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Automatic System of Sound and Light Intensity for Swiftlet House

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Abstract—In cultivating swiftlet nests, some swiftlet breeders still find it difficult to summon sounds and control the intensity of light in swiftlet houses. As for the bird calling technique by playing the audio of the swiftlet without having to be heard at any time and there is also a certain hour, an automatic time system is made so that the on/off audio swiftlet process can be properly organized and also the intensity of light entering the swiftlet house is too bright, so breeders close the ventilation holes with insulation or wood, so the system will be made to control light intensity by using automatic opening or closing of curtains/windows, where when the swiftlet house is bright, the curtain closes, while when the light of the swiftlet house is dark, the curtain opens. RTC DS3231 and LDR sensor which functions as a detector of sound time and light intensity, the NodeMCU ESP8266 microcontroller which functions as a data processor so that results can be displayed on the LCD. This research was conducted in stopover Village, stopover District, West Kutai Regency. Data collection methods used are literature study, interviews, and observation. While the system development method used is Prototype. As well as supporting software used by the Arduino Integrated Development Environment. While the system development method used is Prototype. As well as supporting software used by the Arduino Integrated Development Environment. While the system development method used is Prototype. As well as supporting software used by the Arduino Integrated Development Environment.

Keywords—Auto, Sound, Light Intensity, NodeMCU ESP8266, Sensor, RTC DS3231, Light Dependent Resistor

I. INTRODUCTION

Technological developments are increasing rapidly, with the emergence of sophisticated and modern equipment, both manual and automatic, which is increasing followed by the development of knowledge in the field of technology that is capable of converting analog systems to digital systems. The use of automation system equipment can also be applied in the cultivation of swiftlet nests, especially in the automatic system of sound and light intensity in swiftlet houses.

Swiftlets are poultry that are cultivated with nests as the main production. Swiftlets have characteristics that are not shared by other birds, the most distinctive feature of this type of bird is its ability to produce nests that have high selling value because they can be beneficial for the world of health.

The use of recordings of swiftlet sounds is very effective in luring swiftlets to stay and nest. With this technique, usually within 3-6 months there are swiftlets that have settled and nested in the building. Generally, swiftlets need 1-2 months to adapt to their new environment. If the building doesn't have a recording of the swiftlet's voice, it will be detrimental to the owner of the swiftlet house because the swiftlet will disappear and move to another swiftlet house. So that the swiftlet population continues to grow even more by making improvements to the swiftlet sound so that the swiftlet continues to survive. The owners make sounds through a tape recorder which is played from morning to evening, so they have to make the swiftlet house owner come to the swiftlet's house just to turn the tape recorder on and off. In order for this calling media (bird sounds) to be played automatically, an automatic system is needed whose job is to set the play time and mute time, so that the owner of the swiftlet house does not need to check the tape recorder every time. As for the intensity of light in the swiftlet house, it can affect on swiftlet cultivation. The ideal light intensity for swiftlets ranges from 0.02-0 lux. In order for the swiftlet to be able to see and explore all the nesting rooms, there must be light. The dark room actually makes the swiftlet hesitate to enter the building and even be afraid, because there are predators of rats or owls which pose a physical danger to them. Therefore, the nesting space should not be dark because it will hinder the adaptation process of the swiftlet. then an automatic system is needed whose job is to set the playing time and the time to turn off the sound, so that the owner of the swiftlet house does not need to check the tape recorder every time. The intensity of light in the swiftlet house can affect swiftlet cultivation. The ideal light intensity for swiftlets ranges from 0.02-0 lux. In order for the swiftlet to be able to see and explore all the

