**IR Sensor Frequency Analysis in LabVIEW Using NI-DAQ**

This project involves analyzing the frequency characteristics of an IR sensor using LabVIEW and an analog data acquisition (DAQ) device. The goal is to capture the IR sensor's analog voltage signal and analyze it in low, band, and high-frequency ranges using digital filters and Fast Fourier Transform (FFT).

**Setup**

The IR sensor's analog output is wired to an NI DAQ (e.g., USB-6009). A suitable sampling rate (e.g., 1 kHz or higher) is configured in LabVIEW using DAQ Assistant for continuous signal acquisition.

**Signal Processing**

* **Filtering:**
  + Low-Pass Filter: Removes high-frequency noise.
  + Band-Pass Filter: Isolates specific signal ranges.
  + High-Pass Filter: Captures fast-changing signal events.  
    Filters are applied using LabVIEW’s Butterworth or Express Filter VIs.
* **FFT Analysis:**
  + The Spectral Measurements VI is used to perform FFT.
  + Frequency spectra help identify dominant frequencies in the signal.

**Visualization**

Time-domain signals and frequency spectra are displayed using LabVIEW graphs. Real-time feedback allows monitoring and tuning of sensor performance.

**Conclusion**

Using LabVIEW with an NI-DAQ, IR sensor signals can be filtered and analyzed across various frequency ranges. This enables accurate, noise-reduced signal monitoring for applications in automation, object detection, and control systems.