



Application of FBUS Protocol in Aquaculture

KEYWORDS

pH level, pH sensor, FBUS Protocol, FPGA, Nokia mobile

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ABSTRACT Aquatic life directly depends on pH value of the water and the changes in the pH value can significantly affect the aquatic life by altering other aspects of water. Hence it is necessary to maintain the water with suitable pH value. In this paper, a technique is proposed to measure the pH value of the water in a pond and the measured value will be transmitted to the mobile phone of the fishery owner in the form of SMS alerts. FBUS is the connection provided by most of the Nokia mobile phones which is used to connect the phone with device such as FPGA. This connection can be used for activating the phone to transmit the suitable SMS message that is already stored in the FPGA.

INTRODUCTION

Very high or very low pH values are unsuitable for most aquatic organisms. Young fish are extremely sensitive to pH levels below 5 and may die at these low pH values. High pH levels greater than 9 can harm fish by damaging cellular membranes. Low pH levels accelerate the release of metals from rocks or sediments in the stream. These metals can affect a fish's metabolism and the fish's ability to take water in through the gills, and can kill fish. At high pH (>9) most ammonium in water is converted to toxic ammonia, which can kill the fish. Hence it is necessary to take necessary actions to maintain the suitable pH value. This paper proposed a technique of transmission of the pH value from the pond to the mobile phone of the authorized person in the form of SMS messages to alert him, so that necessary action will be taken to save the fish in the pond.

PROPOSED SYSTEM:

The pH sensor which is connected to the zigbee transmitter, measures and transmits the pH value of the water in the pond. The zigbee receiver which is connected to the FPGA receives this data.

This FPGA is connected to the nokia phone with the help of FBUS connection. Three predefined messages are already stored in the FPGA. They are: 1.pH value is maintained at safe level 2.Water is acidic in nature 3.Water is basic in nature. If the measured pH value is in between 5 to 8, then the FPGA will automatically activate the nokia phone to transmit the message-1 to the mobile phone of the authorized person.



Figure 1: FPGA connected with Nokia phone.

If the measured value is in between 0 to 5, then the FPGA will automatically activate the phone to transmit the message-2 to the mobile phone of the authorized person. If the meas-

ured value is in between 8 to 14, then the FPGA will activate the phone to transmit the message-3 to the mobile phone of the authorized person.

FBUS PROTOCOL:

Most of the Nokia mobile phones have high-speed full-duplex FBUS connection that can be used to connect the phone with FPGA. By using this connection FPGA can activate the Nokia phone to send one of the preloaded messages stored in it. The message will be transmitted to the mobile phone of the authorized person. The speed of the FBUS is 1, 15,200 bps, 8 data bits, no parity, and one stop bit.



Figure 2: FBUS connection in Nokia phone.

The set of rules or procedures that should be followed to establish the communication between the two entities is called as a protocol. It is also necessary to follow a certain procedure to initiate the communication between the FPGA and the phone. The good starting point to initiate the communication between the FPGA and the phone is requesting the version data of the phone.

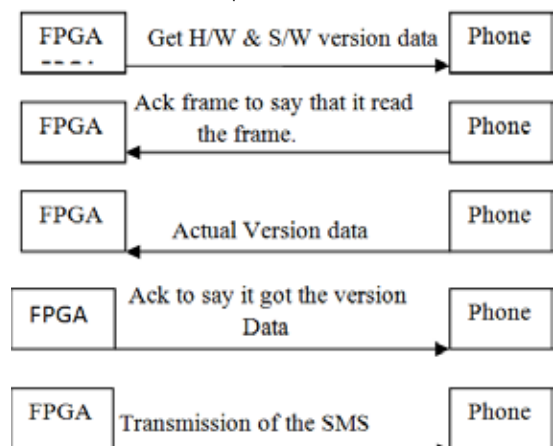


Figure 3: FBUS Protocol.

The phone will transmit the acknowledgement frame to the FPGA and finally it will transmit its version data to the FPGA. Now the FPGA will transmit one of the three preloaded SMS to the phone. This phone will transmit the SMS to the pre-defined mobile number of the authorized person. The SMS message frame consists of various bytes such as frame ID, source (FPGA) address, destination (phone) address, message length, SMS frame header, command for SMS handling, SMS center phone number, phone number of the authorized person. All the three SMS frames are stored in the FPGA and depend upon the pH value, one of the SMS frame will be transmitted to the phone. This phone transmits the valid SMS

alert to the mobile phone of the authorized person.

CONCLUSION:

This system consumes low power, and provides reliable SMS alerts and sent to the appropriate person, so that necessary actions to maintain the safe pH level in the pond to protect the life of the young fish. These types of warning techniques are relatively low-cost and have been successfully employed in a diverse range of countries. Future extensions to the system include improvements such as determining the oxygen levels and pollutant levels present the water.

REFERENCE

[1] Madhu G.C, Dr.Y.Venkatanarayana,(2012), "Design of a flood warning system based on FBUS protocol, International journal of networking and communication Engineering". | [2] aqua-culture.blogspot.com/.../effects-of-high-and-low-ph-levels-in.ht. | [3] FBUS protocol: http://www.embedtronics.com/nokia_fbush.htm | [4] Waldemar Nawrocki, "Measurement systems and sensors", pp. 41-52, Artech House, Incorporated, 2005 | [5] FPGA Architecture-an Overview Springer |