**Electrical Thermostat**



**Description:**

1. The purpose of the system is to measure and report temperature.
2. The temperature measuring sensor transmits a sequence of pulsating electrical signals representing measured temperature values. The width of each electrical pulse ranges between 5 and 80 milliseconds. Individual pulses are separated by 20 milliseconds of absence of any electrical pulses, that is silence.
3. There is a direct correlation between the width of the electrical pulse and the magnitude of the converted temperature value. Pulse width of 5 milliseconds represents 0 degrees Celsius, while a pulse width of 80 milliseconds represents 100 degrees Celsius. That is, each additional millisecond of a valid pulse width accounts for a rise of degrees Celsius in the magnitude of the converted temperature value.
4. If at any given time during the operation of the system the median temperature exceeds 70 degrees Celsius for longer than one second, then the controller transmits an alternating warning signal of 5 milliseconds high followed by 5 milliseconds low until the median temperature subsides to 70 degrees Celsius or below.
5. The random distribution of the pulsating electrical signals, which represent measured temperature values within the specified range, does not approximate realistic temperature measuring instruments. Genuine temperature readings normally change gradually. They do not jump from one random value to another within a certain predefined range.
6. There are also no filtering mechanisms in place to smooth out fluctuations in the obtained temperature readings.

**Prompt:**

Please think and describe step by step the design and implementation of the electrical thermostat system that measures and reports temperature

The temperature-measuring sensor transmits pulsating electrical signals representing measured temperature values. The width of each electrical pulse ranges between 5 and 80 milliseconds. Individual pulses are separated by 20 milliseconds of an absence of any electrical pulses, that is, silence.

There is a direct correlation between the width of the electrical pulse and the magnitude of the converted temperature value. For example, a pulse width of 5 milliseconds represents 0 degrees Celsius, while a pulse width of 80 milliseconds represents 100 degrees Celsius. That is, each additional millisecond of a valid pulse width accounts for a rise of (4/3) degrees Celsius in the magnitude of the converted temperature value.

Temperature = (pulse width – 5) x (4 / 3)

If, at any given time during the system's operation, the median temperature exceeds 70 degrees Celsius for over one second. In that case, the controller transmits an alternating warning signal of 5 milliseconds high followed by 5 milliseconds low until the median temperature subsides to 70 degrees Celsius or below.