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ANALYSIS OF TRANSIENT AND VOLTAGE STABILITY ENHANCEMENT

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ABSTRACT:

This project describes the detail analysis of transient stability and voltage stability enhancement of the hybrid system. In this paper we are using the synchronous generator and photovoltaic (PV) system. These two systems are connected to the grid through the transmission line. In this project we are proposing the control scheme for PV inverters to improve the transient stability of the system. Here we are going to install a dc link capacitor to absorb the exceeding active power, which cannot be absorbed by the faulty grid. Now-a-days the power system has gone through a significant increase in the penetration of Renewable energy (RE) sources, that are always in connection with the power grid through power converters (such as inverters). To maintain and enhance the voltage stability we are going to inject the reactive power into the system. Here the FRT is installed in order to improves the voltage stability and its post-fault recovery through the delivery of reactive power into the grid. The control system of a PV plant also possesses current limiters, DC link voltage control and making the FRT capability able to face any type of fault.

1 INTRODUCTION:

In the last few years, the power system has witnessed the substantial elevation in the invasion of renewable energy (RE) sources, which are usually integrated to the power grid with the help of power converters. The elevation of PV generation intimates some technical hitches, such as transient stability, which makes the working of power system under serious disruption is a primary issue. The inverters are used in PV generation delivers a new possibility, such as ancillary service to synchronous machine. The PV inverters may further maintain stability ensuing a system disruption, such as short circuit created by a lightning strike on a transmission line, which may instigate a fault detection (FD) signal that is accountable for breaking the faulted line's circuit breaker. Even now, it is hard to understand and calculate the inevitable structure of renewable energy generation. This condition is admissible for the reason that the renewable energy penetration level is not significant, which is done to preclude the dropping of synchronism. This paper propounds a FRT control scheme dependent on the concentration of the kinetic energy reserved in the SM's rotating mass to make sure transient stability. The proposed control scheme also enhances voltage stability and its post fault

betterment via the distribution of reactive power to the grid. Although, it carries on a PMU and a PDC, which may need to be admitted.

1.1 EXISTING SYSTEM:

In the existing system, the active power control strategy based on voltage phase difference between renewable energy source and the grid has been proposed and As shown in the figure 1.1, the sensor first measures the data on each given bus at each control interval. A wide area measurement system (WAMS) is used to sample signals such as voltage, and current at a fixed sampling interval, and then packs the sampled digital signals into packets, which are transmitted to the corresponding an open-loop experiment was done. However, as a generation unit, the MGP must have the ability to control the output active power flexibly according to power order controller along different communication network paths, and then they are utilized to generate control signals at the front end of the controller. The reference control signal is transmitted to the corresponding actuator to realize the closed loop control and stability support for the power system.

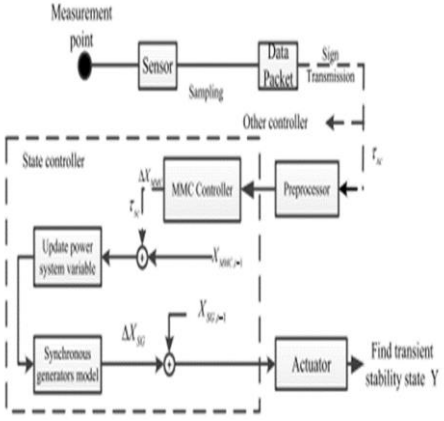


Fig.1.1 Existing system

1.2DRAWBACKS IN EXISTING SYSTEM:

- Transmission capability of the network is low.
- Voltage sensitivity of the load is high.
- There is low power quality improvement.
- Communication delay in the system is high.

1.2 PROPOSED SYSTEM:

The proposed system is to analyses the transient stability and voltage stability enhancement. It consists of Photovoltaic inverter, Synchronous machine, Grid, Phasor measurement unit and PDC.

II WORKING:

The block diagram of proposed system is shown in fig. 1.2.1**.** In this, we are going to proffer a control design for PV inverters that enrich the transient stability of the synchronous generator. This design narrates the solar inverter accompanied by transient stability system for power quality improvement. In this, the DC link capacitor is propounded to absorb the scattering kinetic energy that cannot be absorbed by the defective system. In the time of fault in any one of the transmission lines, the photovoltaic inverters can empower FRT in order to execute the proposed control strategy. To maintain and enhance the voltage stability we are going to inject the reactive power into the system. Here the FRT is installed in order to improves the voltage stability and its post-fault recovery through the delivery of reactive power into the grid. The control system of a PV plant also possesses current limiters, DC link voltage control and making the FRT capability able to face any type of fault.

