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Simulation Of An Automatic Fish Netting Tool With Continuous Servo Motor Drive, Hc-Sr04 Distance Sensor And Button, Using Arduino Mega

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Abstrack: *The current fish harvesting system is still not optimal and requires a lot of human power . In every fish farming place, we can see that the fish netting system still uses manual nets, lots of people, and takes a long time. This affects the turnover / income and profit from the fish empowerment business. Therefore, to increase time efficiency, human energy, turnover and profit, this tool is a solution for every fish empowerment location. Because this tool is designed with an automatic system with a continuous servo motor, HC-SR04 distance sensor, push button, with an Arduino Mega base. button as the input command, the empowerer only needs to input the button (push button) to start harvesting cultivated fish, so that this work becomes more efficient in time, human energy, and influences the increase in turnover and business profits.*

Keywords : *Servo motor, button, distance sensor HC-SR04*

1. INTRODUCTION

Along with the increasing demand for food supplies, more and more people are cultivating fish, both individuals and companies. However, what individuals do, there is a productivity gap with companies that operate in this field. This can happen because of differences in technology and human power. Individual entrepreneurs, experience problems with high technology costs, workers' wages, fish feed costs. Due to these factors, many individual fish farming businesses have had their productivity hampered, and even made losses. This is in sharp contrast to companies that use advanced technology for processing, expert personnel, and production speed.

An example is Mr. Harimawan at the Marina, Semarang. At his place, all work is done manually, without any modern technology used to manage the pool. One of them is when harvesting fish, when harvesting fish, employees of Mr. Harimawan still has to prepare the net, then enter the pond, pull to collect the fish, pull the fish from the pond, lift the fish into the container used to hold them, which of course requires a lot of energy and time, not to mention the results that can be brought in once entered, are not necessarily suitable. hope. Mr. Harimawan maintains this traditional method , because he still does not have sufficient understanding of the importance of technology.

The author conducted this research with the aim of helping small-scale fish farming entrepreneurs, namely using adequate technology. The solution that the author will create is an Automatic Fish Netting Tool with Continuous Servo Motor Drive, HC-SR04 Distance Sensor, and button activation using Arduino Mega. With the supporting

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modules for this tool, namely Arduino Mega 2560, continuous servo, metal servo, HC-SR04 distance sensor, and buttons.

2. THEORETICAL BASIS

2.1 Simulation

According to Udin Syaefudin Sa'ud (2005), simulation is a replica or visualization of the behavior of a system, for example an educational plan, which runs over a certain period of time. Simulation can also be referred to as a model that contains a set of variables that display the main characteristics of an actual living system. Simulation allows decisions that determine how key characteristics can be modified in real terms.

2.2 Automatic

According to Sedarmayanti (2001), automation is a way of carrying out procedures and work procedures automatically, with the most thorough and efficient use of machines or machines, so that existing materials and resources can be utilized.

2.3 Fishing Net Tool

According to Rachmat (2016), the definition of a fishing net or fishing net is a tool used to catch fish. Strong fishing nets are usually formed by stitching relatively thin threads together. Modern nets are usually made from artificial polyamides such as nylon, although organic polyamide nets such as silk, wool or silk thread were commonly used until recently.

2.4 Arduino Mega 2560

Arduino Mega 2560 is a microcontroller board based on the ATmega2560. Which has 54 digital input / output pins, of which 14 pins can be used as PWM outputs, 16 analog inputs, 4 UARTs (hardware serial ports), 16 MHz crystal oscillator, USB connection, power jack, ICSP header, and reset button. This board also uses power connected to the computer with a USB cable or external power with an AC-DC adapter or battery.

Figure 2. 4 .1 Arduino Mega 2560

2.5 Servo Motor

According to M. Syawil (2013), a servo motor is an electric motor with a closed feedback system where the position of the motor will be informed back to the control circuit in the servo motor. This motor consists of a DC motor, a series of gears, a potentiometer and a circuit. controls. The potentiometer functions to determine the angle limit of servo rotation. Meanwhile, the angle of the servo motor axis is set based on the width of the pulse sent via the signal leg of the motor cable. Because a DC servo motor is a tool for converting electrical energy into mechanical energy, the DC servo motor's permanent magnet converts electrical energy into mechanical energy through the interaction of two magnetic fields . One field is generated by the harvesting magnet and the other is generated by the current flowing in the motor coil. The resultant of the two magnetic fields produces torque which causes the motor to rotate. When the motor rotates, the current in the motor coil produces a constant torque.

Figure 2.5.1 Servo motor

2.6 Push Button

According to Abu Akhdan (2014) , the push button is a very useful control component, we can find this tool on the electrical panel or outside the electrical panel. The function of the push button is to control the on or off condition of the electrical circuit. This push button has a momentary working principle, namely when the button is pressed for a moment, it will return to its original position.

