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Control System and Automation of Smart Grid Network

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Abstract: ***Electrical system is the system that automates all several processes that were fall within the domain of Smart Grids and their method. purpose of the Smart Grids are resource power i.e. distribution at a city or state level, that are to an extent autonomous in the sense that they operate logically which reduce the manual operation in the scheme at small area. We figure a Smart electrical powerGrid that mechanizes all the controlling operation include in power grid, using centralised server, we can divert the power supply to whichever area of the city just with one tick of a knob. Also, we can divert power to fault creating area from a new source.With the Wide Area Network interface we provide remote connectivity through attendant, term the World Wide Web on the internet. Thus we can control the grid with the help of web browser and internet remote connectivity.***

Keywords: ***electric smart grid, grid controlling scheme, energy management, central computer server, web page.***

1. Introduction

Electricity being a very necessary part of life is found being distributed over almost every part of country. The delivery of electricity in come room over a ‘grid’ known as the electric power grid, which records each and all electric power line, and distribution unit, right from the generating station to each and every electric pole. This grid therefore is nothing but a mesh reflecting the distribution of power over every area. To control such a grid is a tedious job.

Controlling here includes witchings witches ON and OFF, offering load shedding of shot period, super alteration method in fault act location etc. of electricity in the mini delivery idea. Process of Switching turning supply ON or OFF manually. This is often required during maintenance work as well as while re-establishing faults. As, fine power greedy country like ours, load shedding is a shared wonder. This over consist of switching. Diverting power is required when a major fault occurs over a power line and hence electricity from another grid or another part of the grid is drawn here i.e. diverted here to continue supplying power to the consumers.

All such activities i.e. switching supply ON or OFF, as long as load shedding is an difficult task may require the mechanical switching in need site i.e. with the help of manually switch power ON or OFF with the help of mechanical switches done in electrical power contour. Equally diverting power is the procedure which would demand a number of switching over various two-way switches and this is certainly not a possible way to do, regularly a need transpire. We plan to develop a solution to automate these activity, where we can switch a complete power grid, i.e. the complete power scheme of a city by one federal attendant. We can switch on the power supply ON or OFF just by one clicking button through the controlling screen. We can redirect main power supply from another distribution unit to whichever area we required. Here we work on the function like online fault monitoring detection, achieving load-shedding of whichever area, data record and recovery, power diversion during major faults can be performed from one central server only.

2. Block Diagram of Proposed System

The dominant server system that we plan to develop is a comfort made schemes. It is alike to the UNIX ability comfort and would effort on awareness. We plan to devolpe GUI for leading and monitoring fault shelter using VB 6.0 software. This attendant would be developed in ‘C’. We were use ‘C’ for developing comfort is quite flexible when prepared in ‘C’. Besides, since this attendant would essential to communicate with our hardware model through the serial port, we realized that ‘C’ is capable of providing a direct access and easy programming with the serial ports RS232 during serial communiqué. Thus it is discover that the all bulge are wirelessly linked with server in planned system. In our system we measured bulge that can be considered they are distribution unit, feeder, substation, mini area and so on.

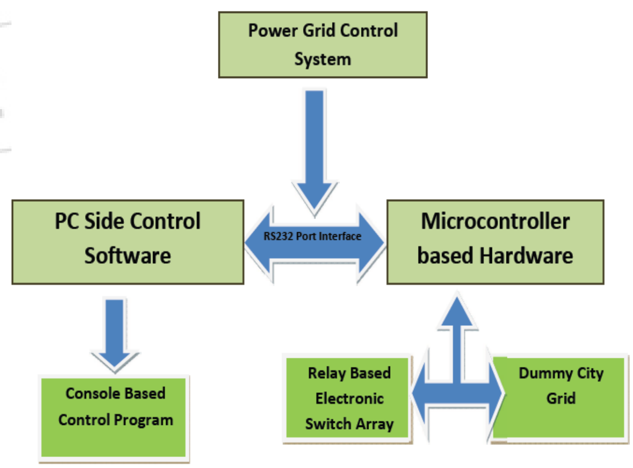


Figure 1: Block diagram of proposed system

So, we are going to develop the system that can demonstrate capabilities like online remote fault detection, which will help us in finding the exact location of any faults in the distribution

power lines through feedback and relays for other features which include diversion, providing load shedding and so on, thus it can communicate with our server wirelessly and controlled using merge server. Level of generating limitation scheme logging, i.e. creating a Web page logging that can communicate with the centralised server for frequent parameters, like energy meter analysis, and frequent voltage and current limitations will be achieve by our expedient. This evidence will be connected wirelessly to our attendant, and a permanent best ever will be made here for future position.

