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# Smart Flexible Turbidity Sensing Based on Embedded Neural Network

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**Abstract:** This paper presents a flexible turbidity sensing system that implements single and multiple infrared (IR) beam architectures. The hardware includes two pairs of IR LED - IR photodiode whose relative position permits the materialization of different architectures for turbidity optical measurement. The control of the sensing architecture is performed by a microcontroller based I/O board that is wireless connected to a PC for advanced control and data processing based on neural networks. Using intelligent processing procedures, the best turbidity measurement architecture is selected in terms of measurement accuracy for a given turbidity level. Elements of neural network design, optimization and embedding as part of an advanced processing software component are presented.

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**I. Introduction**

According to [1], turbidity is an “expression of the optical property that causes light to be scattered and absorbed rather than transmitted in straight lines through the sample”, definition that is in harmony with the one given in ISO7027 [2]. However the turbidity measurement scheme uses the detection of transmitted and scattered light in order to extract the turbidity values.

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