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PROTOTYPE TELEMETERING OF SHIP LOAD ON THE PORT WITH HANDPHONE BASED ON NODEMCU ESP8266

Ase Suryana[1], *Aditya Bani Dwi Putro*[2], *Didi Tarmidi*[3]

[1,2,3]Widyatama University, Bandung, Indonesia

[1]ase.suryana@widyatama.ac.id, [2]aditya.bani@widyatama.ac.id,

[3]didi.tarmidi@widyatama.ac.id

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Keywords: Ship cargo, NodeMCU, Ultrasonic.

ABSTRACT

Ship load gauges usually use the Draft survey method, which is an activity to find out how much cargo in units of weight (Kilogram or Metric Ton) is in a water transport (ship / vessel or Barge / Barge). A way to measure or calculate the weight or tonnage of goods or cargo on board based on Archimedes Law or based on the volume of water pressed by the ship by reading the draft mark on the hull and supporting data on the ship. (Hydrostatic Table, Sounding Table etc.).

The method that has been used so far is still using the manual method. So that a Telemetering Prototype of Ship Weight is made at the Port Pier Via mobile phones to make it easier to find out the actual weight of the ship's cargo digitally. This study uses a shipbuilding prototype with an ultrasonic sensor to determine the increase in water when there is a ship's cargo to be measured. The load sensor readings will be processed using NodeMCU which is displayed on the Blynk application which can be accessed on a smartphone in the form of a water level.

Keywords: Ship cargo, NodeMCU, Ultrasonic.

I. INTRODUCTION

Ship load gauges usually use the Draft survey method, which is an activity to find out how much cargo in units of weight (Kilogram or Metric Ton) is in a water transport (ship / vessel or Barge / Barge). A way to measure or calculate the weight or tonnage of goods or cargo on board based on Archimedes Law or based on the volume of water pressed by the ship by reading the draft mark on the hull and supporting data on the ship. (Hydrostatic Table, Sounding Table, etc.) In addition to the draft survey, there are 3 other ways to calculate weight, namely by scales, weighing bridges and belt conveyor scales. The

draft survey has been recognized by the world and the United Nations as the official calculation method used as the number of cargo in the B / L document (bill of lading) / list of cargo.

The method that has been used so far is still using the manual method. So that a Prototype of Ship Weight Telemetering is made at the Port Pier Via mobile phones to make it easier to know the actual weight of the ship's cargo digitally.

The purpose of this study is to determine and measure the cargo of the ship. This study uses a shipbuilding prototype with an ultrasonic sensor to determine the increase in water when a ship is to be measured. Load sensor readings will be processed using NodeMCU which is displayed on the Blynk application which can be accessed on a smartphone in the form of a water level.

II. LITERATURE REVIEW

Regarding the Title of the Report, here are several studies that serve as references in the preparation of the Report.

Fajar et al. Conducted research related to the measurement of ship load weight in 2011. The research was carried out by designing a measuring device and detecting a ship's cargo weight balance using Loadcell to determine the size of each load.

Research related to the reading of water level rise was carried out by Andika and Rozeff in 2015, the research was carried out by designing a tide monitoring system and displaying it in a visual form via a cell phone. The research tool was made by using an ultrasonic sensor to measure the water level which was then processed by a Ruspberry pi single board computer and sent via SMS using a GSM Serial wvecom 1306b modem.

In completing the report "Prototype Telemetering Ship Load via smartphone based on NodeMCU ESP8266", these references will be used as a basis or reference in making the system, as well as the basic theory underlying the settlement which includes: NodeMCU ESP8266, HCSR 04 ultrasonic sensor

2.1 NodeMCU ESP8266

NodeMCU is an IoT platform that is open source. Consists of hardware in the form of System On Chip ESP8266 from ESP8266 made by Espressive System, as well as the firmware used, which uses the Lua scripting programming language. The term NodeMCU by default actually refers to the firmware used rather than the hardware development kit. NodeMCU can be analogous to the ESP8266 arduino board.

Figure 1. NodeMCU

2.2 Ultrasonic Sensor HC-SR04

Ultrasonic sensor is a sensor that functions to convert physical quantities (sounds) into electrical quantities and vice versa. How this sensor works is based on the principle of reflection of a sound wave so that it can be used to interpret the existence (distance) of an object with a certain frequency. Referred to as ultrasonic sensors because these sensors use ultrasonic waves (ultrasonic sounds).

