

Task collection monitoring system on lockers with notifications on Telegram

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Abstract – In this new normal era, universities, both private and public, have started to learn face-to-face. When collecting assignment reports, sometimes teachers or lecturers are unable to attend because of the hectic activity of activities, sometimes there are students who lie or cheat when submitting assignments. Therefore, making a place or safe for collecting assignments that aims to make it easier for teachers to collect assignments that have been given. The safe is designed using an Arduino microcontroller which functions to integrate components such as RFID sensors, finger print, ultrasonic, LCD and ESP32Cam modules. RFID sensors are used to identify a student's data. The ESP32Cam module is used to take pictures of students' photos when submitting assignments. Student photos will be sent directly to the teacher's or lecture's telegram application. The ultrasonic sensor is used to determine the contents of the safe, if the safe is full the ultrasonic sensor will work and the buzzer will sound. As a security, the safe uses a finger print that can only be accessed by the lecturer or teacher.

Keywords: Locker, Arduino, ESP32Cam, RFID, Finger print.



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I. INTRODUCTION

In the learning process, usually students will be given assignments by teaching staff to test the ability of these students, usually during the process of making assignments, teaching staff will provide time limits in collecting assignments, but during the process of collecting this assignment, not all students can collect on time to ensure that a staff must be on standby to receive the assignments they give, what if these personnel have other work at the time of collection, This task is what makes the author to create a system that can monitor the process of collecting tasks. An example is the development of technology that can be utilized from the existence of an internet connection can access electronic equipment such as room lights that can be operated online via mobile [1].

The problem above is how to be able to monitor the collection of student assignments without a

teaching staff having to be on standby in order to be more productive, the author plans to create a smart locker that functions to receive assignments collected by students with an RFID system to identify data from these students and the system has a camera that is used to ensure the collection of assignments and sends the images to telegram and the system has a functioning RTC To ensure students collect assignments at the time specified by the staff, the system also has a security using selenoid door lock so that students cannot steal assignments from other students.

In this study, distance data from ultrasonic sensor measurements with the percentage value of fish feed residues were obtained from the calculation of many fish feed residues contained in the container. When the fish feed is full, that is, when the distance of the fish feed surface to the sensor is 2 cm, the amount of fish feed is 700 grams [2]. From the first research that made "Design Smart Locker Using RFID Based Arduino Uno", this research is designed for double security on lockers [3]. Then the second research that made "Design and Build an Internet Of Things (IOT)-Based Lecturer Locker Monitoring System" this research was designed to make it easier for lecturers to monitor documents entering the locker [4].

II. METODE DAN DESAIN

Arduino is an open source electronic kit or electronic circuit board in which there is a main component, namely a microcontroller chip with AVR type from the Atmel company [5].



Figure 1. Arduino uno

Task collection monitoring system on lockers with notifications on Telegram

The ESP32-Cam module is a WIFI/Bluetooth development board with ESP32 microcontroller and camera. There are several GPIOs available and there are connections for external antennas. The downside in this case, the module is not available USB port for uploading programs, so we have to upload it using the FTDI module [6].



Figure 2. ESP32Cam Module

RFID is a technology that uses the auto-ID or Automatic Identification method. Auto-ID is a method of data retrieval with automatic identification of objects without any human involvement. Identification of objects or data on RFID technology is done by matching the data stored in the tag memory with the data sent by the reader. RFID is formed by the main components of the tag (transponder), reader and antenna. In passive tags the signal is sent by the reader through electromagnetic waves, then the tag will respond and send data / information in it. The reader also has the ability to make data changes to the tag in addition to reading and retrieving the information data stored in the tag. While the antenna on the RFID system affects the distance and range of reading or identifying objects [7]

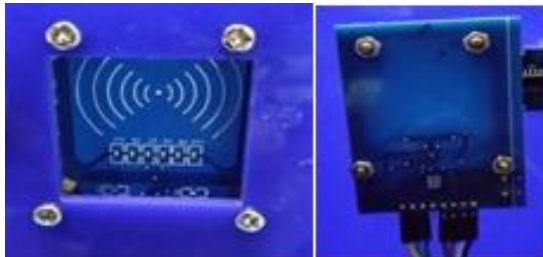


Figure 3. Sensor RFID

Real-time clock (RTC) is a computer clock that tracks the current time. A common RTC used in single-board computers is DS3132. RTC DS3132 module is one type of module which functions as an RTC or digital timer and the addition of a temperature measuring feature packaged in 1 module. In addition, in the module there is an EEPROM IC type AT24C32 which can be used as well. The interface to access this module is using i2c or two wire (SDA and SCL). So that if accessed using a microcontroller for example Arduino Uno pins only needed 2 pins and 2 power pins. The DS3231 RTC module generally has an electrical signal produced by the receiving sensor depending on the

distance of the object to be detected and the quality of the transmitter sensor and receiver sensor [11].