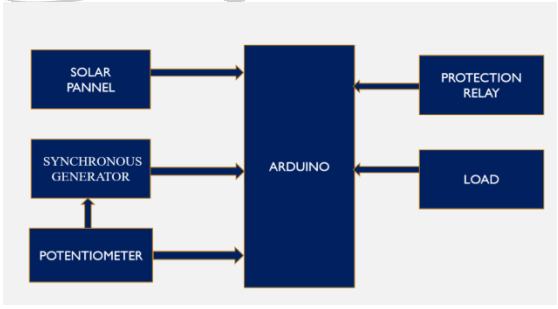


Fig 1.2.1 Block diagram of proposed system

i)SOLAR PANEL:

In this project, a solar panel used in order to produce electricity. This solar panel combined with the synchronous generator forms a hybrid system. The solar panel output extent from 200W to 350W supporting the idealized sunlight and temperature condition.

Fig 2.1. solar panel

ii)SYNCHRONOUS GENERATOR:

A synchronous generator is a concurrence machine which transforms the mechanical energy into the AC (Alternating Current) electric energy. In this project a synchronous generator is also used as a source to produce electricity. It usually runs at the same ideal speed.

Fig 2.1.2 Synchronous generator

iii) BATTERY:

A battery is commonly used for storing power. In this project, the battery is used to store the kinetic energy that cannot be stored by the fault grid in order to maintain the system stable. Whenever the load needs some extra energy, the battery is used to satisfy the loads expectation.

Fig 2.1.3 Battery

iv) INVERTER:

The inverter which converts dc input to ac output. Here we are using 100W dc to ac mini-inverter. It can convert 12V TO 220V. Figure 2.1.4 shows the inverter.

Fig 2.1.4 Inverter

v) Transformer: The transformer connected here is step down transformer. It increases the voltage by decrease the current. The transformer connected in the distributed side. Figure 2.1.5 shows the step down transformer.

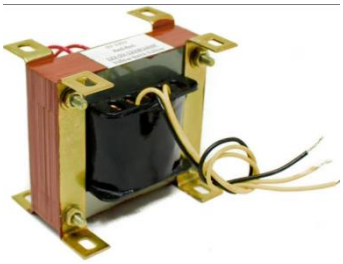


Figure 2.1.5 Transformer

vi) Arduino uno: The Arduino is connected to the pwm driver which calculates how much power is generated from wind. Here we are using Microchip ATmega328P to calculate the power stored in the battery and control the pwm driver. Figure 2.1.6 shows the Arduino atmega328

Figure 2.1.6 Arduino ATmega328

HARDWARE REQUIRED

- Solar panel
- Synchronous generator
- Battery
- Inverter
- Transformer
- Arduino uno

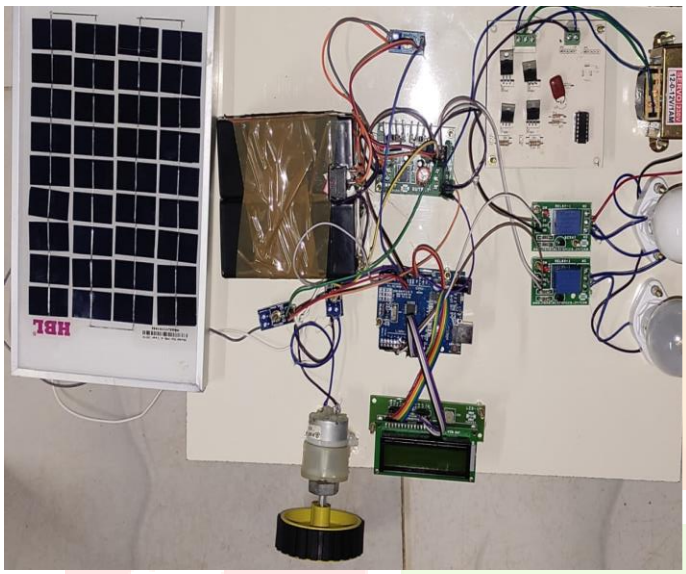
SOFTWARE REQUIRED

Matlab Simulink software

OBJECTIVES

- To improve the transient stability.
- To enhance the voltage stability of solar PV system
- To detecting the fault occurs in the system

HARDWARE SETUP



ADVANTAGES

- Maintain Voltage stability.
- Fault deduction in power system.
- High voltage maintenance.

APPLICATIONS

- Industrial applications
- Used in transmission line

CONCLUSION

In this exertion, a control design for PV inverters is proffered to proceed in the time of fault occurs in the system. It may compensate the transient and voltage stability of the compound system. The exploration established that the proffered control system can react during the PV system is in MC operation, assisting the network to reacquire the strength while and after a disruption on the communication network. The proffered control system prepares the SM kinetic energy to be received in the direction to the dc link capacitors to make sure the transient stability. Apart that, it also permits the installation of reactive power into the network to reinforce the voltage strength of the hybrid system. It too expose the upliftment in the grid voltages during the fault period.

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