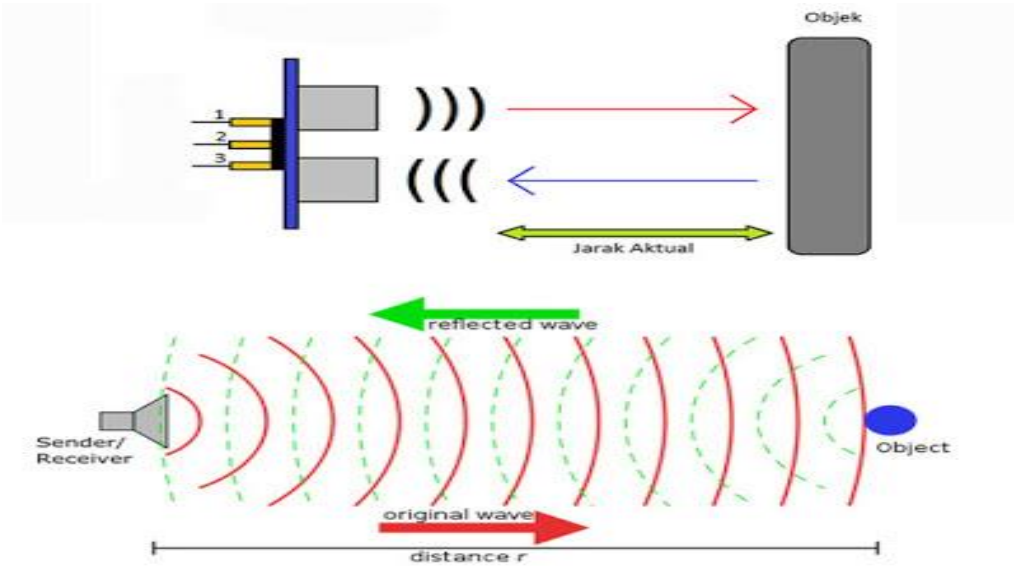

Figure 2. How the ultrasonic sensor works

III. IMPLEMENTATION OF ACTIVITIES

3.1 System Design

Prototype Telemetering Ship loads via smartphone based on NodeMCU ESP8266. Devices needed are HC-SR04 Ultrasonic Sensor, Node Mcu Esp 8266 and Mobile. The Working Principles are:

1. The HC-SR04 Ultrasonic Sensor functions as a water level detector by using the ultrasonic working principle.
2. NodeMCU functions as a processor of input data from sensors that will be sent via the internet with intermediaries Blynk application.
3. Wifi Modem router functions as an intermediary for data communication from NodeMCU to Mobile
4. Smartphone functions as the output level reading display from the Blynk application.

Table 1. Required device

HC-SR04 Ultrasonic Sensor	4 pcs
Node Mcu Esp 8266	1 pcs
Cable jumper	12 pcs
Smartphone	1 pcs
Water container	1 pcs
Ship Miniature (plastic)	1 pcs

