if the consumers cooperate to not use the heavy load until the condition backs to normal then the chance of low voltage will decrease. For avoiding the condition of low voltage an Email will send to the consumers for asking their cooperation and the email contains the proper explanation about the condition and seeks for their help to not use the load of high power until they get the mail about the condition of generation unit is backs to normal and the employees of that plant will also get an email about the condition of the plant with proper detail.

II. MATERIALS AND METHODS

A. Grid Synchronization

In earlier days there was isolated power grid system but in current scenario no such isolated power system exists. There are so many such kind of power system interconnected to each other and form a vast network of generating station and load centre and frequently share power generated among them. Means new generating unit and load centre are being Synchronized to the network as time proceed, it means the monitoring unit have to be careful because the girds and the Generation Units are synchronised with each other and if any disturbances are created in any part of grid the whole grid will damaged.

B. What is Email Notification

Email notification is an email which will send to the consumers and the employees of the plant.
Email notification contains two types of mail, first will send to the consumers asking for their support and second will send to the employees of that plant which contain proper detail about the condition which will help them to work easily and fast with the plant.

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C. Why the Email Notification is important

Let us suppose if there are four types of generation units are synchronized with the power grid and from four, one of them get disconnected then the burden of four comes on a three and at the time of peak demand they unable to fulfil the requirement of consumer and from that, condition of low voltage will develop and it will affect the grid. To avoid that type of low voltage, condition the most important thing is to avoid the uses of the heavy loads and it is only possible by the help of the consumers, for this Email notification will very useful, from this we will ask for a support from the consumers to not use the heavy power consumption load until the condition backs to a normal. From the help of this email consumers are fully notified about the condition and if they show their support then the grid will be protected and the employees of that plant will also get the email which contains full detail about the situation from the help of this mail, they will do their work easily.

D. How the Email notification will work

Sensors used for detecting then fluctuation in voltage and frequency are connected to the Microcontroller. Microcontroller receives the value from sensors and determine the value of Voltage and Frequency. Bolt Wi-Fi is used to connect with the Microcontroller through serial communication and Bolt Wi-Fi will send the actual value of Voltage and Frequency from microcontroller to the computer where Python code is running in which the acceptable range of Voltage and Frequency is already programmed. If any fluctuation occurs then running program will check the fluctuation are in limit or not if they exceed the limit, then it will send the mail by the help of automatic mail service software, to the consumer and the employees of that generation unit.

E. Components

1) Microcontroller
2) Voltage Sensor
3) Frequency Sensor
4) Bolt Wife

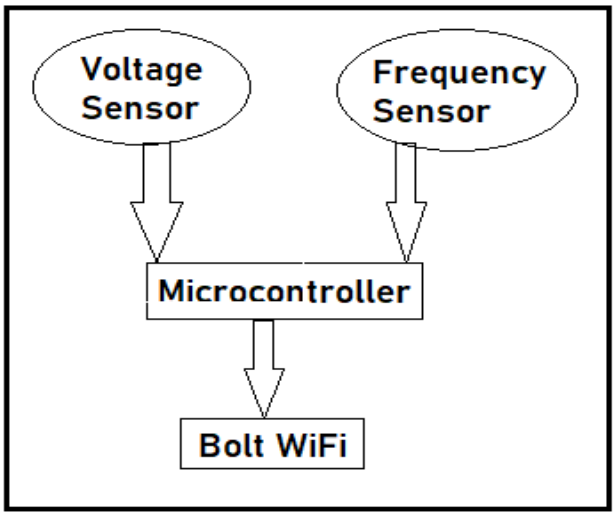

Fig 1- Working Procedure

F. Why it is Important

In this modern era use of electricity is increasing day by day. It is important that quality of electricity is good because many of electrical equipment are electric sensitive small amount of fluctuation can destroy the equipment. Like this our power grid is also have to be in safe condition so we get electricity, if any disturbances in power grid then there is a chance to Blackout and grid failure and if the disturbance comes from any generation unit and if that generation unit will be disconnected then the total number of generation unit will decrease in comparison with earlier when condition was normal, and then due to less number of generation unit, condition of low voltage will occur at the time of peak demand and the consumers observes the condition of Low Voltage.

