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TELEMETERING OF WATER LEVEL OF DAM IN REAL TIME SYSTEM

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AjengMayang St., Mt.Aditya BaniDwiPutro, Feri Ahmad Nurdin, Rizal Fachrurozy, MochammadRizkyTaufikHidayat. Telemetering Of Water Level Of Dam In Real Time System-- Palarch's Journal Of Archaeology Of Egypt/Egyptology 17(5), 477-485. ISSN 1567-214x

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ABSTRACT

The dam on PLTA (hydropower plant) has a function as water supply of primary power needed in PLTA, so that the water level in dam is really impact in operating the Generator Unit. Nowadays, some PLTA are still using conventional method to monitor the dam level by means of using manual measuring instrument where is placed on the edge of dam. In fact, level monitoring conventionally is not effective and efficient because it is not monitored in real time. Level monitoring conventionally causes operating of the Generator Unit only guessing the exitance of the water level. It has an effect if the water level goes down it will impact to the instrument breakdown in Generator Unit because there is many dirt. With the result that is made an instrument of prototype of telemetering dam level via mobile phone based on NodeMcu ESP 8266 so the water level can monitor in real time and facilitate in operating the Generator Unit in low level or high level

INTRODUCTION

Background

The dam on PLTA (hydropower plant) has a function as water supply of primary power needed in PLTA, so that the water level in dam is really impact in operating the Generator Unit. Nowadays, some PLTA are still using conventional

method to monitor the dam level by means of using manual measuring instrument where is placed on the edge of dam. In fact, level monitoring conventionally is not effective and efficient because it is not monitored in real time. Level monitoring conventionally causes operating of the Generator Unit only guessing the exitance of the water level. It has an effect if the water level goes down it will impact to the instrument breakdown in Generator Unit because there is many dirt. With the result that is made an instrument of prototype of telemetering dam level via mobile phone based on NodeMcu ESP 8266 so the water level can monitor in real time and facilitate in operating the Generator Unit in low level or high level.

The aims which expect to be reached in making this paper are:
1. To know the water level of dam in real time.
2. To facilitate in operating the Generator Unit refers to the existence of the water level.

The Limitation of problem

In making this instrument, there will be able the limitation of problem so it does not digress from specification and ability of the instrument made. The limitation of problem is:
1. The limit of maximum level which can be read sensor is 10 cm.
2. The mobile phone which is used must typical of smartphone and has installed blynk application to be able watching the water level.

THEORITICAL BACKGROUND

NodeMcu ESP 8266

NodeMcu is a platform of IoT which is typical of opensource. It consists by hardware which is System on Chip ESP8266 from ESP8266 artificial of Espressif System and firmware which is used is 2rotoc program of scripting Lua. The term of NodeMcu default actually refers to firmware used prefer than hardware of the development kit NodeMcu, it can be analogized as board 3rotoco itself ESP8266.

Ultrasonic sensor HC-SR04

Ultrasonic sensor is a sensor which functionate to change the magnitude of fisis (sound) to magnitude of electricity or in contrary. The mechanism of this sensor based on to the fundamental of resonance of the sound wave it can be used to decode the existence (distance) an object with a certain frequency. It is called as a ultrasonic sensor because this sensor used the ultrasonic wave (sound of ultrasonic).

Servo Motor

Servo motor is an electronic component in the form of a motor that has a feedback system to provide information on the actual rotation position of the motor which is transmitted to the microcontroller control circuit.

Basically servo motors are widely used as actuators that require precision motor rotation positions.
If the normal DC motor can only be controlled speed and direction of rotation, another case on a servo motor is the addition of a parameter that can be controlled based on the angle / degree.
The main components making up the servo motor include DC motors, gear ratios, potentiometers and servo controllers

Flow meter sensor

Water Flow sensor is a sensor that has a function as a counter flow of water flowing in which the movement of the motor will be converted into liter units. This sensor consists of several parts, namely plastic valves, water rotors, and Hall Effect sensors.

The motor on the module will move at a speed that changes according to the speed of the flowing water.

