

Novel Design and Performance Optimization of Multi-Agent Smart Grid

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Abstract

Smart Grid is a cutting edge electric grid framework for improved electrical framework proficiency, unwavering quality, exact shortcoming identification and wellbeing with smooth coordination of sustainable and elective energy source through computerized control and current correspondence innovation. In the proposed work structure of design for multi agent based smart grid is chosen with 10kW breeze power plant, 10kW sunlight based power source and 15KVA Diesel Generator and Main grid. At last outcomes from these tests are watched and dissected for Control agent, DER agent and Load agent. It likewise incorporates the Architecture of MAS based smart grid and a control board with Supervisory Control and Data Acquisition condition where agents were appointed capacity at that point to legitimize highlights of multi agent based smart grid examinations identified with burden adjusting and burden shedding.

Keywords: Grid, Smart Grids

Introduction

Around there an agent is described from an authority's perspective. Differentiation between agent development and distinctive IT spaces (for instance man-made intellectual prowess, web-organizations and ace systems and grid handling) it is analyzed the differences between settled structure control progressions and agent advancement. programming building's importance of agents. Based on that, separate in detail between an enhancer, a shut circle controller, learning systems, and an agent.

"Reactivity Intelligent agents can see their condition, and respond in an advantageous style to changes that occur in it in order to satisfy their arrangement objectives.

Proactiveness Intelligent agents can show goal composed direct by venturing up to the plate in order to satisfy their arrangement targets.

Social limit Intelligent agents are fit for speaking with various agents (and possibly individuals) in order to satisfy their arrangement targets."

It creates the impression that these credits are to some degree also appeared in authorities' top tier control progressions. With a certain goal in mind this supposition that is generous. an agent can be perceived from other control headways.

'agent' perhaps offers included worth if agents in any occasion involve a particular degree of understanding, along these lines demonstrating the above recorded characteristics. Thus, the descriptor 'astute' is superfluous. Zenith power costs ordinary metering on now mechanical hindrances to be bound and passed all customers reliably. In parallel, from fossil ended power stations growing stresses over natural mischief a ton of reasonable power source use has provoked a

hankering for. Wind control and sun based essentialness are outstandingly factor key structures, and the necessity for dynamically present day control systems to for the most part significantly controllable sources to energize relationship with the grid ended up being clear. [2]

Markdown Smart grid advancements are currently used in various applications, for instance, gathering and media interchanges and grid movement are being balanced for use in.

- Integrated Communications: Areas for advancement include: substation computerization, demand response, assignment robotization, supervisory control and data acquiring (SCADA), essentialness management systems, remote work systems and other development, control line transporter correspondence, and fiber-optics.
- Smart control age using impelled parts: Smart power age demand, others self-rulingly picking weight, base weight and peaking power viably in causing proper for the production of that work to can start, stop and use more than one with a comparative generator control age is a thought of organizing.
- Power system computerization: it's speedier finding and definite responses for express grid unsettling influences or power outages engages. Rely upon these advances and various duties for all of the four key zones. Impelled control procedures are three advancement classes: appropriated insightful agents (control structure), analytical instruments and operational applications
- Sensing and estimation: focus commitments and grid security gear prosperity, imperativeness burglary expectation, checking, appraisal and control reinforce strategies. Developments include: Advanced microchip meters (smart meters) and the meter examining contraptions, wide-area checking system, dynamic line (regularly based on progressing warm assessing (RTTR) Distributed temperature identifying structure united with electronic scrutinizing) rating, electromagnetic imprint estimation/Use and constant examination, time, switches and connections, backscatter radio development, moved equipment, esteeming and mechanized protective hand-off.
- Phasor estimation units: Many in power systems structuring system acknowledge that the phasor estimation a wide region framework was set up, the 2003 Northeast control blackout covers a little locale that.
- Distributed power stream control: Power stream control contraptions to control the movement of force inside fasten onto the present transmission lines. Support of such devices with progressively vital use of feasible power source in the essentialness grid is guided to enable progressively unsurprising, by giving consistent control transmission lines. This advancement even more reasonably by broken economical power hotspot for later use to store enables the grid.
- Smart grid use propelled advancement to control all of the homes of buyers or mechanical zones for the control of electric two-course control from suppliers to clients using electronic correspondences to mastermind. Grid, essentialness saving, similarly as the huge proportion of information contained in taking care of costs and augmentation constancy and straightforwardness of risk are avoided lessens. This is the spot consistence structuring to address essentialness self-governance and an unnatural climate change later on as a technique for diminishing the need to focus..