3. Architecture

3.1 Hardware Architecture

We intend to use 8051 microcontroller, which will act as the brain of our project. We prefer microcontroller because it has inbuilt UART for serial communiqué, four input/output ports, intrinsic memory and timers. All these items used in our project and will be employed via programming.

MAX 232 IC will be used to implement RS-232 protocol. It acts as a medium of communiqué between the controller and attendant or PC.

Relays work an important role in our project. They are responsible for all the switching activities involved in our project. Relays activate on 12v DC supply, which will be attained straight from 12v adapter. Microcontroller 8051 and other components work on 5v DC. For that it is essential to transform 12v to 5v by mean of voltage regulator IC LM7805.

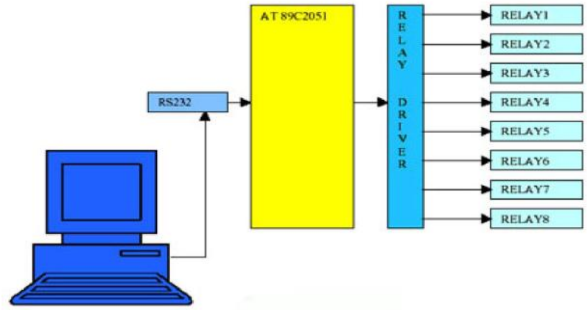


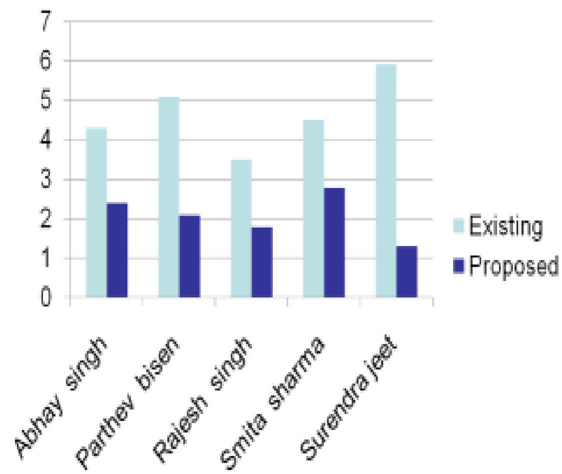
Figure 2: Hardware Architecture

3.2 Software Architecture

Here we are using the embedded "C" coding for controller programming as it is simpler to code and easy to understand using Kiel uVision4 and Flash magic is the software (for burning the code into microcontroller board). For developing the GUI i.e. fault monitoring screen and controlling screen we use Visual basic 6.0 software and we resolve by mean of Xpress PCB software for scheming the layout of main controller board.

Comparative analysis of fault reporting

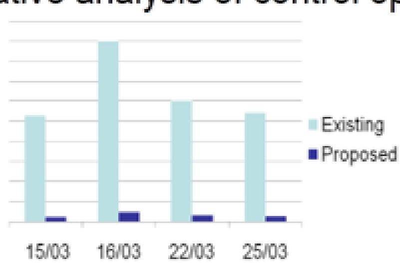
SR no	Consumer name	Date	Area(address sector)	Fault occurrence Time	Fault reporting time (existing)	Fault reporting time (proposed using GSM)	Time lapsed between occurrence and report (existing)	Time lapsed between occurrence and report (proposed)
1	Abhay singh	22-02-15	Balaji nagar (sector 5)	11.45 AM	1.20 PM	12 PM	96 min	15 min
2	Parthev bisen	24-02-15	shankar nagar(sector 13)	9 AM	10 AM	9.11 AM	60 min	11 min
3	Rajesh singh	25-02-15	Wardhamn nagar(sector 9)	8.45AM	10.35 AM	8.55 AM	110 min	10 min
4	Smita sharma	25-02-15	Deendayal nagar(sector 6)	1 PM	2 PM	1.12 PM	60 min	12 min
5	Surendra jeet	26-02-15	Pratap nagar(sector 3)	2.20 PM	3.15 PM	2.34 PM	55 min	14 min