nesting rooms, there must be light. The dark room actually makes the swiftlet hesitate to enter the building and even be afraid, because there are predators of rats or owls which pose a physical danger to them. Therefore, the nesting space should not be dark because it will hinder the adaptation process of the swiftlet. then an automatic system is needed whose job is to set the playing time and the time to turn off the sound, so that the owner of the swiftlet house does not need to check the tape recorder every time. The intensity of light in the swiftlet house can affect swiftlet cultivation. The ideal light intensity for swiftlets ranges from 0.02-0 lux. In order for the swiftlet to be able to see and explore all the nesting rooms, there must be light. The dark room actually makes the swiftlet hesitate to enter the building and even be afraid, because there are predators of rats or owls which pose a physical danger to them. Therefore, the nesting space should not be dark because it will hinder the adaptation process of the swiftlet. so that the owner of the swiftlet house does not need to check the tape recorder every time. The intensity of light in the swiftlet house can affect swiftlet cultivation. The ideal light intensity for swiftlets ranges from 0.02-0 lux. In order for the swiftlet to be able to see and explore all the nesting rooms, there must be light. The dark room actually makes the swiftlet hesitate to enter the building and even be afraid, because there are predators of rats or owls which pose a physical danger to them. Therefore, the nesting space should not be dark because it will hinder the adaptation process of the swiftlet. so that the owner of the swiftlet house does not need to check the tape recorder every time. The intensity of light in the swiftlet house can affect swiftlet cultivation. The ideal light intensity for swiftlets ranges from 0.02-0 lux. In order for the swiftlet to be able to see and explore all the nesting rooms, there must be light. The dark room actually makes the swiftlet hesitate to enter the building and even be afraid, because there are predators of rats or owls which pose a physical danger to them. Therefore, the nesting space should not be dark because it will hinder the adaptation process of the swiftlet. then there must be help light. The dark room actually makes the swiftlet hesitate to enter the building and even be afraid, because there are predators of rats or owls which pose a physical danger to them. Therefore, the nesting space should not be dark because it will hinder the adaptation process of the swiftlet. then there must be help light. The dark room actually makes the swiftlet hesitate to enter the building and even be afraid, because there are predators of rats or owls which pose a physical danger to them. Therefore, the nesting space should not be dark because it will hinder the adaptation process of the swiftlet.

One of the problems in the current shelter village is that the owner of the swiftlet's nest still routinely turns the sound on and off manually and for the intensity of the light entering the swiftlet house to be too bright, the breeder closes the ventilation holes with a partition or a wooden board (Andrianto, et al. 2016).

Given this problem, the researchers created an automatic system design tool for sound and light intensity in based on microcontroller for swiftlet house. failure percentage harvest (Ariyaniand Isma. 2018).

II. LITERATURE REVIEW

A. System

According to Susanto (2013) a system is a collection (group) of subsystems/parts/components, both physical and non-physical, that are interconnected with each other and work together harmoniously to achieve a certain goal.

According to Gaol (2013) the system is the relationship of one unit with other units that are interconnected with each other and which cannot be separated and lead to a single unit in order to achieve the goals that have been set. If a unit is jammed or disrupted, other units will also be disrupted to achieve the stated goals.

Based on the definition above it can be concluded that the system is a collection or series of components that are interconnected, work together, and interact with each other to achieve a predetermined goal (Yusrifar and Aryo, 2017).

B. Automation

According to Santoso (2013), Automation is a process to control the operation of a tool automatically which can replace the role of humans to observe and make decisions. Where the existing control system is starting to shift to control system automation, so that human intervention in controlling is very small. An equipment system that is controlled automatically is very convenient when compared to a manual system, because it is more efficient, safe and thorough.

According to Fauzan Ghifari (2013), according to him, automation is a field of science that requires its users to change manual machines into automatic ones, so that in the process automation can simplify existing life processes.

Based on the definition above, it can be concluded that the purpose of automation in human activities is to make it easier to get more practical results, so as to save time.

C. Sound

According to Sarwono (2002), sound is a wave in the form of vibrations from molecules of substances that collide with each other in a coordinated manner, causing waves and transmitting energy and some of it is reflected back. The media through which it passes has an elastic mass so that it can transmit the sound.

D. Light

According to Satwiko (2009) Sunlight is an electromagnetic wave which has a wavelength between 290 nm to 2,300 nm and has a complete spectrum from ultra-violet to infra-red. Because sunlight also carries the results of heat radiation, the light used as a source of natural lighting in the room is the light of the celestial sphere. Direct sunlight can be used to enter directly into

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the room if we want certain architectural effects on the room or building.

