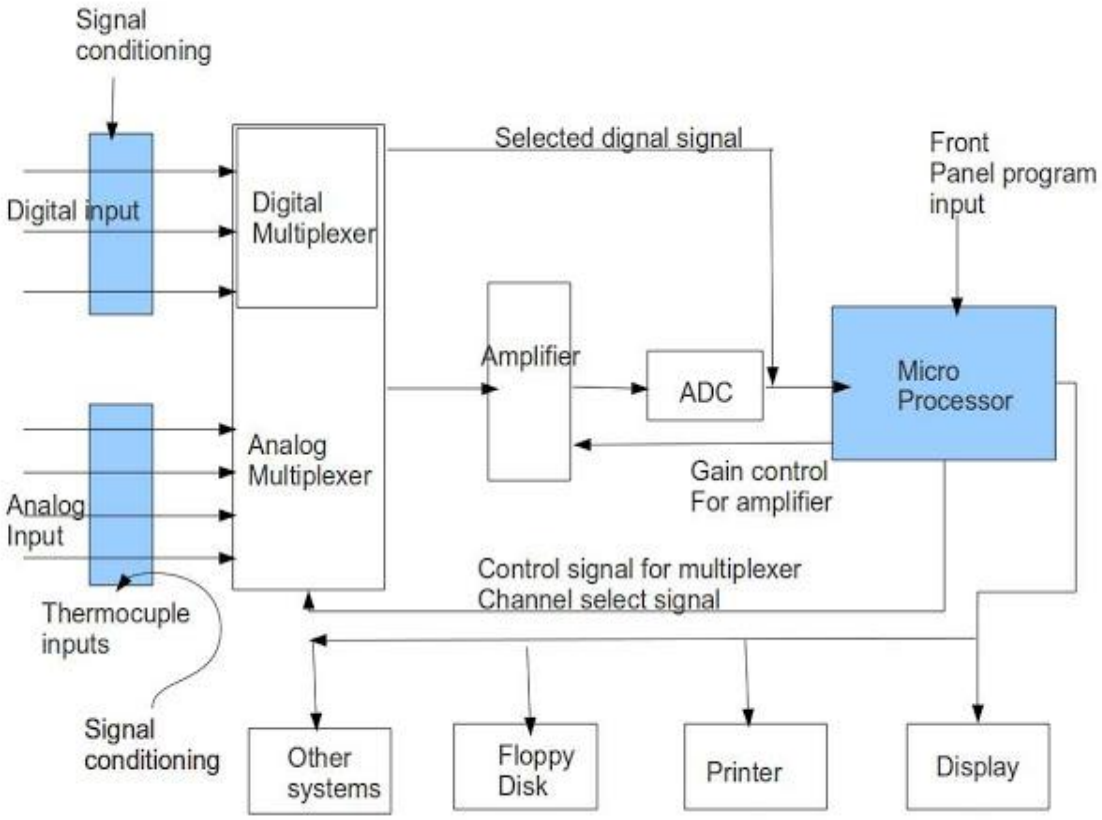
Microprocessor based data logging, processing and output – A mini Project

This post deals with using a microprocessor in instrumentation for collecting/acquiring data, processing it and displaying the output using the suitable display such as digits on an led or a computer screen. The basic elements of the data logger has been shown in the figure.

A typical data logger can handle 20 to 100 inputs. (some are even capable of handling around 1000 inputs). Such a unit is used to monitor the inputs from a large number of sensors or used to give outputs to number of display units or actuators. With the help of the signal conditioners, the output signals from the sensors are processed to make it suitable for measuring the input.



Mini Project based on Microprocessor

Lets assume the project is to data log the temperature of a liquid in a tank in a chemical industry and a thermocouple is placed inside the tank and the reading are to be seen in a display and recorded.

The output from the thermocouple is a small voltage is a small voltage in millivolts. Signal conditioning is done to convert this small voltage into suitable size current signal with noise rejection, linearisation and cold junction compensation for not being at 0'C.

The input and output devices are connected to a microprocessor system through ports. Inputs can be from sensors, switches, keyboards, etc.. and the output can be to displays, actuators, etc.,

Microprocessors require inputs that are digital. Hence, if the output from the sensor is analogue to digital converter ADC needed. Further, if the signal generated by he sensor is very small, amplification of the signal is first done before it is fed to an ADC. Even for digital signals, signal conditioning may be required to improve thier quality.

After suitable signal conditioning, the signal from the individual sensors are fed to a multiplexer. A multiplexer is circuit that can take-up inputs from a number of sources and then by selecting an input channel, give an output from just on of them.

In some appilications, there might be a need for measurements to be made at a number of different locations. In such a situation, instead of using a separate ADC and microprocessor for each measurement, a multiplexer is used to select each input one after the other, and switch it through a single ADC and microprocessor.

The output of the ADC is a digital signal which is processed using a microprocessor. The output from the microprocessor is displayed on a digital meter that indicates output and channel number or a printout record from a printer or the output of the microprocesor can be stored on a floppy disk or transferred to a computer for analysis but new need to program the microprocessor for every different output to needed.

A data logger can make around 1000 reading per second with an accuracy of 0.01% of full scale.

Source:

http://instrumentationandcontrollers.blogspot.in/2010/10/microprocessor-based-data-logging.html