Literature Survey

[Yun-juan Li, et-al, 2012] arranged subtleties and features of the Smart Microgrid programming system that was organized, Implemented, attempted and facilitated by using oneself made configurable feeder terminal unit (FTU) thing named NF650 (HMI) FTU(HN-F60) FTU Function configuration programming) . Flow orchestrate structure programming arrangement thought united with FTU. According to this procedure, the system programming has comprehended the FTU work module game plan, similarly as the transport line security method of reasoning structure. It can extra and open versatile vector graphics(SVG).And finally it has completed FTU work online upgrading by downloading the arrangement information and the line security reasonable layout to the FTU remotely. Besides, the paper uses segregated arrangement thought and The paper presents a transport system structure gauges to comprehend the item based on the present course organize robotization system. It revolves around electrical wiring graphs, human-PC interface and progressing data getting ready. The idea in paper was using anomalous state programming language to execute a run of the mill structure. The system stacks the customer portrayed data structure to the terminal, explores these data structure and pulls back the security action condition as shown by the customary interface, and completes each kind of confirmation advancement as demonstrated by the terminal have persistent screen data. The system joins structure makes a general organization library and customers construct justification diagrams, structure develops the progressing data taking care of module based on the SQLite, Sending rules to FTU and tolerating data from FTU was the limit of persistent data taking care of module and Real-time data module gets the man-machine interface bearings, settle the headings, request the relating FTU affiliation information from the database, prepares the rules and sends to the looking at FTU.

[M.I.Ridwan, et-al, 2012] made IEC 61850 SVS research focus to ensure the productive use of Smart Microgrid related advances . The SVS lab fills in as a basic stage for testing and checking the headways and moreover in defeating any issues among developments and customer affirmation. SVS examine office was proposed to rehash an ordinary arrangement of 132kV Air Insulated Substation (AIS). The arrangement seeks after a twofold transport bar course of action with two over element inlets, one vehicle coupler sound, two HV transformer narrows and two MV transformer straights. Based on the single line diagram, the structure approach of IEC 61850 was associated and the system detail depiction (SSD) archive was conveyed using an outsider system course of action instrument which was the HELINKS STS. the SVS inquire about office was fit for reproducing the genuine assistant contraptions arrangement inside a substation. To reproduce fundamental contraptions, for instance, electrical switch, isolator and transformer, a touch screen based human machine interface (HMI) called the switchgear test framework is completed. This switchgear test framework can copy the status and fundamental cautions of basic contraptions.

[Effichios Koutroalis, 2012] proposed another strategy to pursue the overall MPP based on controlling a DC-DC converter related at the PV bunch yield under mostly covering conditions. In regular PV foundation a bypass diode or sidestep switch is related in parallel with each PV module to verify sun arranged cells against capability defilement and hotspot disillusionment impacts. Various MPP following strategies have been made before to work the PV display at the MPP point. Under practical working conditions the region and enormity of the adjacent and overall MPP depend upon the stochastically moving covering model zone and game plan of the PV modules. Earlier scattered MPPT framework was