Light intensity is the intensity of light emitted by a light source in a certain direction. The process of the arrival of light to an object is called illumination, while the amount of light flowing in one area unit is called illuminant and is measured in units of Lux. The intensity of light emitted by an object can be measured with a light meter or lux meter.

F. Swiftlet

Swiftlet (Collocalia vestita) is a bird with tapered wings, long tail, black color with brown underside. Swiftlets cannot perch because they have very short legs so they rarely stand on the ground but can stick to walls or roofs. Able to fly in dark places with the help of echolocation, nest in groups with nests made of saliva (Sunardi and Zaenab. 2013).

Habitat or community collection of swiftlets is only found in Southeast Asia, swiftlets are mostly found in Indonesia, Malaysia, Thailand, Vietnam, the Philippines, Cambodia and Laos. Swifts are not found in European countries, America, or on the African continent. This is because swiftlet breeding must be in areas with tropical climates with high rainfall. Swiftlet's nest has important health benefits, including:

1) as a dry cough remedy
2) maintain skin beauty
3) treating lung complaints
4) treat damaged blood vessels
5) increase appetite
6) Mineral source for the immune system

Swiftlet's nest can be seen in Picture 1.

Picture 1. Swiftlet

G.Hardware

According to Vicky (2011), Hardware, also known as Hardware, are all the physical parts of a computer, and are distinguished by the data that are in it or that operate in it, and distinguished by software (software) which provides instructions for the hardware in completing its tasks. Computer hardware can also be interpreted as a tool designed to receive and process data. Each hardware contained in the computer has its own tasks so as to produce a complete computer system and work properly (Pradipta, 2012).

H.RTC (Real Time Clock)

RTC (Real Tine Clock) DS3231 is an IC that can be used as a timer which includes seconds, minutes, hours, day, date, month, and year. Data access is carried out with a serial system so that it only requires two lines to communicate, namely the clock line to carry data clock information and the data line to carry data or what is often called I2C (Inter-integrated Circuit). The RTC DS3231 uses the I2C serial communication type. The library function used is i2c.h. with this function we don't need to be bothered anymore with defining the I2C serial communication protocol, but just call some of the functions that have been provided by the Arduino IDE. The main function used to initialize I2C in the Arduino IDE is i2c_init (void). The arrangement of the DHT11 sensor pins can be seen in Picture 2.

Picture 2. DHT11 Sensor Pin Arrangement

I. NodeMCU ESP8266 microcontroller

A microcontroller is a controller that is used to control a process or aspects of the environment, an example of an application for a microcontroller is to monitor a house, when the power goes out, backup energy is turned on with a sound sensor. In its time, the controller was built from the logic components as a whole, making it big and heavy, after that a microprocessor was used so that the whole controller fit into a fairly small PCB, until now we still often see controllers controlled by ordinary microprocessors (Zilog Z80) , Intel 8088, Motorola 6809, etc.). The process of downsizing components continues, all the components needed to build a controller can be packaged in one chip, In everyday discussions and on internet forums, microcontrollers are often known as µC. Free translation of this understanding, it can be said that a microcontroller is a micro-sized computer on one IC chip (integrated circuit) which consists of a processor, memory, and programmable interface, so it is called a microcomputer because the IC or microcontroller chip consists of a CPU, memory, and I/O that we can control by programming them. I/O is also often referred to as GPIO (General Purpose Input Output Pins) which means pins that we can program as input or output as needed. The NodeMCU board can be seen in Picture 3.

Picture 3. NodeMCU boards

J. Light Dependent Resistor (LDR)

Light Dependent Resistor or commonly called LDR is a type of resistor whose value changes with the intensity of light received by the component. Usually used as a light detector or light conversion quantity meter. Light

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Dependent Resistor, consists of a semiconductor disc that has two electrodes on its surface, when it is dark or in dim light, the material from the disc produces a relatively small number of free electrons, so there are only a few electrons to carry electrical charges. This means that when the light is dim, the LDR becomes a bad conductor, or it could be a large resistance LDR when it is dark or the light is dim.