Iron	1 Kg and 0,5 kg

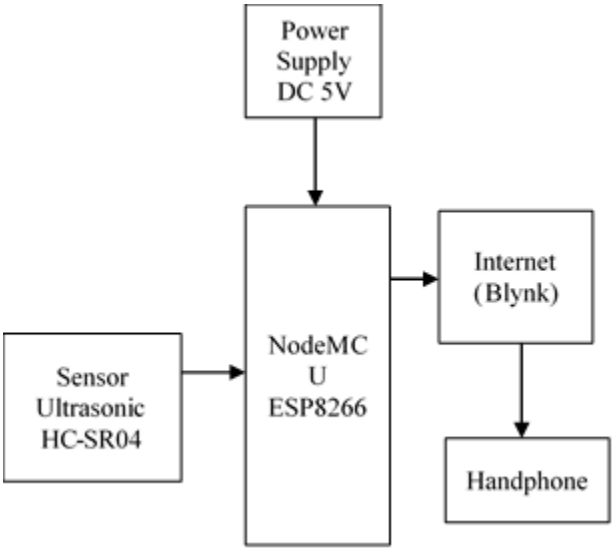

Figure 3. Block Diagram

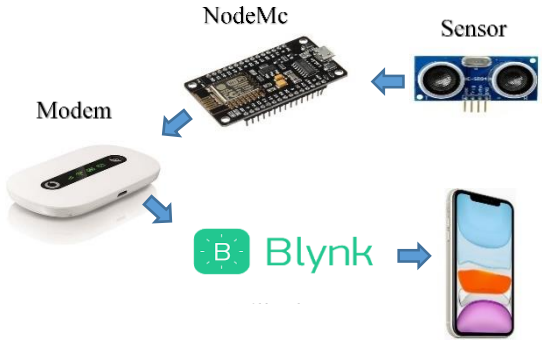

Figure 4. System

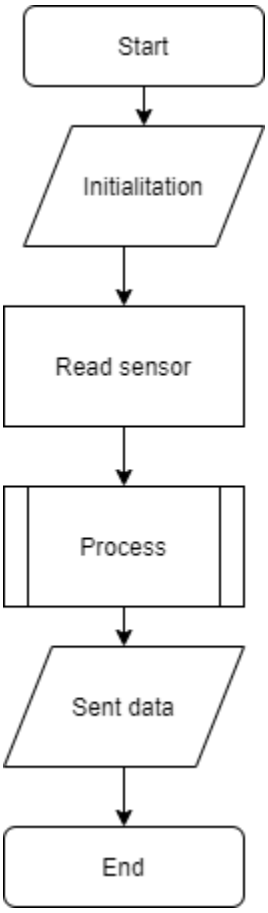

Figure 5. Flowchart

3.2 Wiring Diagram

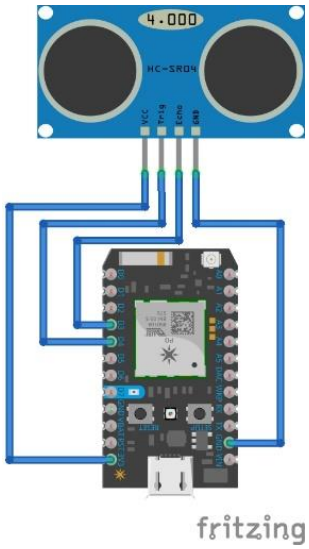

Figure 6. Wiring Diagram

Spesification

- Supply 5 Vdc
- Minimum distance sensor is 0 cm

- Maximum distance sensor is 10 cm
- Max load 2 Kg

IV ANALYSIS

4.1 Experiment Tool

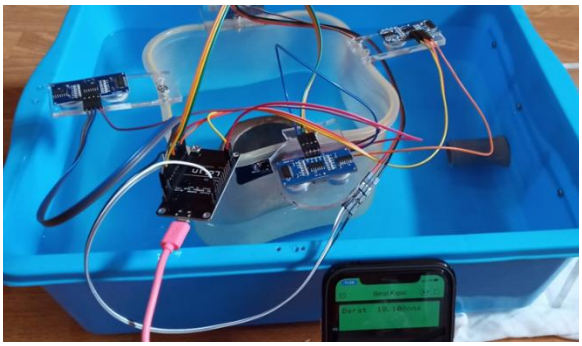

Figure 7. Implementation

4.2 Analysis

Measurements are made with the initial water level without load and with load.

Table 2. Load with level

Load (Ons)	Level (cm)
1	0,5
2	1
3	1,5
4	2
5	2,5
6	3
7	3,5
8	4
9	4,5
10	5

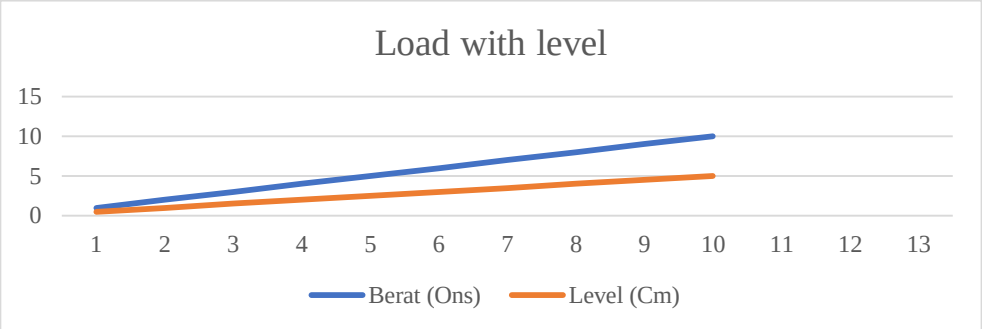

Figure 1. Load with level

From the measurement results, it can be concluded that if the object weighs 1 kg, the water level will increase to 5 cm, this indicates that for every 1 kg increase in object load, the water level increases to 0.5 cm.

So it can be seen on the graph that the increase in load (weight) is directly proportional to the increase in the level (height) of water.

V. CONCLUSION

Conclusion

1. From the measurement results it can be concluded that if the object weighs 1 kg, the water level will increase to 5 cm, this shows that every increase in the object's load by 1 kg, the water level increases to 0.5 cm.
So it can be seen on the graph that the increase in load (weight) is directly proportional to the increase in the level (height) of water.
2. This tool can be applied to the dock at the port to know the cargo load digitally.

Suggestions

1. It is necessary to conduct further research directly to the Port wharf
2. Calibration of tools on each ship to be tested is very necessary

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