

# Bangladesh University of Engineering & Technology

EEE 206

## Energy Conversion Laboratory Project Proposal

**Section:** A1

**Group:** 01

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### Proposal 1: Design of a regulation and feedback control system for a synchronous generator with simulink

The idea is to use simulink built in models to regulate steady state operation of a **synchronous generator** connected to a time variable load. Here regulation implies to use different feedback systems to control the governor set points and other operating parameters of the synchronous generator to drive it close to the normal rating values.

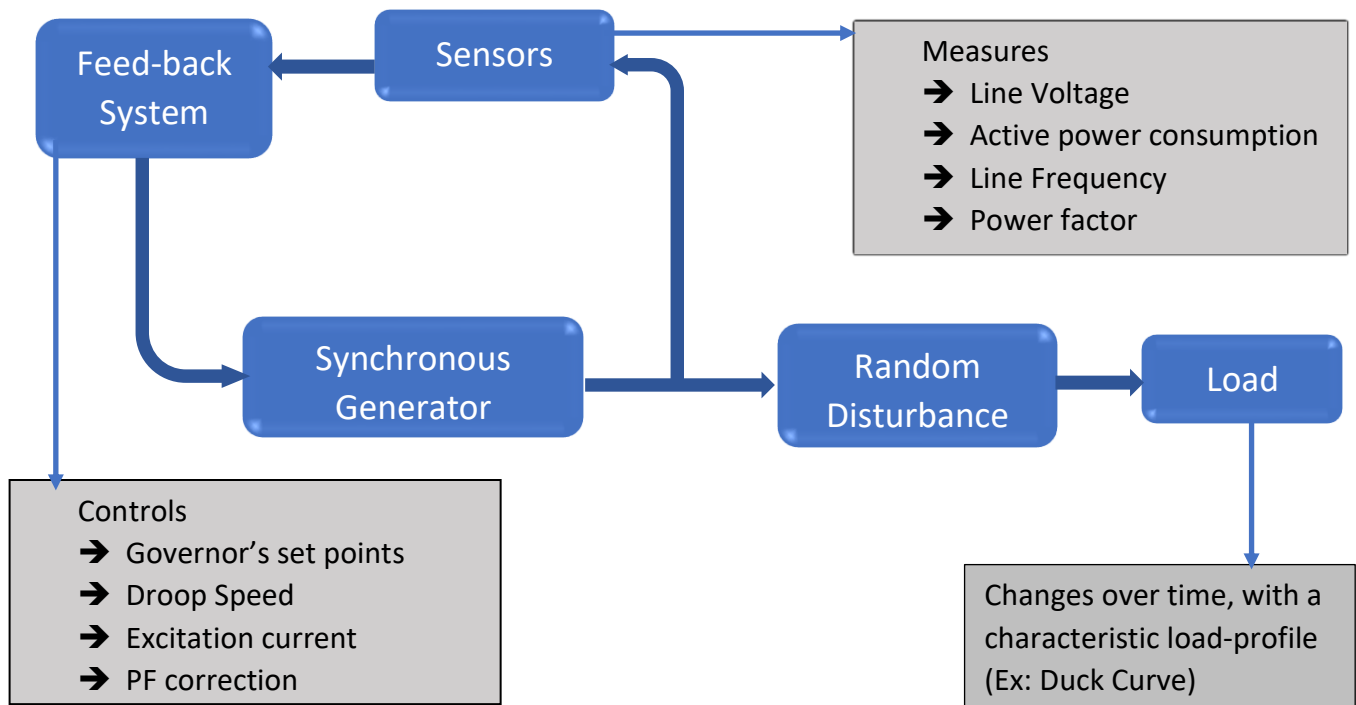
We will model the time variable load as a typical power consumption system which has a characteristic load profile with time (Example: a duck curve). As demands of power consumption changes over the course of a day, the generator must be capable of regulating its operating parameters in response to those changes, otherwise this can destabilize the particular power system. The following parameters need to be regulated within the synchronous generator with our proposed feedback control system —

- Governor's set points
  - Torque of the prime mover
  - Speed of the prime mover's rotation
- Excitation/Field current
- Addition of condenser on demand
- Speed droop (SD)

The variables we will monitor with sensors are —

- Line voltage
- Line frequency
- Power factor
- Supply of real power

The whole point of this regulation system is to keep these variables within normal operating conditions, even if time variable load forces them to alter.



*Figure 1 : Functional Block Diagram of the system*

As to this point, we assume the synchronous generator will operate alone. Later, if time permits, we will implement this regulation system preserving the same idea for the following cases —

- Paralleled with an infinite bus
- Paralleled with another equal/unequal rated synchronous generator