When the light is bright, there are more electrons released from the atoms of the semiconductor material. So there will be more electrons to carry the electric charge. This means that when the light is bright the LDR becomes a good conductor, or it can also be called the LDR has a small resistance when the light is bright and when it is eight the resistance value will increase as can be seen in Picture 4.

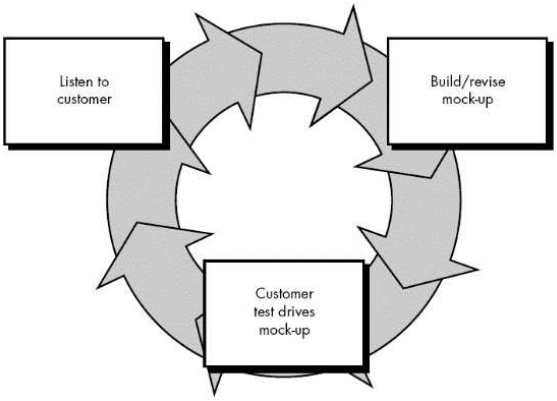
Picture4. Light Dependent Resistor (LDR)

K.Flow chart

According to Yatini (2010), a flowchart is a diagram that shows the flow of data through a program or information handling system and the operations imposed on the data at important points along the path. Flow chart use annotations and symbols, such as rectangles, rhombuses and ovals to represent operations. Lines and arrowheads connect these symbols to show the direction of data flow from one point to another. As a graphical diagram that shows a program or other system, a flowchart is useful as a supporting tool to show how the proposed program works and as a means to understand the operations of a program.

L. Model Prototype

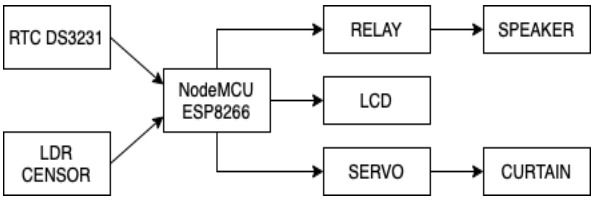
Pressman (2012) The Prototype Method is a new paradigm in software development methods, this method also revolutionizes old software development methods, namely the sequential system which is commonly known as the SDLC or waterfall development model can be seen in Picture 5.



Picture 5. Illustration of Prototype Model

M. Block Diagrams

The design of this block diagram is made to plan the hardware in accordance with the specifications and working methods of the system to be made so that it is expected to be efficient in time, cost and effort (Vicky. 2011) can be seen in Picture 6.



Picture 6. Block Diagrams

The following is an explanation of the block diagram design of the automatic sound and light intensity system at the swiftlet house, the RTC DS3231 module for time control of sound and the LDR sensor to change the value of the received light intensity resistor, then NodeMCU ESP8266 processes the data that has been obtained from the RTC DS3231 and the LDR sensor which then the output data results from the sensor are displayed via the LCD (Liquid Crystal Display), each tool has the following functions:

1. NodeMCU ESP8266 : As a controller of all components.
2. RTC DS3231 : as a digital timing module to control sound.
3. LDR sensor: to detect the available light intensity.
4. Relay : Switch for ON/OFF sound decible.
5. Servo : as a control system so that it can be set to determine and ensure the angular position of the motor output shaft.
6. LCD: as a display to display the results of sound time and received light intensity.
7. Curtains/Windows: as automatic open/close when connected to the servo.
8. Speaker: as sound / audio in the swiftlet house.

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III. RESEARCH METHODS

A. General description

This tool was built to make it easier for swiftlet house owners to control the sound and light intensity of the room in the swiftlet house so that it can improve the quality of swiftlet nests and reduce the percentage of crop failure.Ekojono, et al 2018).

