Week 21

The architecture of the network link is based on the requirement of the system. In daisy chain structure, each converter is connected to another one by a direct data link. The nearby converters can communicate fast, but since the entire process is being controlled by a supervisory controller (master controller), this benefit cannot be so useful in the system. A data packet from master should travel across all converters to reach the last one. This can cause data latency and can lead to instability in worse cases. To overcome, the data packet must be transferred faster compared to control time step and be sent bit by bit without being buffered in each hardware repeater. Since data line is point to point, fiber optic communication is possible and this will give a high degree of robustness to the entire design.

In parallel architecture, any controller should communicate with other controllers in the system. Good example of this type of communication is RS-485 standard. This standard enables us to have up to 256 devices in the system with baud rate up to 10 Mb/S. The pay off in this architecture is the ability of master controller sending data packets to all of the controllers simultaneously. Due to the nature of parallel architecture, fiber optic realization with common industrial devices is not possible and the only way to implement it is by electrical communication (fiber optic realization of this topology will be similar to daisy-chain). The weakness of this architecture is the same as daisy-chain architecture, and if the parallel data link gets a fault, there is no other way to communicate with other converters and synchronize them.