SMART CANARY BASED ON IOT WITH RFID AND TELEGRAM

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Abstract

Today many people are fond of raising birds, ranging from small cages to large-scale cages. One of the people who likes to raise canaries is Mr. Fajar Bangun Ari Pratama in Sukabumi village. Mr. Fajar is one of the canary breeders who has participated in various competitions. Where these canaries will be given food and drink every seven in the morning, because of the various competitions that have been won and the high prices that make the owner of this canary afraid of the bird being stolen. An idea emerged to make this research entitled Smart Canary Bird Cage Based Internet Of Things With Rfid And Telegram.

This research has also been able to produce a tool or system that monitors feed and automatically fills and conditions the cage at any time using a smartphone. The workings of the ultrasonic system that is above the drinking place will detect the drinking distance if you have finished drinking it will fill it automatically. The same way for the loadcell will be under the feed and under the cage to detect the weight of the feed and the weight of the manure if the feed runs out then the feed will fill automatically, for the DHT11 temperature the sensor will detect the temperature if the temperature is below the standard temperature then the light will turn on if the temperature is above then the fan will turn on. All conditions in the cage will automatically be entered into the database so that they can be displayed via a smartphone. It is hoped that with this tool, the owner of the cage will be given convenience so that they are not required to enter the cage to find out the condition of the cage, feed and birds. Based on the several reasons above and developing previous research, the author suggests creating a system or tool entitled “Internet Of Things-Based Smart Canary Cages With Rfid And Telegram". This research was conducted with the aim of preventing people who raise birds from getting sick easily and providing comfort for bird owners when they are not around the cage. This tool or system is able to provide notifications to telegrams when the bird's cage is about to be stolen, provide food and drink for the birds. automatically according to the needs of the birds and carried out regularly.

Keywords: Bird cages, Internet of things, RFID, Telegram.

1. Pendahuluan

The increasing development of technology compared to the technology of ancient times. One of them is technology in the field of electronics which is very rapidly developing over time. With the innovation of the latest technological inventions, it has a very good impact on all fields. As in the cultivation of canaries that still lack maintenance and care that is carried out automatically [1]. The country of Indonesia has many farms, one of which is the Canary Canary bird farm is a type of poultry originating from the Makaronesia Islands located in the Atlantic Ocean or in northwestern Africa. Canaries are loved by humans for their melodious voice and beautiful colorful feathers ranging from yellow, white, green and red. [2]

Nowadays, many people like to raise birds from small farms to large-scale farms. One of the people who likes to raise canaries is the father of Fajar Bangun Ari Pratama in campang Sukabumi. Mr. dawn is one of the canary selectors who has participated in various competitions. Where this canary will be fed and drank every seven o'clock in the morning, because of the various competitions that have been won and the high price that makes the owner of this canary afraid of the bird being stolen.

Seeing the above conditions, an idea emerged to make this study entitled Smart Canary Aviary Based on the Internet Of Things With Rfid And Telegram. Previously this bird cage research had been carried out by [3] This study, specifically carried out system development on the application layer and service layer in the internet of thing-based system by using the Node-Red platform and creating a local database to collect data from the platform. [4] The data will be analyzed using one of the data mining methods in the form of the naïve bayes method. [5] LDR and DHT11 sensors are used to carry out the acquisition of temperature, humidity and light intensity data. [6] If the temperature of the coop exceeds or is equal to 34 degrees Celsius, the light in the cage will turn off and if the data is less than equal to 33 degrees celsius , then the system will turning on the light in the cage. In addition, several other components are also used such as Arduino Mega 2560, NodeMcu ESP8266, and computer network media and cloud applications in the form of a Node-Red platform. [7] A proto-type iot-based quail cage monitoring system can be implemented on the Node-Red platform using the Naïve Bayes method. Against the data obtained, accuracy testing was carried out and an accuracy value of 80 percent was obtained.

Research on bird cage security has also been carried out by [8]. In this study, it has also been able to produce tools or systems, namely monitoring feed and filling automatically and cage conditions every time using a smartphone. [4] The way the ultrasonic system works above the drinking place will detect the drinking distance if it is finished drinking will fill automatically. [9] The same way to loadcell would be under the feed and under the cage to detect the weight of the feed and the weight of the dirt if the feed runs out then the feed will fill automatically, for the DHT11 temperature the sensor will detect the temperature if the temperature is below the standard temperature then the light will turn on the opposite if the temperature is above then the fan will turn on. [10][11][12] All conditions in the cage will automatically enter the database so that they can be displayed via a smartphone. It is hoped that with this tool, farm owners will be given the convenience of not being required to enter the cage to find out the condition of the cage, feed and birds.

