

Automated liquid dye color mixing system

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Abstract

There is a worldwide tendency to automate manual operations in production lines. Some manual systems cause poor quality of the products, slow processing speeds, and waste material, which are caused by human errors in the measurements. However, fast and accurate automated systems for liquid dye color mixing are far too expensive for small local industries. Thus, this new system was introduced, which is a combination of two separate units. The units are a software-based unit for estimating the needed dye color volume ratios and a physically built dye mixing unit. The software-based unit is implemented using Python programming. As the inputs for the unit, the operator can select the three base colors, the required color to be prepared by the base colors, and the volume of the required color. The unit estimates the volumes of the three base color combinations to produce the required color. The dye mixing unit of the system consists of three transparent tanks that contain liquid dye(s) with the given base colors. In the unit, a flow sensor connected to an Arduino microcontroller was used to output the respective dye volumes that were estimated by the software-based unit to physically process the required color dye. For obtaining the user inputs, a Graphical User Interface (GUI) was developed and implemented. The system produced accurate color outputs for different input dye color combinations. This economical and automated dye color mixing system reduces human interaction with the chemicals more efficiently and effectively by minimizing labor and material costs. The system is suitable for dye mixing in the apparel industry.

Keywords: *Arduino, Dye color volume ratios, Flow sensor, Liquid dye*