Figure 2.6.1 Push Button

2.7 LCD 1602

According to Heri Andrianto and Aan Darmawan, a 16 x 2 LCD is a display made from liquid crystal material whose operation uses a dot matrix system. A 16 x 2 LCD can display as many as 32 characters consisting of 2 lines and each line can display 16 characters.

Figure 2. 7 .1 LCD 16 x 2

2.8 Ultrasonic HC-SR04

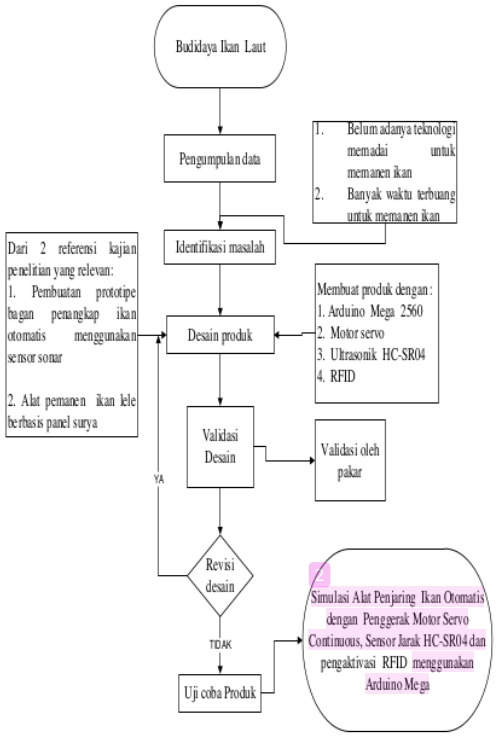
This sensor is a ready-to-use sensor, a tool that functions as a sender, receiver and controller of ultrasonic waves. This tool is used to measure objects with a radius of 2cm – 400cm, with an accuracy level of 3mm. This tool has 4 pins, namely VCC, GND, Trigger, and Echo. The vcc pin functions as a 5v power supply and gnd as ground. The trigger pin functions to emit a signal from the sensor, and the echo pin is to capture reflections from the trigger.

Figure 2.8.1 Ultrasonics

2.9 Crane (Pulley)

According to Fusian Hendra (2016) a crane is heavy equipment used to transport objects for work. Cranes work by lifting the material to be moved, moving it horizontally, then lowering the material to the desired location. This tool has a large shape and lifting power and can rotate up to 360 degrees and has a wide range.

2.10 Framework of Thought



3. RESEARCH METHODS

In this research the author used the *Research and Development development procedure*, namely the research method used to produce certain products and test the effectiveness of these products. (Prof. Dr. Sugiyono, 2008)

Some of the stages are as follows:

a. Initial stages

The main problem that is sought for a solution is the absence of a system that can harvest fish efficiently, with maximum results at the Marina Semarang fish farming site, in order to reduce costs and time.

b. Data collection

In collecting data here the author carried out literature studies and observations in order to obtain information.

c. Product design

The product design for the fish harvesting simulation program here uses the Arduino Mega 2560. Referring to the old method of harvesting , the replacement with a new system is carried out as follows.

way :

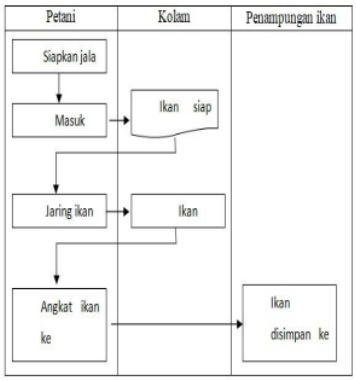


Figure 3.1 Old way FOD

With this old method , fish farmers have to prepare nets, then enter the pond, then net the fish in the pond, lift them to land and then store them. This activity cannot be done alone, but must be done by several people at once.way :

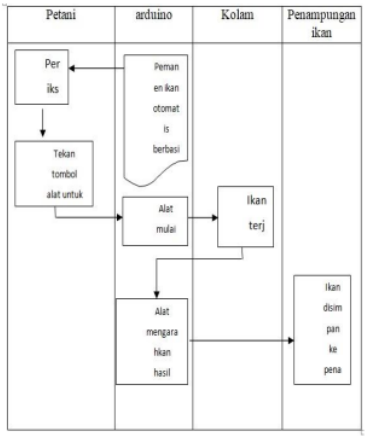


Figure 3.2 FOD new way

With the new method , only 1 person is needed to activate the tool, then the tool will work itself to net fish, farmers only need to move the fish from the net for storage.

d. Design validation

Design validation is one of the development processes carried out to determine the level of effectiveness of the new product. Validity testing assisted by experts with assessment using questionnaires.

e. Design revision

In this stage, an expert validates the resulting design. If it is not in accordance with the initial objectives, the researcher will make improvements or revise it as requested by the expert.

f. Test the final product

Data from the test results of the fish harvesting simulation program were then analyzed to find out whether the model was suitable for use or not. If the evaluation model and instruments do not meet the model fit requirements, then they are revised and tested again. These trials and revisions are carried out repeatedly until a final prototype is obtained that meets the requirements.

