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AUTOMATION OF MULTIPLE DATA MEASUREMENTS FOR COMPUTER INTERFACE

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ABSTRACT

Multiplexing electronic devices play a central role in electronic circuits that are used in communication and information technology. As this work shows, self-designed multiplexing devices can be used effectively to enhance the experimenting capability in a physics laboratory. Instead of many measuring instruments, a multiplexer can be used to automatically select one from several input signals and transmit it to a single measuring instrument in a manual measuring setup in a laboratory. This enables automation of multiple data measurements via one instrument within short time intervals as we desire.

Design and construction of a low cost multiplexing electronic device is reported through this work that would select one from several input signals and send the output to a measuring instrument or via an analogue to digital converter to a microprocessor. Thus, the design is such that the multiplexing device can be used with and without amplification depending on the need and the sensitivity (resolution) of measuring instruments.

The initial design was carried out with the assistance of details (data sheets) of different integrated circuits used. The designed instrument was constructed by soldering the components on circuit boards having the parts such as multiplexing circuit unit, operational amplifier unit, regulated power supply unit, analog to digital converting unit and microcomputer unit. Multiplexing circuit unit contains the CD4051BC multiplexer IC, CD4017BC decade counter IC, 555 timer IC, common cathode seven segment display with CD4511BC driver IC. Operational amplifier unit was prepared by using CA 3140 op-amp IC. And a regulated power supply unit was constructed for different supplies of ICs purpose. Flash analog to digital converting method were used to connect the microprocessor in which the visual studio 2007 software was initialized on PC and the C++ programming was written to accept and analyze the digital data from the multiplexing electronic device.

And the circuit was shield using a wood box. Then, the voltmeters were connected with multiplexing electronic device and readings were taken for *function of multiplexing electronic device* and to verify the *amplification reliability*.

Several test experiments were performed with multiplexing electronic device to check the *multiplexing process* and to verify the *amplification reliability*. The multiplexer automatically selecting one from several input voltages and sending each of them as outputs to a single voltmeter was performed for several time delays, which confirms the function of the multiplexing device. The amplification reliability of the second option mode was investigated for several gain factors and the uncertainty limits were verified.

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