Figure 4. Sensor RTC

Solenoids are electrical components that can convert electrical energy into mechanical energy or movement so that solenoids are called electromagnetic devices [9]. The way this solenoid works is that when current flows through the wire in the solenoid system, around the wire will produce a magnetic field. On the coil will be installed a spring which later if the magnetic field is formed the spring will be attracted by the magnet. In the solenoid door lock used for this study, this occurs when the spring is docked at the SDL so that the lock opens, and if the electric current is cut off, the spring will stretch back because the magnetic field is lost and the SDL becomes locked [5].

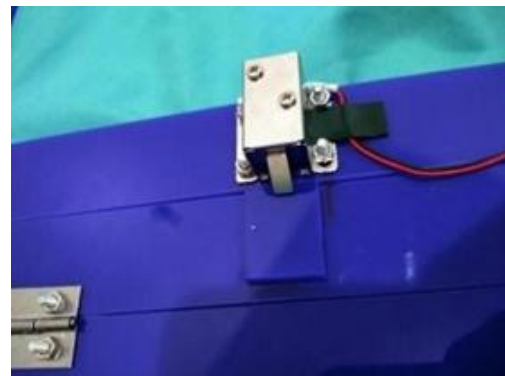


Figure 5. Solenoid Door Lock

Ultrasonic HC-SR04 is a sensor module that can measure distances ranging from 2cm to 4cm, where the accuracy is 3mm. In this module there are transmitter, receiver, and control circuit sections[10]. Large amplitude with CR2032 3V battery that functions as RTC back up when the main power is off. In addition, there is also EEPROM AT24C32 which can give you 32K EEPROM to store data, this is the best choice for applications that require data logging features, with higher time precision [8].

Task collection monitoring system on lockers with notifications on Telegram



Figure 6. Ultrasonic HC-SR04

Finger Print is a device that can read the pattern of strokes on the skin of the human hand. One type of fingerprint is fingerprint as608, this fingerprint module is used in this study. This sensor module is equipped with DSP (Digital signal Processing) that performs image rendering, then calculating, feature-finding and finally searching on existing data [12].



Figure 7. Finger Print

LCD is a layer of organic mixture between a layer of clear glass with a transparent electrode of indium oxide in the form of seven segments and an electrode layer on the back glass. The reflected light cannot pass through the molecules that have adjusted and the activated segments appear to darken and form the character of the data to be displayed[13]. One type of LCD (Liquid Crystal Display) is a 20x 4 type LCD which has a 20-character flat letter display to the side and has 4 lines.

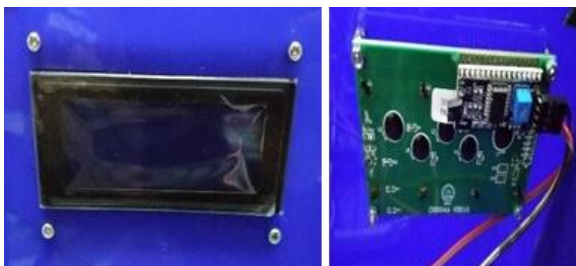


Figure 8. LCD

Buzzer is an electronic component that functions to convert electrical vibrations into sound vibrations. Basically, the working principle of the buzzer is almost the same as the loud speaker, so the buzzer also consists of a coil attached to the

diaphragm and then the coil is fed with current so that it becomes an electromagnet [14].

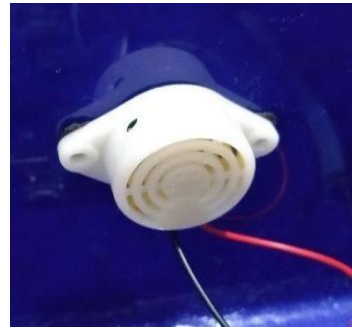


Figure 9. Buzzer

Telegram messenger is a messaging app that works over the internet. According to Telegram, the service has more than 200 million monthly active users. Telegram bot creation process: 1. Create a new Telegram bot using Father Bot. 2. Give the Telegram bot a friendly name with a unique username. 3. When the user completes the token number used by the user to connect telegram with the device [5].



Figure 9. Logo Telegram

Multimeter is a measuring instrument that can measure quantities such as voltage, current and resistance in the power supply and components used. Measured values are displayed on digital displays, so they can be read easily and instantly.



Figure 10 . Multimer Digital

In this study, the action research method was used, which is one form of research design.

Task collection monitoring system on lockers with notifications on Telegram

In the action research method, research describes, interprets and explains a condition at the same time as intervening with the aim of improvement or participation. The action research method consists of several stages which can be seen from the picture below [14].



Figure 11. Research Framework

The formation of tool design in the microcontroller-based task collection monitoring system will be described by a series of schematics. In this study, the components and what is needed are arduino as managing data from RFID and RTC and processing the data to control buzzers, LCDs and relays, RFID serves to identify student data, RTC functions to detect assignment collection times and deadlines, ESP32Cam as taking pictures and sending the images to telegram, buzzer as a warning, LCD to

display the processing results of Arduino, Relay as a digital switch from Arduino.