furthermore used to manufacture the open MPP intensity of PV show. Under mostly disguising condition the ordinary MPPT technique misses the mark realizing enormous decline of both the made power and the PV vitality age system faithful quality. Usage of explicit sensors extended the PV structure cost, by combining 3-layered feed forward neural hardware significantly extended the multifaceted idea of the system. MPPT estimation based on Fibonacci gathering does not guarantee association to overall MPP genetic count and PSO show gigantic multifaceted nature which addition utilization cost of overall MPPT control system. In new methodology the PV bunch is related with DC-DC control converter which is obliged by a little scale controller based control unit P and O MPPT is picked in perspective on its utilization straightforwardness, versatility and life. The new strategy does not require data of the electrical characteristics of the PV modules and their course of action a buck type DC-DC control converter is used to interface the PV show yield capacity to electric grid or battery bank. DC-DC converter works in steady conduction mode and simultaneously the data and yield voltage swell parts are decreased. The proposed overall MPPT system is performed in 3 consecutive organizes the reliable data control, PV bunch voltage rule and P and O mastermind. The DC-DC converter yield voltage depends upon either continuously changing battery state or the electric grid voltage and remains predictable. The technique is associated irregularly to recognize the circumstance of overall MPP of the PV display. By then the P and O MPPT count is executed in order to keep up movement at the as of late recognized overall MPP during transient assortment of sun arranged light and encompassing temperature conditions. During P and O MPPT process the DC-DC converter typical information power is controlled by evaluating the PV group yield voltage and current. Tests were done in research focus by making model of overall MPPT system. Test outcome exhibited that overall MPPT count successfully refrained from getting captured in close-by optima and figuring adequately recognized the circumstance of overall MPP and confirmation mixing of overall MPP under any mostly disguising conditions. The system can without a lot of a stretch be intertwined into any current MPPT control structure in both high apparent power rating PV system and low control vitality gathering application.

[Marie Schnitzer, et al, 2012] finished research for daylight based irradiance and whether capriciousness at nine zones in USA. There are various wellsprings of data available with fluctuating qualities like size unequivocal estimations, satellite showed data and evaluated data from adjoining organization based reference station. Size express estimation data aggregation was more accurate than the shown data and surface based reference data sources. Shown data was available from various private and open sources like National Renewable Energy Lab, National Solar Radiation Database, Satellite pictures, numerical atmosphere desires estimation. Shown datasets have more weakness than surface based estimations. Surface based referenced data can be obtained from National Oceanic and Atmospheric Administration, Integrated Surface Irradiance Surface Study, Surface Radiations Networks surface, Baseline Surface Radiation Network (BSRN), European Radiation Atlas, World radiation Data center. When using data got from such reference station was the proximity of the undertaking site. Most routinely used system for site unequivocal sun arranged resource was measure-relate envision MCF method has exhibited decline in the powerlessness in daylight based resource check by assessing the exactness for whole deal sun controlled resource RES measures. Different methodologies like assortment in Magnitude, assortment in Distribution were used to examine the site unequivocal and showed data sources. Designers finished logical

examination and assessed defenselessness with Modeled Data and Uncertainty with site unequivocal evaluated data and the results exhibited site express estimations diminished helplessness in daylight based vitality checks which reduces execution danger and may make an undertaking progressively speaking to financiers. Vitality helplessness can be furthermore decreased by using high precision instruments. Makers reason that exhibited data sources may vary by up to 10%-20%. Site express estimations united with longer period referenced educational accumulation can help decrease vitality creation defenselessness and point of confinement execution chance by 2%-5%.papers Long Term plausible Solar Power Generation

Proposed Work

Planned framework for work is depicted in beneath recorded steps. one by one procedure is characterized in these means. With reference to prior characterized parameters.

Step - 1 Measure V_{solar} , I_{solar} , P_{solar} , F_{solar} and V_{wind} , I_{wind} , P_{wind} and F_{wind} .

Step - 2 Check V_{solar} , V_{wind} and F_{solar} , F_{wind} .

$V_{wind} == V_{solar}$

$F_{wind} == F_{solar}$

Step - 3 If above condition fulfill then DER agent send message to Control Agent.