While in the hall sensor the effect contained in this sensor will read the signal in the form of a voltage that is converted into a pulse and sent to the microcontroller in this case Arduino Uno and processed as data on the flow rate of flowing water.

THE IMPLEMENTATION

The Prototype of Telemetering of Dam Level via mobile phone based on NodeMcu ESP 8266. The hardware which was needed was Ultrasonic Sensor HC-SR04, NodeMcu ESP8266, Flow meter sensor, Micro servo and mobile phone.The mechanism was:

1. Ultrasonic Sensor HC-SR04 had function as detected of dam level with using the mechanism of ultrasonic.
2. Micro servo had function to open and close valve
3. Flowmeter had function as detected of flow and volume dam.
4. NodeMcu had function as input data processing from sensor which would be sent by internet media with link by Blynk application.
5. Modem router WIFI had function as link of data communication from NodeMcu to mobile phone.
6. Mobile phone had function as an output of level reading display from Blynk application.

Block diagram system we can show in fig.1 and flowchart system we can show in **Fig 2.**

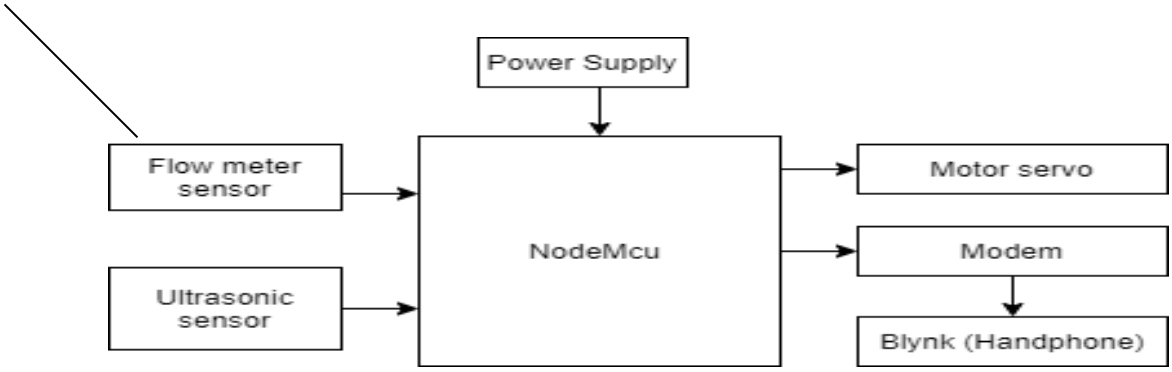


Fig1. Block Diagram System

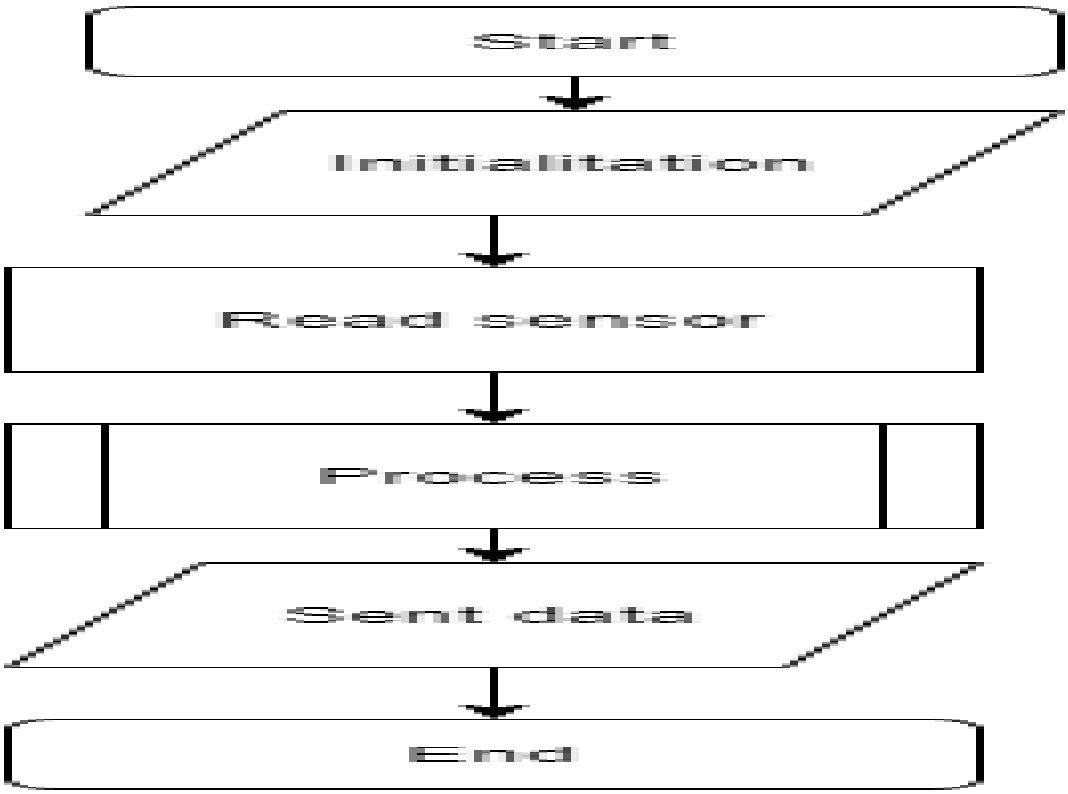


Fig 2. Flow chart System

A prototype has been implemented using ultrasonic for water level sensors. The distance water in the container indicates of the water level. The **Fig 3** representation pictures of wiring diagram.

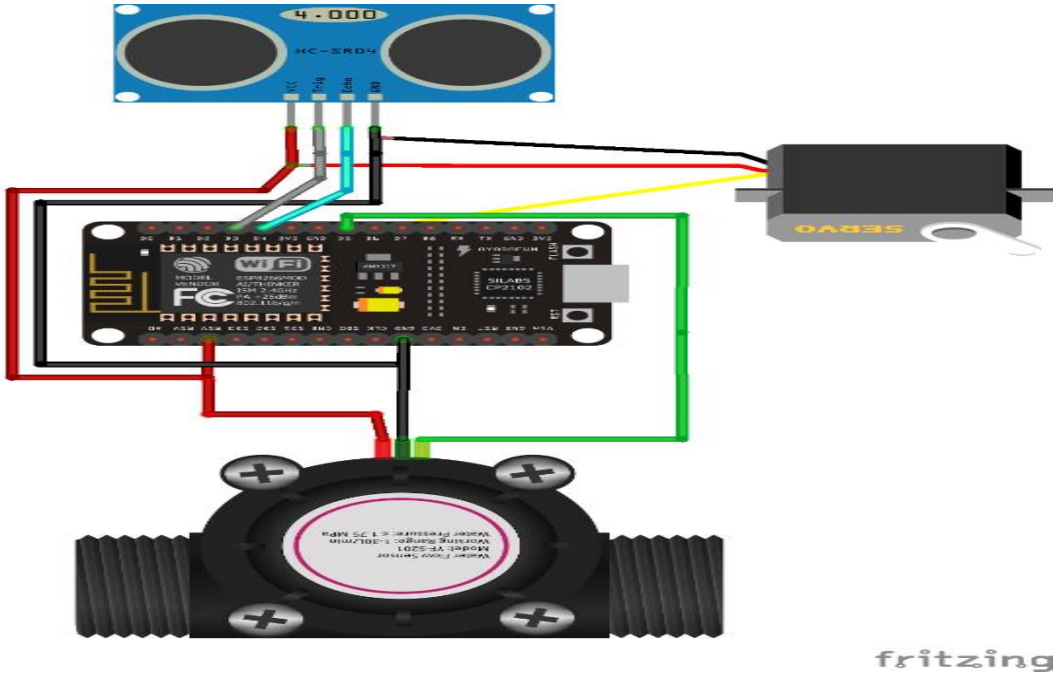


Fig 3 Wiring Diagram System

The device media specification:
a. Supply 5 Vdc
b. Minimum range of sensor reading is 0 cm
c. Maximum range of sensor reading is 10 cm

The Fig.4 we can show system has been installation in prototype media.