By utilizing advances in technology, the process of controlling the sound and light intensity of the room in this swiftlet house, can be done with an automatic sound and light intensity tool based on NodeMCU in the swiftlet house. In this NodeMCU-based automatic sound and room light intensity tool, the sound output data and room light intensity in the swiftlet house can be displayed on an LCD Display (Soki, et al. 2019).

B. Needs Analysis

Needs analysis is an early stage analysis that begins in the process of developing a prototype tool using the prototype method. Requirements analysis is carried out to find out and collect all the requirements needed in the process of building a prototype tool. To build a prototype system for automatic sound and light intensity based on NodeMCU, several devices are needed so that the tool can run properly (Setiawan 2011). The most important and basic needs are programming and microcontrollers. In this analysis there are 2 analyses, namely:

1. Functional Analysis

   At this stage it is explained that the prototype of the automatic sound and light intensity system consists of an RTC DS3231 and an LDR sensor to set the automatic sound time when on/off and detect the availability of light in the swiftlet house, where NodeMCU acts as a data processor that has been obtained from the RTC and the LDR sensor then the output data from the sensor is displayed via the LCD (Liquid Crystal Display), this makes it easier for users to process the automatic system.
2. Non Functional Analysis

   At this stage of the analysis defines the required hardware and software, including:
   1. Hardware
      1) NodeMCU ESP8266
      2) RTC DS3231
      3) LDR (Light Dependent Resistor)
      4) Relays
      5) LCD (Liquid Crystal Display)\
      6) Speaker
      7) Jumper Cable
      8) Breadboards
   2. Software
      1) *Arduino Integrated Developmont Environment*

C. System Analysis

In the system analysis, there are several special conditions to complete this automatic sound and light intensity system, including:

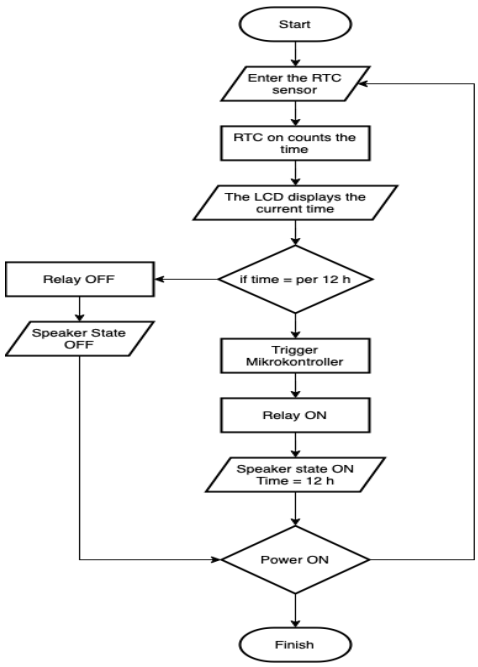
1. This tool produces results that are not fixed due to the limited capabilities of the RTC and LDR sensors.
2. This tool produces output in the form of sound decibel numbers and light intensity through the LCD.

D. Prototype Building Stage

After conducting a needs analysis, the next step is the system design stage. In this stage, the results of the needs analysis are poured into a design that will describe the system being created, so that users can get an overview of the system.

1. System Flowchart on Voice

   In this NodeMCU-based automatic sound and light intensity system, the first process is process initialize or declare RTC variables DS3231 and those that will carry out the process of calculating the time for the sound where there is a relay as an automatic switch that has been set at a certain hour when the sound is on/off every 12 hours. Then the resulting data will be sent and processed on the NodeMCU microcontroller, after the data is processed, the data will be displayed as output in the form of information. The sound system flowchart can be seen in Picture 7.