Step - 4 As Control agent Receive message from DER agent. Control agent gives reaction by working

CB 1, CB 2,

CB 5, CB 6, CB7

Step - 5 Measure Control Agent X parameters like stage 1

Step - 6 Measure Control Agent Y parameters like stage 1

Step - 7 Check Condition Control Agent X > Control Agent Y

On the off chance that Above Condition fulfill, at that point Control agent give solid running message to DER and Load Agent.

Step - 8 If Control Agent X < Control Agent Y at that point

Measure V_{mg} , F_{mg} .

Step - 9 If V_{mg} , F_{mg} mates to Control Agent X at that point offer direction to Control Agent for CB4.

Step - 10 If control Agent X > Control Agent Y at that point Control agent give message for sound running.

Step - 11 If Control Agent X < Control Agent Y at that point measure V_{dg} and F_{dg} .

Step - 12 If Above V_{dg} and F_{dg} matches to control agent X at that point Control agent offer order to work CB3..

Result Analysis

Experiment No : 1

In this trial for the choice of wind control information is gathered this information is from the reference of government climate observing site. Wind speed information is in meter/sec. greatest wind speed is in the time of June and July.

As saw that power yield is 24 hrs. as wind streams for 24 hrs of the day. Also, greatest wind speed is during 11 am to 3pm as appeared in table. As there are two wind processes so power yield will be multiplied at the season of stacking. Absolute power age for the entire day is 39,325 watt.

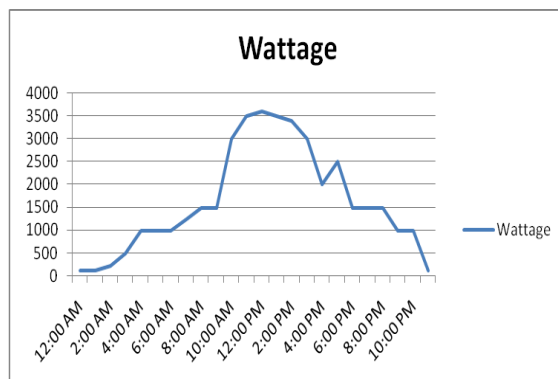


Fig 1 wind power output in wattage for randomly selected date of july.

Experiment No: 2

To play out this examination information did for the period of summer day. As in the late spring season sun based irradiance is most extreme so around then it gives greatest yield. For progressively exact investigation and similar examination perception of information is done on a similar date when wind power plant information is measured. Here in table sun powered power plant parameters as voltage among stages and current of each stage is measured. Furthermore, time term of information is from 8:00 AM to 5:00 PM.

In the table it tends to be seen that voltage between two stage is 415v for what it's worth to be. Furthermore, all out power age for the entire day is 74,400 watt. As similar to wind power plant sunlight based power yield is a lot higher. From the above information it tends to be seen that sun oriented power plant is better alternative for sustainable source at that point wind power plant.

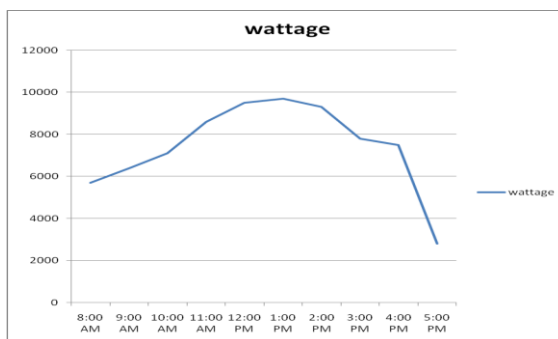


Fig 2 Solar power plant output in wattage for same date of july

Conclusion

Smart grid is inevitable destiny of electric system and a movement to realize Smart grid prompts dynamically versatile wellsprings of power and essentially revolve around reasonable sources. As sun situated, wind and other renewable. Controller in Grid accept an imperative occupation. It takes contribution from weight promotion open power sources and concurring take decision. As a need of fundamental initiative controller performs limit and give smart

decision. As by making figuring of a Multi agent based SMART Grid in controller continuously precise better result can be cultivated. As in the above work it is done viably control and rule of power.

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