1) To protect the gird, the abnormal generation units should be disconnected.
2) To avoid the condition of Low Voltage, consumers have to cooperate otherwise providers and consumers both will go from heavy losses.

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III. WORKING

If any overload condition will occur then the burden of generation unit will increase and causes the fluctuation in Voltage and Frequency generating unit. For protecting the gird from any type of failure it's a best way to disconnect that generating unit from the grid.

After the disconnection of the generation unit from the grid, Bolt Wi-Fi will send the data of microcontroller to the monitor and from there an email will send to the consumers and the employees by the automatic email software.

IV. RESULT

Generation unit will be disconnected from the grid when voltage and frequency of generation unit exceed the limited range. These ranges are fixed in which value of voltage and frequency have to exist.

	Minimum	Maximum
Voltage	374V	457V
Frequency	49.5Hz	50.2Hz

Table 1- Range of Votage and Frequency

A. Operation of Email Notification System

Email will be sent directly to the consumers and the employees, when generation unit will be disconnected from the grid.

Actual Voltage	Actual Frequency	Status of Power Plant	Status of Email
In Range	In Range	Connected	Unsend
Low	In Range	Disconnected	Sent
In Range	Low	Disconnected	Sent
High	In Range	Disconnected	Sent
In Range	High	Disconnected	Sent
Low	Low	Disconnected	Sent
High	High	Disconnected	Sent

Table 2- Status of Email

In above observations we clearly see that when the power plant gets disconnected from the grid, the email is sent to the required persons. After receiving the email consumer will aware about the situation and if they show their support, by not using heavy load until they got the mail about the condition of the generation unit, backs to normal. Then from the help of the consumers and the providers, the grid will be protected.

V. CONCLUSIONS

Through the feature of email notification, the consumers and employees will aware about the condition of generation unit because the emails contain proper detail about the generation unit. In email, support of the consumers will be asked and if they give their support then the grid will be protected and safe.

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REFERENCES

[1] Sarfaraz Ahmad, Dushyant Bagul, Rahul Harijan, Prof.Rahul Jadav Paper on Comparative Analysis of techniques for fault detection of Grid Synchronization. March, 2019 International Journal of Research and Analytical Reviews Vol. 06

[2] Shubhdeep Joshi Tushar Parihar Varun Kumar Shakya Pradeep Kumar Upendra Pal Singh Paper on Detection of Power Grid Synchronization Failure on Sensing Frequency and Voltage beyond Acceptable Range. April, 2017 International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering Vol. 06

[3] Suraj Wadhai, Madhuri Wadekar, Shreya Junankar, Chandrashekhar Rathod, Vaibhav Hingane, Ankit A. Zade Paper on - Detection of Power Grid Synchronization Failure by Sensing Bad Voltage and Frequency. March, 2017 International Research Journal of Engineering and Technology Vol. 03

[4] B. Naga Sarvani, B. Vineela Thulasi, K. Rahul, K. Satish Kumar, V.D. Sekhara Varma Paper on - Detection of Power Grid Synchronization Failure by Sensing Bad Voltage and Frequency Beyond Acceptable Range and Load Protection. July, 2017 International Research Journal of Engineering and Technology Vol. 04

[5] Prakhar Pandey Sawan Kumar Sharma Paper on Detecting Power Grid Synchronization Failure on Sensing Bad Voltage or Frequency. Jan, 2018 International Journal for Scientific Research & Development Vol. 06

[6] Shubham Singh, Shripad. G. Desai Paper on Detection of Power Grid Synchronization Failure by Monitoring Frequency and Voltage Using Embedded System. April, 2020 International Journal of Engineering Development and Research Vol. 04

[7] J. Svensson, "Synchronization Methods for Grid-Connected Voltage Source Converters," IEEE Proceedings in Generation Transmission Distribution, vol. 148, no. 3, pp. 229–235, 2001.

[8] Wallnerström, C. J., Stenberg, S., & Hilber, P. (2012). Fault Management at a Distribution System Operator. In PMAPS 2012, The 12th International Conference on Probabilistic Methods Applied to Power Systems, June, 2012, Istanbul.

[9] Ajit S Gaikwad, Ch. Malla Reddy, Pravin S Gulhane, "Developing Islanding Detection Arrangement for Grid on Sensing Voltage or Frequency Variation"- International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering, Vol. 3, Issue 7, July 2015.