Research on bird cage safety has also been carried out by [13]. in this study discussing the design of a prototype automatic device for feeding and bathing birds by utilizing a servo motor as a feed cover control and an aquarium water pump is used as a water booster from the reservoir to bathe birds and give birds a drink. This study used Arduino as a Microcontroller and ultrasonic sensors as the main sensor.

Based on previous observations and studies The amount of feed given to birds should be sufficient, but not excessive. In this study to determine drinking supplies in aviaries, the author used a journal reference [14]. in this journal using ultrasonic sensors to detect food and water level sensors for drinking. The author uses this journal reference because previous studies have not explained the height of drinking supplies in aviaries using water level sensors.

2. Method

A. Component circuit schematic

The schematic series of tools is designed using *Fritzing software* in the form of an overall picture to be further implemented in real form. Below figure 3.6 is an example of a schematic sequence of all the tools to be used. As for the series, it is found in the following figure.

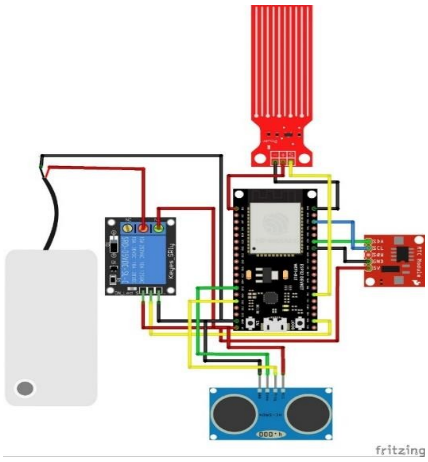

Figure 1. Eating and Drinking Schematic Series

Figure 2. is a schematic sequence of tools for eating and drinking used by the authors during the study. The schematic above has been connected to the pins of each of them and can work according to the tools or systems created by the author. Which is shown in [Fig. 2].

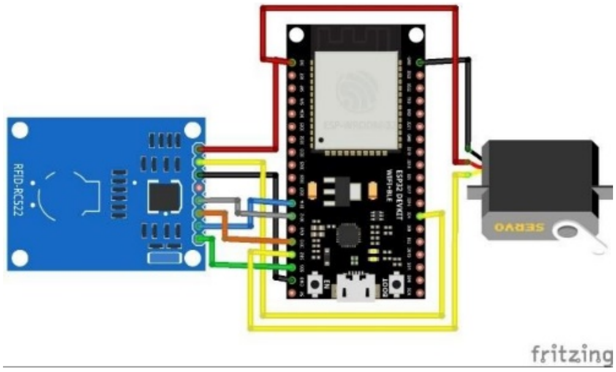

Figure 2. RFID Schematic Series

B. Tool Design

The design of the tool is made to get a 3D picture of the tool to be designed with the aim of being a guide in making the tool. The design of this tool is made with SketchUp *software* in the form of 3D modeling with such a design to get a real picture. Below is an example of a design tool that the author will use in research Which is shown in [Fig. 3].

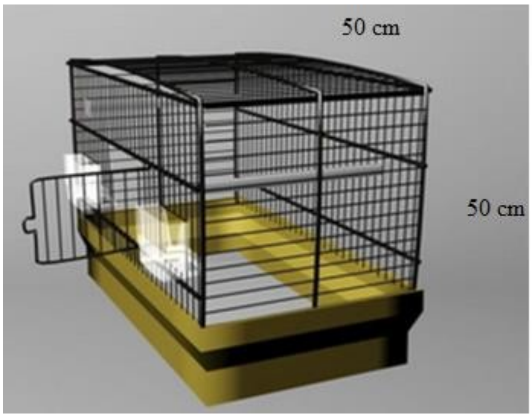

Figure 3. Design Tools

C. Sensor implementation

After collecting materials and tools, the next stage is to implement the design of the tools that have been made. At this stage, the results of the design that has been made will be implemented into a real system . Implementation is carried out in two stages, namely implementation on software and implementation on hardware.

In this study, the implementation of software that will be implemented, namely the use of software, is one of the stages where the programs that have been created will be saved into NodeMCU through software in the research that is being carried out by the author using software arduino IDE using the c language. After the program is finished, click compile to find out which program was created right or wrong. If the program is correct then click upload to save the program into NodeMCU.

D. Sensor Implementation

After collecting materials and tools, the next stage is to implement the design of the tools that have been made. At this stage, the results of the design that has been made will be implemented into a real system . Implementation is carried out in two stages, namely implementation on software and implementation on hardware.