3.1 Set of tools

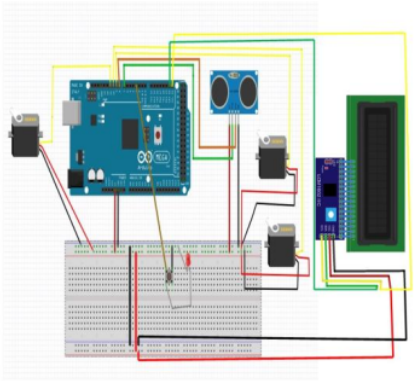


Figure 3.1.1 Equipment circuit

4. DISCUSSION

4.1 Component Prices

Nama barang	Harga
Arduino Mega 2560	Rp 220.000
Push Button	Rp 2.000
Led	Rp 1.000
Metal servo MG996	Rp 160.000
Continuous Servo	Rp 145.000
Mini Servo	Rp 40.000
Ultrasonic HC-SR04	Rp 30.000
Rangka katrol	Rp 220.000
1 set jala	Rp 50.000
TOTAL	**Rp 868.000**

Figure 4.1.1 Component prices

4.2 Push Button and Led Testing

When the yellow push button is pressed for a few seconds, the LED will light up as shown in figure 4.2.1 , while in figure 4.2.2 the LCD shows "Start Tool" indicating that the system will immediately start the fish harvesting process.

Figure 4.2.1 Led is on

Figure 4.2.2 LCD status

4.3 Metal Servo Testing

Shortly after the LED on the push button lights up , the metal servo will move the position of the pulley towards the pool.

Figure 4.3.1 Metal servo

Figure 4.3.2 Net to the pond

4.4 Testing of HC-SR04 continuous servo and ultrasonic sensor

The net will go down as soon as the metal servo moves towards the pool, picture 4. 4.1 shows when the net goes down into the pool, picture 4. 4.2 shows when the net goes up.

Figure 4.4.1 Mesh down

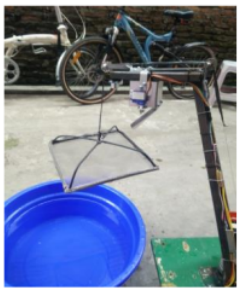


Figure 4.4.2 Rising mesh

Figure 4. 4.3 shows the location of the ultrasonic sensor, whose function is to stop the speed of the net during the process of removing fish from the pond.

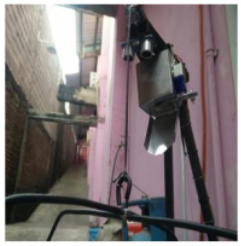


Figure 4.4.3 location of the ultrasonic sensor

4.5 Testing the opening of a fish feeder

The fish feeder is opened and closed by a mini servo, this process occurs when the net is lowered into the pond, figure 4. 5.1 shows when the feed valve is open, figure 4. 5.2 shows when the feed valve is closed.

Figure 4.5.1 open feed bin

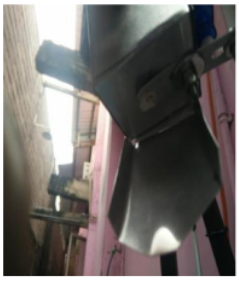


Figure 4.5.2 closed feed bin

4.6 Tool reset testing

When the black push button is pressed (figure 4. 6.1), the pulley will reset back to its original position, the LCD shows the indicator "Tool is off" (figure 4. 6.2).

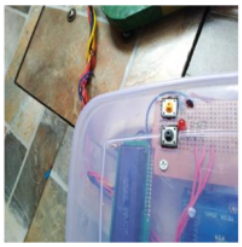


Figure 4.6.1 black reset button

Figure 4.6.2 LCD shows the condition of the tool

5. CONCLUSIONS AND SUGGESTIONS

5.1 Conclusion

The conclusion of the research that has been done according to the author is:

1. The automatic fish netting device was successfully made, and is able to work according to the sequence of the system that has been planned.
2. The tool designed by the author is very easy to use, just by pressing a button the tool will work.
3. Ultrasonic sensors often fail to read the height, so the tool can experience errors

5.2 Advice

From the conclusion about the fish netting device, the author gives suggestions namely:

1. The author does not provide a security system in the design , so it cannot minimize problems that might occur. A security system can be added in the form of an automatic stop or alarm if the device malfunctions.
2. The tool design by the author cannot accommodate many fish at once due to the lack of strength in the frame, servo motor, and the small size of the net. Several more frames can be added to increase the strength of the pulley, replace the servo with greater power, and a larger net.
3. There is no ability to measure fish harvest, so it would be better if a measuring tool could be added, either in the form of weight or quantity.
4. The tool is not equipped with a sensor to stop the net when the net goes down, so the net continues to run down until the specified time runs out. Sensors can be added to stop the speed of the net

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GENERAL COMMENTS

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10

PAGE 11

PAGE 12

PAGE 13