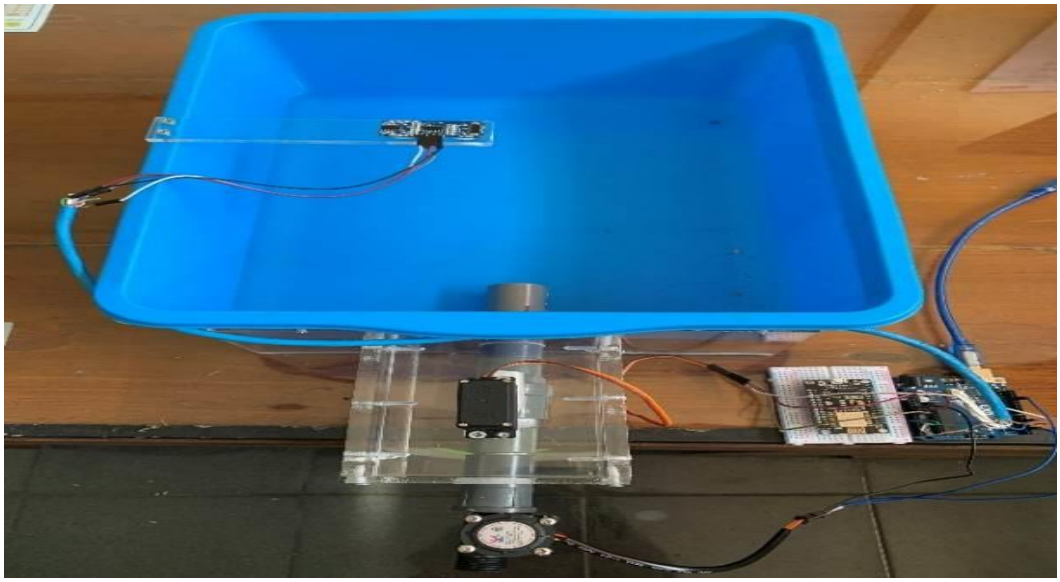


Fig4. Installation in Media

ANALYZING

The device test system we have test several time. In Fig. 5 we can shown display pictures in Blynk application.

Fig5. Display Pictures in Blynk Application

Table1. Measurement table

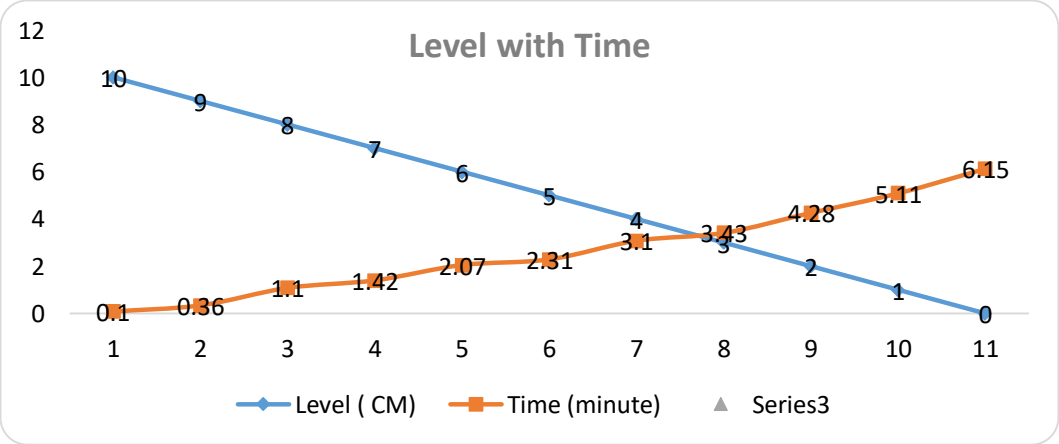
Reading with Ruler	Reading with Device
0 CM	0 CM
2 CM	2,2 CM
4 CM	4,1 CM
6 CM	6,3 CM
8 CM	8 CM
10 CM	10,1

From the result of measurement could be got a conclusion if the water level was higher so the sensor reading would really accurate but if the water level is lower , the sensor reading gets the highest differences 0,3 cm because of the sensor transmitted the ultrasonic wave wider if the object far-off so that it would get the wall of water container and the sensor range would read an object which got the water container wall.