[10] Zongjie Liu, Lifeng Zhu, Li Deng, Lijun Qin, Feng Jiao, "The Research of Islanding Detection about the Photovoltaic Grid-Connected Generation System"- International Journal of Computer and Electrical Engineering, Vol. 5, No. 3, June 2013.

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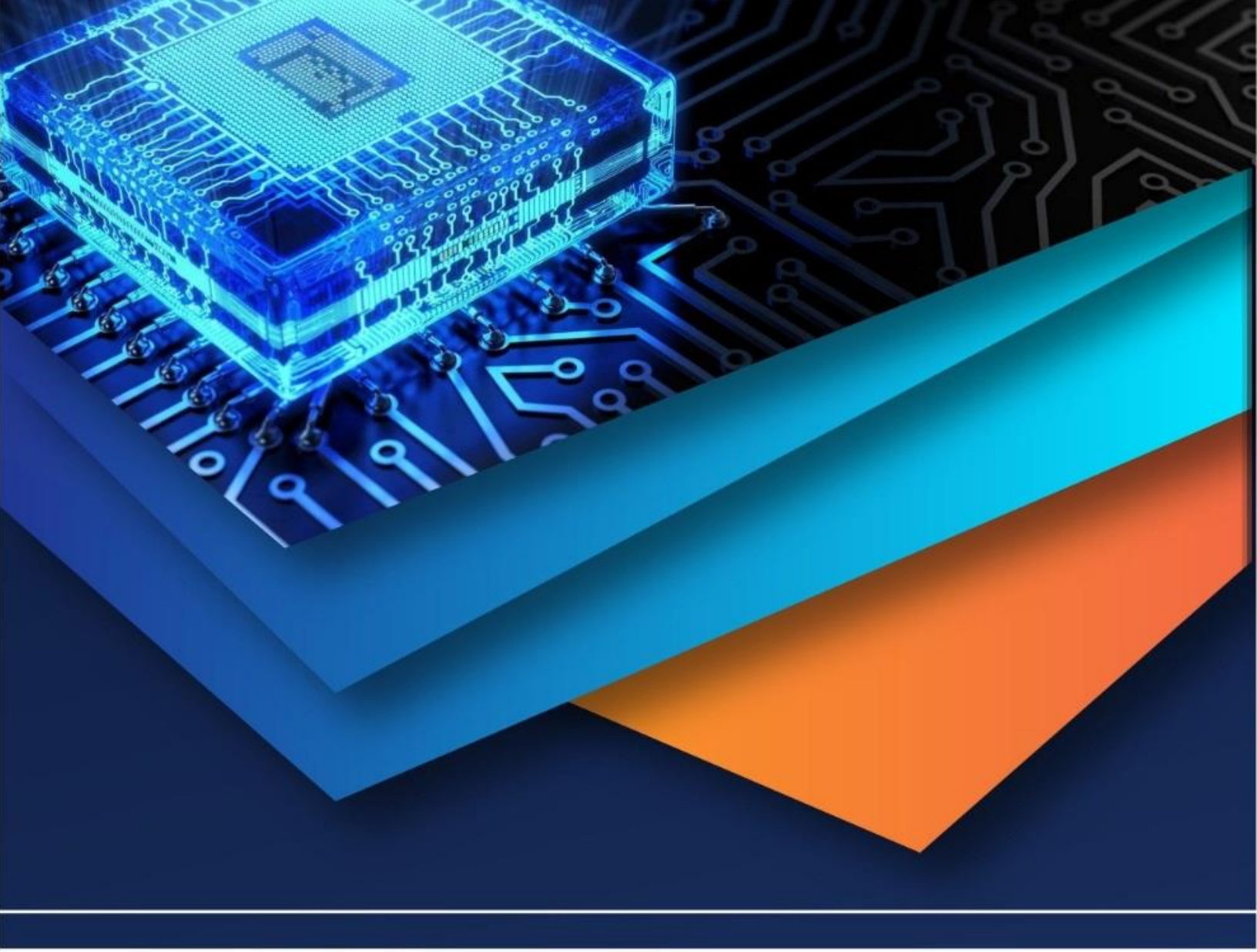

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