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Design and construct an Auto - Synchronization of Turbidity monitor system

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Abstract

This research aims to design an auto-synchronization monitor system to determine the quality of water. The parameter that will be monitored is Turbidity. The system intended locally consists of a Turbidity sensor, and Arduino-UNO joined together and installed in the field to monitor Turbidity. This sensor will sense the Turbidity of water and send the value to Arduino. After that, the Arduino will send the turbidity value as SMS message to the Data Collection Centre (DCC) via a mobile network using shield GSM sim900 that joined on Arduino tablet. The Data-logger in DCC will receive the SMS message that contains turbidity value, and then it will treat the SMS message and convert it to data by special Software that has been programmed in the lab. When we received any abnormal value for Turbidity from our monitor system, the Software will give us an alarm. The important features in this system are collocated and auto-synchronization of the turbidity data in one place and provide us with alarm, economical consumption of energy, portable, cheap construction, and development ability. These features made the designed system very useful in scientific laboratories, environment centers, and the industrial sector.

Keyword: Arduino, Turbidity, Auto-Synchronization,

1. Introduction

Water has many factors that are directly affecting its quality [1]. The importance of these factors is Turbidity [2]. The Turbidity means the soled is suspended in water. The Turbidity makes water cloudiness and not clear. So, the Turbidity is causing many problems during water treatment processes, especially by using ultra-filtration and Reverse osmoses techniques. If the Turbidity reaches a high level, the technician in the water treatment plant should be using more chemical as Alum or polymer to reduce the sold suspended in water before entering in UF and RO plants [3]. So, the pre-treatment processes vital to prevent any problem that causes loss of more money and technicians efforts. The researchers have created many methods to monitor Turbidity, such as determining the Turbidity by scattering [4]. But when we need to prevent any sudden change in water quality, we should use continuous monitor systems [5,6]. This system is characterized by the high price and high cost of operation [7].

2. 2. Method and Experimental:

The tablet (1) shows the required components to construct the designed system. The designed turbidity system consists of two parties. The first is the sensing part [8]. This part of sensing the Turbidity in water and sending Turbidity to the Data Collected Centre (DCC). The first part consists of Arduino type Uno , GSMP shield, and turbidity sensor. Floating container. All last components were put in a Plastic container. The plastic container was designed and printed by 3d printer and designed to float on the water surface.
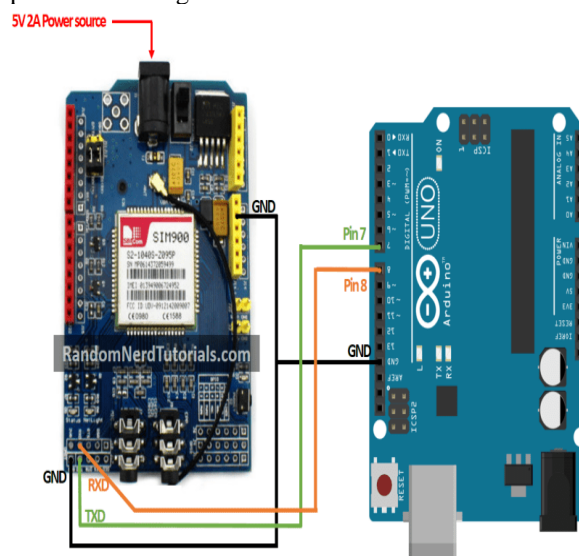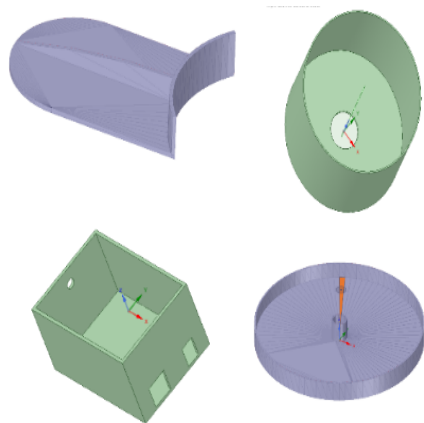

Figure (1): The assembly method for GSMP with Arduino tablet

Figure (2): The 3d designed container parts

Table (1. The components of the designed system)

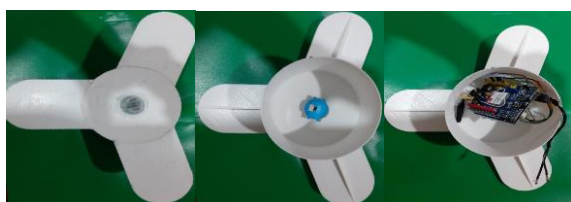| Name of Components	
Arduino UNO	
GSMP SIM 900	
Turbidity Sensor	
Power supply 5V 2A	

Figure (3): The 3d printed module for floating container

The second part consists of a GSMP shield connected with Arduino type Uno. This Arduino is controlled by Software called Signal to the peak. This Software is programed locally in our laboratories.

Figure (4): The Data Received Unit (DRU)

3.Result and Discussion:

The Turbidity system had been designed to monitoring the turbidity levels continuously. The turbidity determination start when put the floating container in water. The turbidity sensor will checking the turbidity level continually in water and send the value to Arduino[9]. The Arduino will analyze the received data then classify it into six grades. The turbidity grade is Dangerous, Very High, High, **Normal**, Low, and Very Low. After that, the GSMP that joined Arduino UNO will send data to DCC via mobile network (SMS) message.
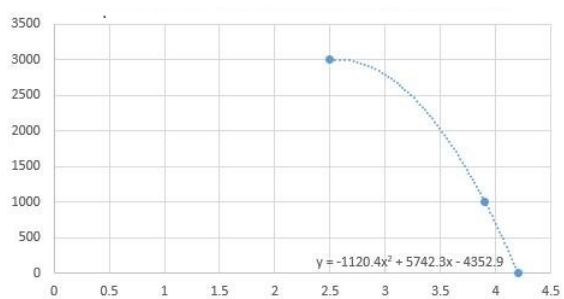

Figure (5): The correlation between Turbidity and voltage for turbidity sensor that been used.

Data Received Unit DRU will receive the turbidity value that was sent in DCC. Then the data received will be sent to Arduino to treat it and convert it to Microsoft excel[10]. The macro unit installed on Microsoft excel will convert data to curve to show the turbidity levels for long hours. The macro unit is programed locally and called Signal to the peak.
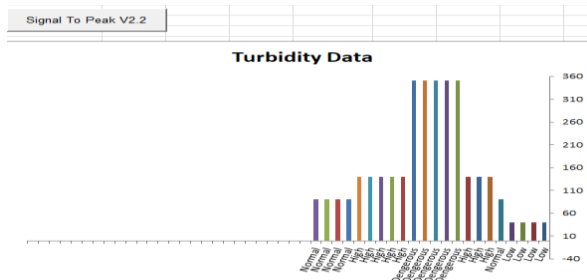

Figure (6): The Interface for the program (Signal to peak)

Now we become monitor the Turbidity of water lively and easily. The designed system can use it in

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different laboratories, environment directories, industrial and agriculture fields. The developed system characterizing by very cheap, small size, computerize, developable, and Data Synchronization.

4.Conclusions:

The turbidity monitor system is made from cheap and available material in local markets. The designed system helps us save the operations effort by locally monitoring Turbidity and conception of chemicals as polymer and Alum used to reduce turbidity from raw water. Hence, this system makes Ultra and Reversed osmosis plants work with efficiency higher better. The designed system can provide us with an alarm when arriving at the water at a high turbidity level. Hence, we can prevent entering the water turbid before arriving at following process and damaged it.

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