Table2. Level With Time

Level (CM)	Time (minute)
10	0,1
9	0,36
8	1,1
7	1,42
6	2,07
5	2,31
4	3,1
3	3,43
2	4,28
1	5,11
0	6,15

Chart 1. Level with Time



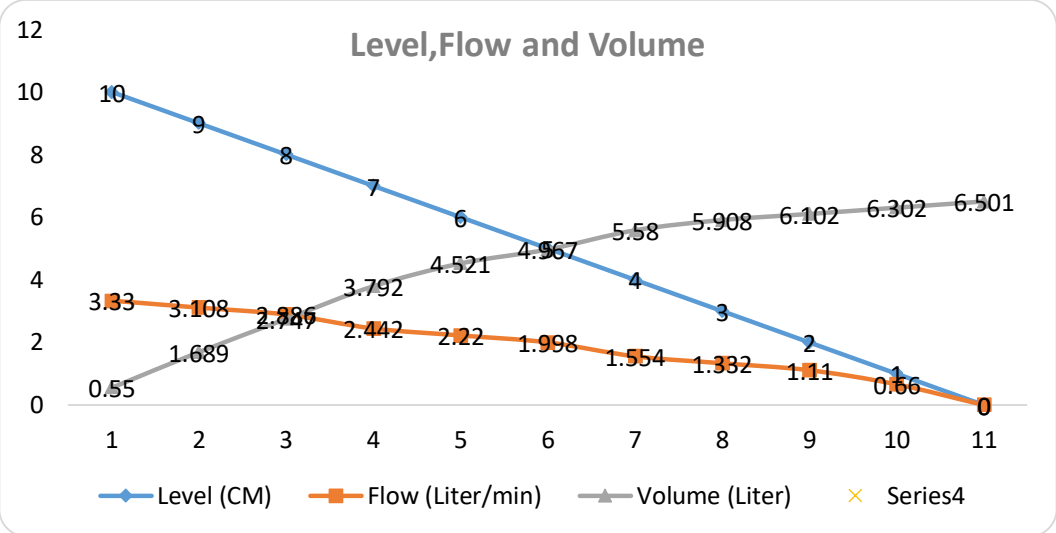
From the result of measurement level with time could be got a conclusion the time taken from the full water level to runs out is 6 minutes with an average reduction of every cm is 36 seconds.

Table3. Level, Flow and Volume

Level (CM)	Flow (Liter/min)	Volume (Liter)
10	3,33	0,55
9	3,108	1,689
8	2,886	2,747
7	2,442	3,792

6	2,22	4,521
5	1,998	4,967
4	1,554	5,58
3	1,332	5,908
2	1,11	6,102
1	0,66	6,302
0	0	6,501

Chart2. Level, Flow and Volume



From the result of measurement could be got a conclusion if
Every 1 cm decrease, the water flow decreases and the volume of water that comes out increases.

CONCLUSION

1. The result of measurement, there had difference between the measurement with ruler and device it caused by the sensor which transmitted the ultrasonic wave was wider if the object far-off. So it got by the water container wall and reading the range of sensor which got the water container wall.
2. The result of measurement level with time could be got a conclusion the time taken from the full water level to runs out is 6 minutes with an average reduction of every cm is 36 seconds.
3. From the result of measurement could be got a conclusion if every 1 cm decrease, the water flow decreases and the volume of water that comes out increases
4. The device could be applied in hydropower plant to know the water level, water flow and volume of dam.

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