Hardware implementation is the final stage in the design of the system to be implemented, where at this stage all components will be installed in accordance with the system that has been made.

Main Component that used in this research are:

A. Sensor Ultrasonic

An ultrasonic sensor is a very common wave to detect the presence of an object or objects capable of detecting at a distance from the object . This sensor is able to convert physical quantities or sounds into electrical magnitudes. Below is an example of an *ultrasonic sensor* that will be used in this study. The notion of an ultrasonic sensor is a sensor that functions to change physical quantities (sound) into electrical quantities and vice versa. [15] Which is shown in [Fig. 4].

Figure 4. Sensor Ultrasonic

The HC-SR04 has two main components as its preparation, namely transmilitary and *receiver*. The function of transmilitary ultrasonics is to emit ultrasonic waves with a frequency of 40 KHz then the ultrasonic *receiver* traps. [16]
the result of the reflection of ultrasonic waves.

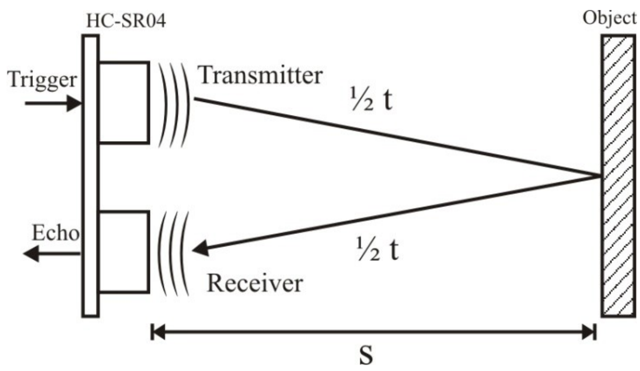

Figure 5. Working Principle Of The HC-SR04 Ultrasonic Sensor

the picture above explains the principle of distance measurement using the HC-SR04 ultrasonic sensor , namely when a trigger pulse is given to the sensor, the transmitter will start emitting ultrasonic waves, and at the same time the sensor will produce a TTL output The transaction up indicates that the sensor starts calculating the measurement time, after the receiver receives the reflection generated by an object, the time measurement will be stopped by producing the output TTL transition down, if the measurement time is t and the speed of sound is 340 m/s, then the distance between the sensor and the object can be calculated using the equation (Research, 2009)

$$s = t \times \frac{320\ m/s}{2}$$

Where :

s = distance between the sensor and the object (m)

t = travel time of ultrasonic waves from transmitter to receiver (s).

B. Cable Jumper

One of the components that are quite important in making this circuit is the Arduino jumper cable. Jumper cable has the meaning of an electrical cable that has connector pins at each end and makes it possible to connect two components involving *Arduino* without the need for *soldering* . [17] The connectors at the end of the cable consist of two types, namely *male* connectors and female connectors. Below is an example of a jumper cable used. Which is shown in [Fig. 5].

Figure 5. Cable Jumper

C. Esp32u Microcontroller

Understanding the water level itself is a set of tools used to measure the water level in various places to obtain reference data. The simplest level is a pair of tubes connected at the bottom. A simple water level measures the water level through the water level of both pipes, whether they are the same or not. The result of water level measurement is lower than with laser, but the accuracy of water level measurement is high with remote measurement. In order to avoid measurement errors when using the level, the water temperature must be the same. [18] Which is shown in [Fig. 6].

Figure 6. Water Level

C. Water Pump Mini

Water pump is a type of pump that uses a DC motor and unidirectional voltage as the voltage source.the motor will rotate one way if the voltage applied at the two terminals is different and if the voltage pattern is Mini Submersible Water Pump is a small dip water pump motor. This mini water pump is commonly used for aquariums, fish ponds, hydroponics, robotics or projects in the manufacture of applications based on microcontrollers Mini Submersible Water pump using a Brushless DC motor and working with a DC voltage of 12V 240L / H, the advantage of this mini water pump is that it is not noisy in its use and safe when working in water. Which is shown in [Fig. 7].

Figure 7. Water Level

E. Servo Motors

Servo motor is a 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 motor, a series of gears, a potentiometer and a control circuit. The potentiometer functions to determine the angle limit of the servo rotation. Meanwhile, the angle of the servo motor axis is set based on the width of the pulse sent through the signal leg of the motor cable. Servo motors are basically often used as actuators that require precise motor rotation positions. [19] DC motors can only control the speed and direction of rotation, while on servo motors the addition of parameters can be controlled based on degrees/angles. The servo motor is able to work in two directions (CCW and CW) where the angle and direction of movement of the servo motor can be controlled by providing a PWM signal duty cycle setting on the control pin. The speed of the servo motor is regulated by the amount of frequency sent from the program via the data cable on the servo motor. Servo motors have two types namely:

1. Standard Servo Motor 180a
   Standard servo motors only move both ways (CW and CWW) with the total deflection of angles from right, center, left is 180o where the deflection of each angle reaches 90o. [20]
2. Motor Servo Continuous

This type of servo motor is capable of moving both ways (CW and CWW) without there is a deflection limit of the rotating angle or it can rotate continuously. shown in [Fig. 9].