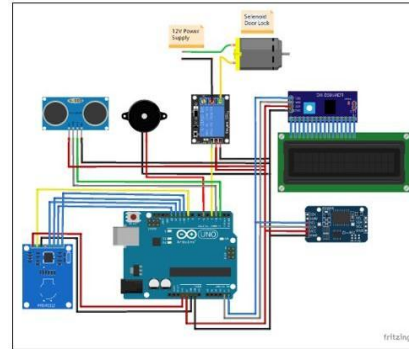


Figure 12. Series Image

At this stage the design of this tool has a goal so that during the process of making the tool can run well according to what is expected until the end until the tool can be used perfectly as desired. Furthermore, to make a design of this tool, a flowchart is needed. The design of the tool that will be used to create this task collection monitoring system tool has three stages, namely input, process and output.

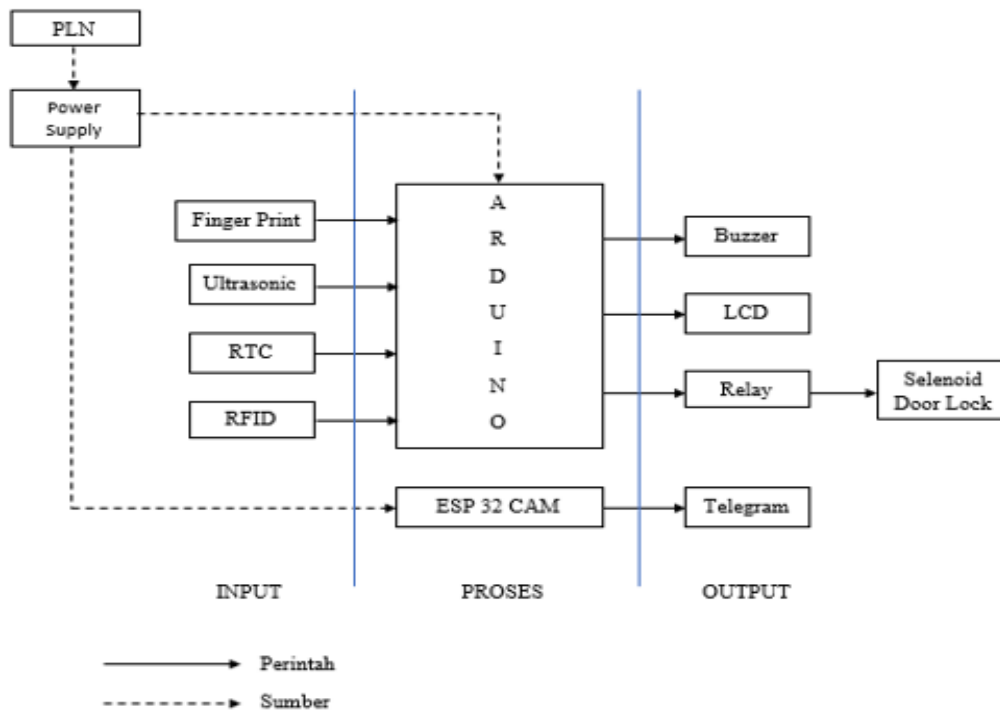


Figure 13. Block Diagram

III. RESULTS AND DISCUSSION

This stage is the stage of installing task collection monitoring system components on lockers with notifications on telegrams.



Figure 14. Shape Tool

A student attaches an RFID card or ID card to be scanned into the tool and then the tool identifies the student's data, on the LCD display will appear verified data and the student's name. Then the tool gives a command to take photos / pictures of students which will be automatically sent to the user's telegram application or device owner, the buzzer sounds and then the door opens to enter assignments. In the process, a time limit is given, if it has passed the predetermined time limit, students cannot scan and cannot enter assignments. On the inside of the locker, it can be determined how many tasks have been collected, if it is full, it will appear on the Full task LCD so that it is immediately taken by the locker owner / teaching staff. To take assignments in the locker using finger print that can only be used by teaching staff / owners.



Figure 15. Tool Progress

Test the esp32cam camera on telegram The process of sending images to telegram is active when students attach the rfid card to the rfid tag and

ultrasonic sensor located nearby.

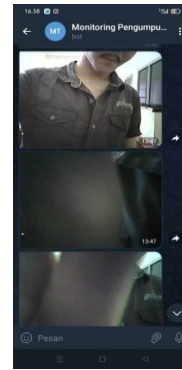


Figure 16. Telegram App

IV. CONCLUSION

Based on the results of the design and testing of the system as a whole, the conclusion of the tool made, namely the microcontroller-based task collection monitoring system using telegrams in this study was successfully designed. Based on the results of the Rfid sensor test carried out, it was found that the Rfid managed to detect every ID card that was scanning, the sensor worked well with a predetermined time lag. Based on the results of finger print testing as a safety for the main door of the safe, it was found that only the teacher could open the main door to avoid cheating students who wanted to take the contents of the safe. Based on the results of testing the telegram notification that has been carried out, it was found that there was one failure to be sent out of five attempts. The average photo submission time is 2 seconds.

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