Picture 7. Sound System Flowchart

2. System Flowchart on Light Intensity

   In the NodeMCU-based automatic sound and light intensity system, the second process is for light intensity when the LDR detects light, if the received light is bright, the servo will move the curtain to close on the axis 90 degrees otherwise if the received light is dark, the curtain will open on the axis 90 degrees and conditioned by looping with power on, if yes then input the LDR sensor and if not then it's done immediately. Then the resulting data will be sent and processed on the NodeMCU microcontroller, after the data is

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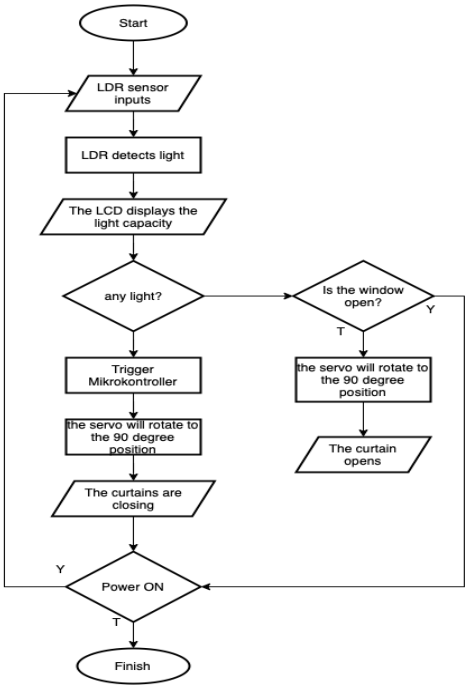
processed, the data will be displayed as output in the form of information. The light system flowchart can be seen in Picture 8.



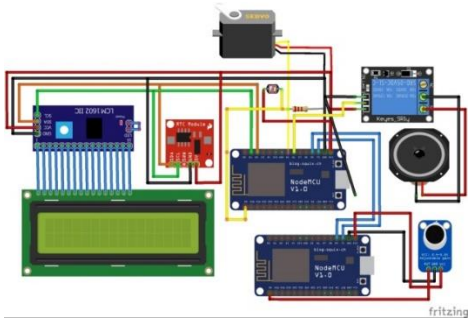
Picture 7. Light Intensity System Flowchart

E. Prototyping

After completing the design, the next step is to do prototyping, where at this stage I make a prototype tool based on the design that was made before and based on the needs of prospective users (Ronny. 2020).

1. Hardware (Hardware)

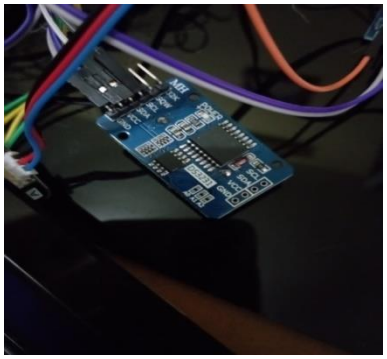
The hardware or hardware used in the automatic sound and light intensity system tool in the swiftlet house is the RTC DS3231 module and the LDR sensor which is a sensor controlling the sound and light timing, NodeMCU ESP8266 which is a microcontroller that will process the LD and RTC DS3231 sensor data so that it becomes data output or output, servo, blinds/windows, relay, LCD, speakers and jumper cables. The series of automatic sound and light intensity tools can be seen in Picture 9.



Picture 8. Series of Automatic Sound and Light Intensity Tools

1) RTC (Real Time Clock)

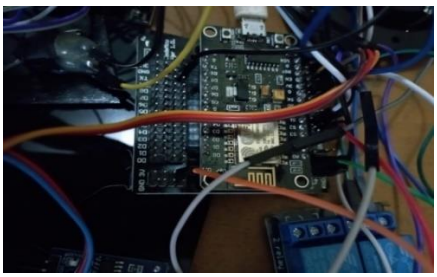
RTC (Real Time Clock) is an IC chip that has the function of accurately calculating time starting from seconds, minutes, hours, day, date, month, to year. To maintain or store the time data that has been turned ON, the module has its own power supply, namely a button clock battery, and the accuracy of the time data displayed uses an external crystal oscillator (Rosa, 2015). RTC DS3231 can be seen in Picture 10.



Picture 9. RTC DS3231

2) NodeMCU ESP8266 microcontroller

NodeMCU is an open source IoT platform. It consists of hardware in the form of the ESP8266 System On Chip from ESP8266 made by Espressif 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 development kit hardware. This development kit is based on the ESP8266 module, which integrates GPIO, PWM (Pulse Width Modulation), IIC, 1-Wire, and ADC (Analog to Digital Converter) all on 1 board. NodeMCU ESP8266 can be seen in Picture 11.



