INTELLIGENT SYSTEM FOR MEASURING WATER IMPURITY RATIO

G.E.M.D.C.BANDARA*, S.D.PATHIRANA, T.A.U.S.RATHNAYAKE AND C.N. SENANAYAKE

Department of Production Engineering, Faculty of Engineering, University of Peradeniya, Peradeniya

Turbidity is a measure of the amount of suspended materials in water, which ranges from colloidal to coarse dispersions. Before distribution, all authorized water treatment plants and organizations measure turbidity of water in order to ensure that pure water is supplied to consumers. Therefore for water treatment plants, Turbidimeters are imported to Sri Lanka to use them as a measuring device for purity of water.

Most of the Turbidimeters used in Sri Lanka are of analog type (HACH 2100A series). Our objective of this effort was to manufacture a Turbidimeter, which displays Turbidity as a numerical value in a digital display (seven segment /LCD display). The used principle is called nephelometry i.e. the intensity of light scattered (where the detection angle is 90^0 to the incident light) by turbid liquid was measured using a photodiode. The photocell output, which was a voltage reading, was proportional to the intensity of the light beam given by scattering. This voltage reading was fed to the analog input of a microcontroller (PIC16F877). Then the input was processed by the microcontroller and converted to a Turbidity value and displayed as a turbidity reading in NTUs. (Nephelometric Turibidity Units).

The needed standard samples were obtained from water treatment plants at Sarasavi Uyana, University premises and the Department of Environmental Engineering at Faculty of Engineering, University of Peradeniya. The calibration and testing were done by using HACH 2100A Turbidimeter at several stages of the project in order to obtain the required accuracy.

The turbidity reading obtained became stable when two Plano-convex lenses were used to converge the light beam. A point source similar to the one that is used in analog turbidity meters was used. Instead of 0-1000 NTU range, it was possible to obtain a NTU range of 1-100 NTU for the device, which was a reasonable range for Sri Lankan standards according to the water board specifications, which is the main authorized institution for water testing & distribution.

This device gives readings directly in NTU's and user friendly in order to minimize the possibility of making errors by the testing personnel. This instrument can be introduced to Sri Lankan water treatment plants and other relevant places to measure turbidity at a lower cost.