Comparative analysis of control operation

Date	Total no. of control operation performed	No. of switching operation	No. of maintenance shutdown	No. of diversion operation	Time taken per switching operation In existence system	Total time taken for all control operation In existence system	Time taken per switching operation in proposed system	Total time taken for all control operation in proposed system
15-03-2015	11	6	4	1	16 min	176 min (10560 sec)	2 sec	22 sec
16-03-2015	15	7	7	1	20 min	300 min (18000sec)	2 sec	30 sec
22-03-2015	10	4	5	1	20 min	200 min (12000sec)	2 sec	20 sec
25-03-2015	12	6	5	1	15 min	180 min (10800sec)	2 sec	24 sec

Comparative analysis of control operation



4. Applications

- Load shedding
- High voltage grid control
- Industrial automation
- Electro, Hydraulic and pneumatic valve control
- Robotic control and many more
- Hotel power management
- Street light management
- Home automation.

5. Result

- We can control an entire power grid, i.e. the whole power scheme of a city level for e.g., by one a centralised attendant.
- We can switch the power supply to any area of the city ON or OFF with the click of a button.
- We can divert power to any area from another source.
- We are implementing functions like fault detection, performing load-shedding of any area, data logging and retrieval, power diversion during major faults, etc performed from one central server only.
- There is no need of manual switching of power lines.
- Logging of various parameters related to power transmission can be performed.
- There is centralized control of entire power grid.
- No need of Internet or any other such network for the purpose of communication.
- It is an easy to use Interface.
- Command Console for advanced users.
- Password protection to avoid misuse.