Picture 10. NodeMCU ESP8266

The specifications owned by NodeMCU are as follows:

1. This board is based on the ESP8266 serial wifi SoC (Single on Chip) with onboard USB to TTL, the wireless used is IEE 802.11b/g/n.
2. 2 tantalum capsitir 100 micro farads and 10 micro farads.
3. 3v LDO regulators.
4. Blue LED as indicator.
5. Cp2102 USB to UART bridge.
6. Reset button, USB port and flash button.
7. There are 9 GPIOs in which there are 3 PWM pins, 1 x ADC channel, and an RX TX pin.
8. 3 ground pins.

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9. S3 and S2 as GPIO pins
10. SI MOSI (Master Output Slave Input), namely the data line from the master and into the slave, sc cmd/sc.
11. SO MISO (Master Slave Input), namely the data path out of the slave and into the master.
12. SK which is SCLK from master to slave which functions as a clock.
13. Pin Vin as a charge voltage.
14. Built in 32-bit MCU.

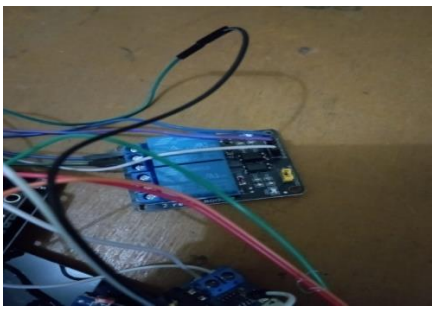
3) LCD (Liquid Crystal Display)

The output section uses a 16x2 line character type LCD, and can display 16 characters per line and only has 2 lines. The LCD (Liquid Crystal Display) is equipped with an internal controller so that the LCD scanning process is carried out by the internal controller (Ihsan. 2017). LCD 9 Liquid Crystal Display) 16x2 can be seen in Picture 12.

Picture 11. LCD 9Liquid Crystal Display) 16x2

4) Relays

Relay is an electrically operated switch. Many relays use electromagnets to mechanically operate the switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit with separate low-power signals, or where several circuits must be controlled by a single signal. The first relay used in the long-distance telegraph circuit as an amplifier can be seen in Picture 13.



Picture 12. Relays

5) Light Dependent Resistor (LDR)

LDR is a type of resistor whose value changes with the intensity of light received by the component. Commonly used as a light detector or light conversion quantity meter can be seen in Picture 14.

Picture 13. LDR

6) Servo Motors

Servo motor is a device or rotary motor that is designed with a closed loop feedback control system, so that it can be adjusted to determine and ensure the angular position of the motor output shaft (Stoneman, R. (2017). Servo motors can be seen in Picture 15.

Picture 15. Servo Motors

7) Tool Use

When the tool that has been designed is turned on, the first thing that is done is the RTC DS3231 detects the time to determine the on time and mute the sound on the swiftlet house and the LDR sensor detects to control the light intensity on the swiftlet house, after that the RTC DS3231 data and the LDR sensor are processed by NodeMCU, then NodeMCU sends RTC and LDR data to the LCD, the user can see the sound value and light intensity on LCD. The tool when turned on can be seen in Picture 16.

Picture 14. Tool When Turned On

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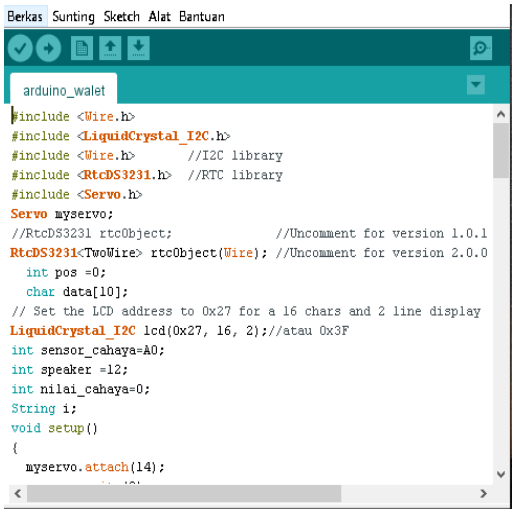
2. Software

The software used in making the program uses the Arduino Integrated Development Environment application for writing programs on the microcontroller (Hendra S, et al; 2015).