Figure 8. Servo

3. Result and Discussion

A. Ultra Sonic sensor testing

Ultrasonic sensor testing is carried out by calibrating the sensor of the measuring instrument, namely the ruler by changing the duration of the sound reflection from the sensor to a distance by calculating the duration divided by the duration of the ultrasonic wave reflection from The transmitter to the receiver then then calculates the percentage value of failure from the comparison results shown in the table below. Which is shown in [Fig.9].

No	Ultrasonic Sensors	Information
1	3 cm	Full Food
2	5 cm	Full Food
3	8 cm	Full Food
4	10 cm	Consumables
5	13 cm	Consumables
6	15 cm	Consumables
7	17 cm	Consumables

Figure 9. Sensor Ultra Sonic Testing

From the test table above, it can be concluded that the closer the sensor distance is to the bird's food supply, the more it will be read or detected the amount of food and if the food with the ultrasonic sensor is farther away, the food will be detected exhausted. This test was carried out 7 consecutive experiments .

B. Water Level Testing

This test is carried out to find out whether the water level sensor can work properly or not. This test was carried out 7 times in a row so that the sensor could work according to the author's needs. Which is shown in [Fig.10].

No	Sensor distance	Information
1	0	Active
2	1- 500	Inactive

Figure 10. Water Level Sensor Test Result

From the test table above, it can be concluded that the closer the sensor distance is to the bird's drinking water supply, the more food will be read or detected and if the water with the drinking sensor is farther away, the drinking water will be detected.

C. RFID sensor testing

This RFID Sensor Testing aims to find out whether the door is successfully secured or not.. The one shown in [Fig. 10].

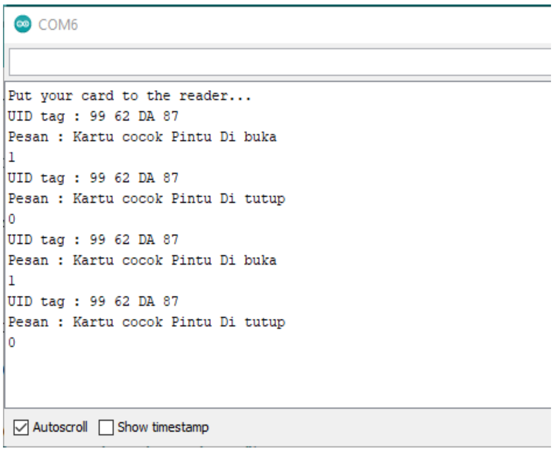

Figure 10. Serial Display of RFID Monitor

In figure 10 above is the serial display of the rfid monitor in the aviary where in the picture above it can be seen that if the chip is suitable, the door will open and close according to the existing system. shown in [Fig. 11].

Figure 11. Application Of RFID

Figure 11 is an image of the application of the rfid sensor to the door of the canary cage room, where the rfid sensor is affixed to the door of the aviary room. shown in [Fig. 12].

No	Percobaan	Sensor RFID	Information
1	Wed 1	ON	The door was successfully opened
2	Wed 2	ON	The door was successfully opened
3	Wed 3	ON	The door was successfully closed
4	Wed 4	OFF	Tidak ada responds

Figure 12 RFID Sensor Testing Results

Based on table 4.4 can be analyzed as follows :

a. During the first experiment, the Rfid sensor used a chip that was already systemized with the rfid sensor on the door of the aviary and the door was successfully opened.

b. During the second attempt, the door was successfully opened with an existing rfid chip.

c. When the third experiment was an experiment or test to close the door and the rfid chip successfully closed the door of the bird shed .

d. The fourth attempt of the door was not successfully opened or there was no response because in the fourth experiment the author used a different chip so that the system did not respond to anything and the door was not successfully opened.

4. Conclusion

The conclusion that the author can give to this study is after testing and analyzing the automatic feed and drinking supply monitoring tool in the canary cage. Ultrasonic sensors can work well, namely being able to detect the amount of food in feed containers and feed supply containers. Likewise, the water level sensor can work well, which is able to monitor the supply of drinking water and fill the drinking supply automatically.

Daftar Pustaka

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