UDC 004

AMPLITUDE-TYPE SENSORS IN FIBER-OPTIC DEVICES

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This article describes the process of intellectualization of the fiber-optic sensor (FOS) system. The block diagram of the intelligent system is shown. The modeling of the flowchart of FOS intellectualization in the LabVIEW program is shown.

The object for intellectualization is a fiber-optic sensor used to measure movements.

FOS intellectualization is achieved through the use of digital filtering, an error correction unit, a displacement parameter calculation unit, as well as an information signal generation unit, while automatic correction is possible in each digital unit depending on the requirements and operating conditions.

Figure 1 shows a block diagram of the intelligent system.

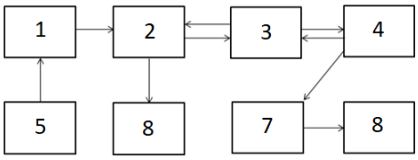

Figure 1. - Block diagram of the intelligent system

5-power supply unit; 1-radiation source; 2-beam splitter; 3-optical fiber 1, 7-optical fiber 2; 4 – the object under study; 8-output device.

The creation of the primary converter was performed according to the block diagram in Figure 2.

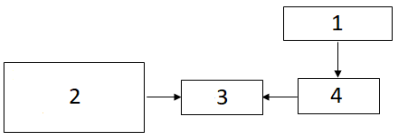

Figure 2. - Block diagram of the intelligent displacement converter system

The information signal from the sensor (1) via the NI-6009 ADC (4) is sent to the PC (3) on which the LabVIEW software package is installed (2). This program allows you to measure, filter, graphically display the signal in real time and perform various operations on the information signal.

The developed intelligent sensor system (Figure 3) consists of 11 blocks:

- a generator that simulates an information signal (1);
- the signal from the primary transmitter (7);
- an external and internal signal control unit (6);
- a filter block (2);
- an error correction unit (3);
- a calculation block X-displacement, V-speed, a-acceleration (4);
- a display (output of calculated values X, V, a) (5);
- a flash memory (11);
- graph 1 (displaying the signal before the filter block) (8);
- graph 2 (display of the signal after the filter block) (9);
- graph 3 (displaying the signal after the error correction block) (10).

The development of the appropriate software allows you to automatically determine the signal level, analyze it, and perform further operations with it: storing, transmitting, processing, and displaying data. Using the self-monitoring mode allows you to automatically detect and correct errors.

A program written in the LabVIEW environment is usually called a virtual device (VD), or a virtual instrument (VI). This follows from the fact that any program created in LabVIEW is presented in the form of a device, the main components of which are the front panel, the flowchart, the icon and the connecting panel. Figure 4 shows the developed block diagram of the intelligent fiber-optic motion sensor system.

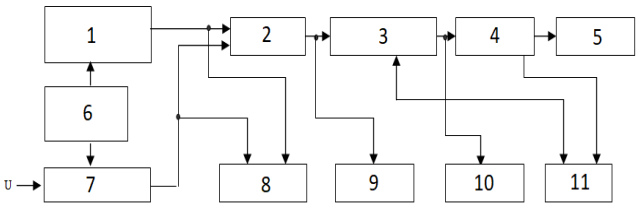

Figure 3. - Block diagram of an intelligent system integrated into a single-board computer

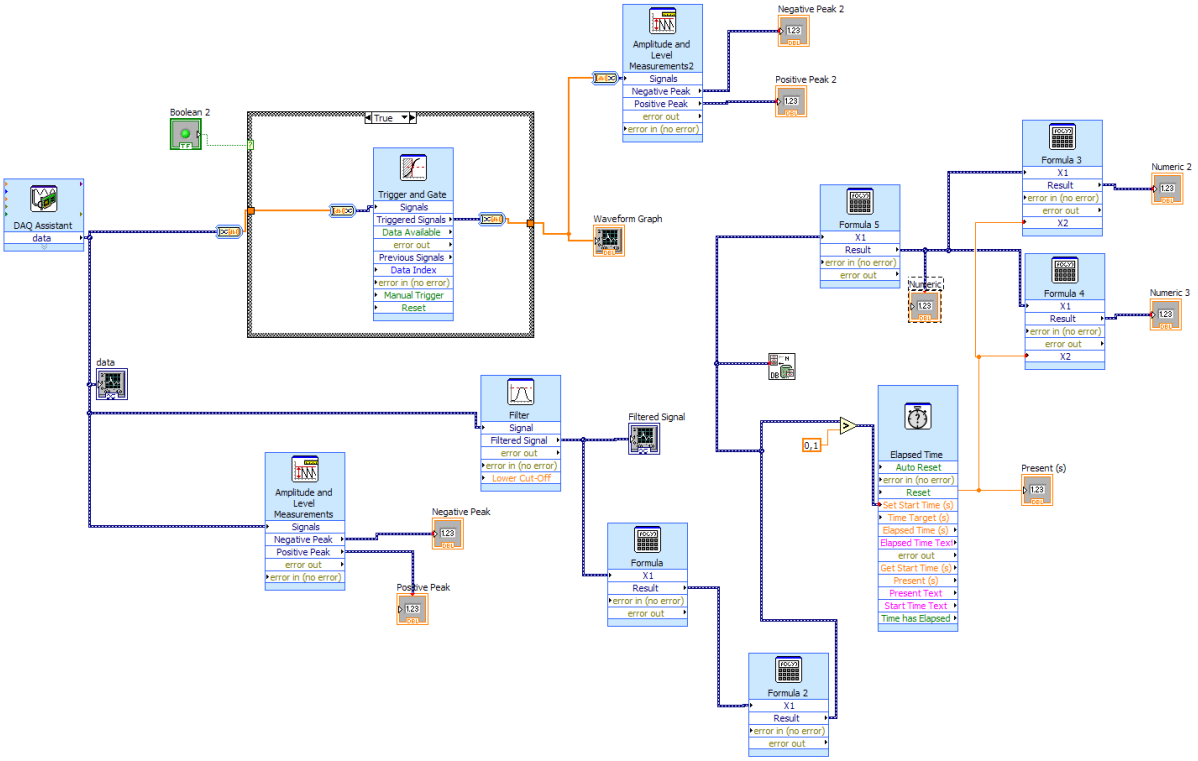

Figure 4. - Block diagram of the intelligent fiber-optic motion sensor system

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