1) Programming on the NodeMCU ESP8266 Microcontroller

In this discussion, we will discuss creating programs using the Arduino Integrated Development Environment application. In the Arduino Integrated Development Environment application, there are sketches for typing programs and tools such as verify or compile, upload, new, open and save projects as shown in Picture 17.



Picture 15. Program on Arduino IDE

F. Testing

At this stage I tested the system that had been made to check for defects in the system. The testing process is carried out by testing the hardware (hardware) used with the Black Box testing method.

1. Hardware Testing

1) DS3231 RTC testing

Automatic sound testing using the RTC DS3231 aims to control the specific time the sound will turn on/off automatically with certain hours that have been set so that the owner does not go directly to the swiftlet's house. The results of sound testing on the RTC DS3231 can be seen in Table 1.

Table 1. Sound test results on the RTC DS3231

Test	O'clock	Relays	Voice
1.	08.00	On	On
2.	10.00	On	On
3	14.00	On	On
4.	17.00	On	On
5.	20.00	off	off

From the results of the sound test, the RTC works well in terms of measurement error accuracy according to the error information in the datasheet.

2) LDR Sensor Testing

Testing the light intensity using the LDR sensor aims to control the light that will enter the swiftlet's house by making curtains or windows that will function if the light gets darker, the curtains will open and the light gets brighter, the curtains will close. The results of testing the light intensity on the LDR sensor can be seen in Table 2.

Table 2. The results of testing the light intensity on the LDR sensor

Test	Test Equipment	Curtain	Error
1.	HP Flashlight	OFF	0
2.	HP Flashlight	OFF	0
3	HP Flashlight	OFF	1
4.	No Light	ON	0
5.	No Light	ON	0

From the results of the light intensity test, the detection results of the LDR sensor in terms of the accuracy of measurement errors are in accordance with the error information in the datasheet.

3) Testing LCD 16x2

The function of the LCD program displays the results of the automatic sound time and light intensity obtained from the RTC DS3231 and the LDR sensor which has been processed by the NodeMCU ESP8266 microcontroller. The test here is carried out when the system is turned on, the LCD will turn on by displaying sound information and light intensity on the swiftlet house (Waworundeng, et al. 2017). LCD testing can be seen in Picture 18.

Picture 16. LCD Testing

At the time of testing the LCD will display the sound time which has been determined by the hour when the sound is on or off and the light intensity value read by the RTC and LDR sensor in the swiftlet house so that if monitoring is still carried out via the LCD (Harris and Son 2017).

G. Evaluation

After the testing or testing phase has been completed and the prototype made is running well, the next prototype will be used by the user. Program installation and learning will be carried out to the user regarding how to use the prototype that has been made. Evaluation will be carried out if there is a program error found, upgrade the tool or microcontroller and evaluation is carried out to suit the needs of the user.

V. CONCLUSION

To make an automatic system tool for sound and light intensity in a swiftlet house, the main components are needed, namely, NodeMCU ESP8266 as a microcontroller that processes data to produce output, RTC DS3231 as time input, LDR as light intensity input, 16x2 LCD and speakers as output display, relay as a switch that connects the on/off speakers, servo as hardware that rotates automatically to open/close the curtain.

This system does not work well at light intensity where the servo motor should function to open/close the curtain which only functions to open the curtain but to close the servo is not strong enough to move the curtain and for setting the time according to RTC and swiftlet sound can be active based on the specified time , however, when the time is turned on from the beginning when the device is turned on, it will repeat the time if it is turned on again, therefore the RTC should adjust to the online time.

Based on the results of the tests that have been carried out, it can be concluded that the sound and light intensity automatic system tools can function poorly, where each tool can function as it should.

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