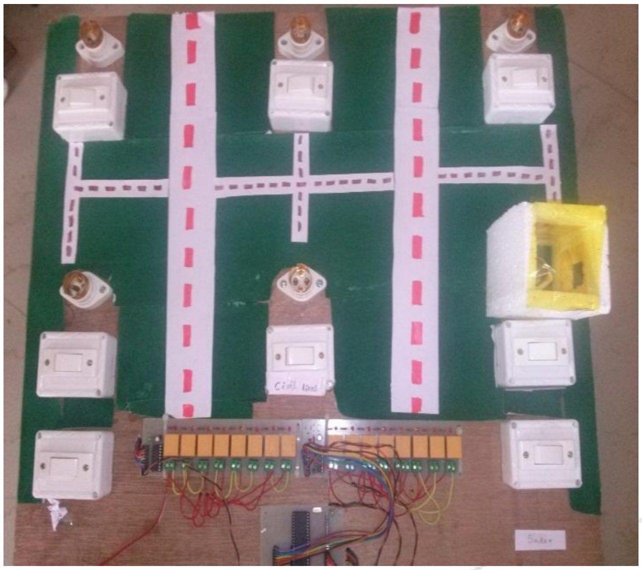


Figure 2: City model

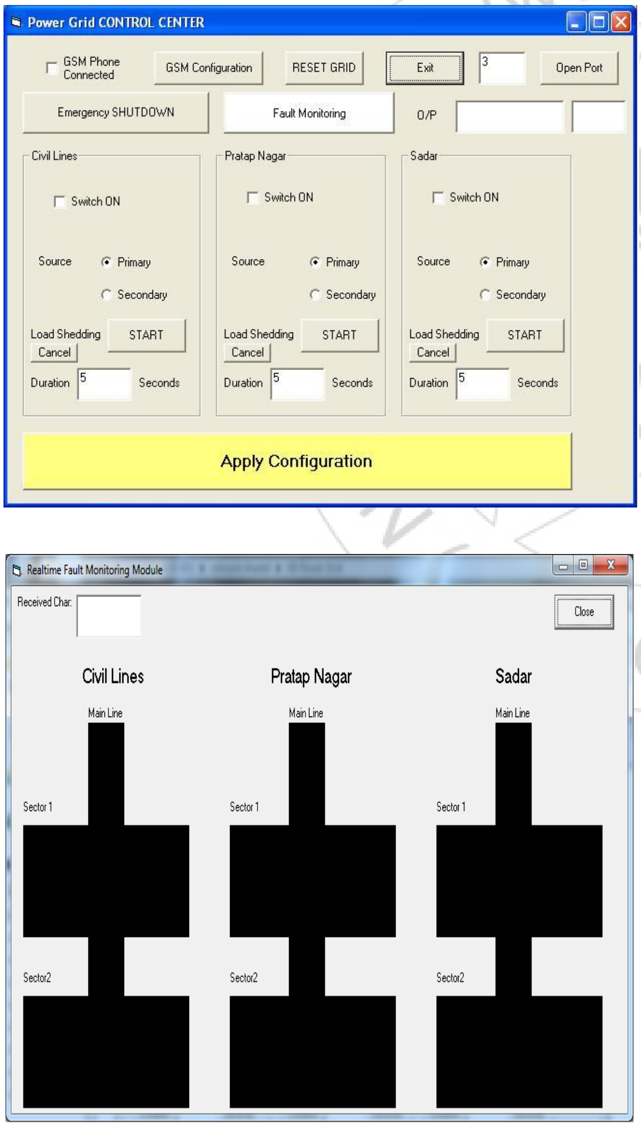


Figure 3: Controlling screen

6. Future Scope

With the help of proper planning and process of integration of data, we can increase the efficiency of the system and also work on providing the greater efficiency in future. Several recommendations are given to optimize the potential benefits in future: Take a holistic view of smart grid infrastructure early in the planning lifecycle stage before deployments begin. If this step is omitted, a utility may miss the technology's full potential and often have to spend considerably more to integrate the functionality post deployment.

If we integrate the distribution unit with the smart grid infrastructure in real time it will be flexible in electrical distribution over the power lines and effort proficiently. If the accomplishment isn't satisfy, it indicate to create the new system and data will be addressed over there to communicate with existence one. With wireless power, efficiency is the more significant parameter. A large part of the energy generated by the plant must arrive at the receiver or receivers to make the system economical.

The key issues that need to be dealt with this regard includes: - resolving interoperability issues, crucial the minimum practical necessities for the system and establishing the appropriate technical standards. Further, because of growing environmental concerns, it is found that Asian grids are far more flexible than today but using distributed automation technique we can use various energy efficient technique for efficiency consideration

7. Conclusion

We build a Smart Grid that automates ALL of its processes, using centralised server even perform controlling operation, and also gives remote connectivity to this server via a Wide Area Network interface We can control the power supply to whichever area of the city on or off with the click of a button. We can divert power to whichever area from a new source. We are implementing functions like fault detection, performing load-shedding of whichever area, data record and recovery, power diversion during major faults, etc. performed from one central server only, Due to there is no need of any manual switching as it is replaced by automated system. Data Logging which include various parameters related to power transmission and controlling that can be performed using our system i.e. using a centralized control of entire powergrid. Internet or any other such network can be used for the purpose of communication because using this interface we can easy manage everything. These Command consoles are used by advanced users and for security purpose we use Password protection to avoid misuse.

We were obtaining without an additional help, each state takes a risk and responding to utility AMI agendas and forgoing any opportunity to move forward with their own Smart Grid agendas which could potentially create more competitive and robust market activity and simultaneously more user benefit.

Even with this special consideration for states is that it must correlate with additional scheme. Many requirement and problematic are alike with other scheme. Thus it is necessary to come in work with the collaboration and develop an AMI to integrate with a smart grid system.

In Asia demand of electricity is varied but due to demand of increasing electricity we can improve the amount requirement in India and China after getting the information of improve smart grid and placement in Korea. In Asia the quantity of placement regarding to the placement, controlling and security and distribution is quite less in modern society. Therefore the need of the hour and for modern revolutionizing societies of Asia-Pacific region is to consider as a Smart Grid Vision.

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