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DETECTION AND MONITORING SYSTEM ON THE PACKAGE RECEIVING BOX

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ABSTRACT

The package delivery system during this pandemic period require concerned health protocols. Receiving packages sometimes needs to be done even though there is no recipient. Here, the box for receiving goods has an important role. The goods receiving box must have security and ensure that the goods are received/placed in the box. In this case, it is necessary to detect the presence of objects in the box using a weight sensor, and a box locking motor is also needed. A push-button is needed when the package items are put into the box. The process of this activity can be monitored directly with the help of the Blynk application from a smartphone. The tests are carried out, and the push button signals to open the box. The weight sensor detects weight changes. The Blynk application will inform the smartphone that the object has been placed in the box from the weight change, and the system will lock the box again. The detection and monitoring system for goods on the box can work well.

Keywords: pandemi, security, sensor load cell, Blynk application

INTRODUCTION

Shopping activities these days are done mainly by online shopping because it is very helpful in getting the desired items. Online shopping is the activity of purchasing goods via the internet. It is convenient and time-saving for many people. However, one of the challenges of online shopping is the safe delivery of packages to the recipient's address, especially when the recipient is not at home. To address this challenge, a detection and monitoring system can be implemented on the package receiving box [1]. This system can incorporate sensors to detect when a package is placed inside the box and provide real-time monitoring of the box's status [2], ensuring that packages are securely received and protected from theft or damage [3]. Additionally, the system can provide notifications to the recipient when a package is delivered, adding an extra layer of security and convenience to the online shopping experience. This online shopping activity is a new form of communication that does not require direct face-to-face communication. However, it can be done separately from and to the rest of the world through notebooks, computers, or mobile phones connected to internet access services, making it very difficult practical.

Nevertheless, what we have to face after the goods arrive, we have to carry out the process of receiving goods which are usually carried out by the buyer of the goods themselves or their families at home, which means that there must be someone at home so that the process runs smoothly. If there is no one at home to receive the goods, it is very risky to the safety of the goods if they are just left behind. For this reason, an acceptance process is needed with special storage in the form of a safe box and can detect the existence of the goods received/placed. This detection and monitoring system on the package receiving box can ensure that the packages are securely stored and protected until the recipient is able to retrieve them. By implementing this detection and monitoring system, the recipient can have peace of mind knowing that their packages are safe and secure even when they are not at home during the delivery time.

Implementing a detection and monitoring system on the package receiving box not only ensures the safe storage of packages but also provides a comprehensive solution to the challenges of online shopping. This system can be designed to incorporate a range of sensors such as proximity sensors, motion sensors, and temperature sensors to further enhance the level of security and monitoring[4-5]. The integration of these sensors allows for real-time tracking of the package's movement, temperature, and overall status, providing detailed information to the recipient [6-7].

By incorporating these advanced technologies, the detection and monitoring system on the package receiving box can elevate the overall online shopping experience, providing peace of mind to both the sender and the recipient. Moreover, it can potentially reduce the number of package thefts and damages by enhancing security measures and creating a transparent and accountable delivery process. This tool is equipped with a solenoid door lock that can only be opened by entering a password via the keypad as a password input medium. Furthermore, it uses a weight sensor to detect objects placed in the box. Then the system will send the data to the Blynk application on the smartphone so that the customer can be identified through the

information received in real-time. The system using the weight sensor can determine where the goods in the box have been placed.

METHOD

The method of this research is to implement the use of a keypad for input media as an access code to open the box door by activating the solenoid [8], the use of a weight sensor here to determine the presence of objects placed in the box, this will happen if objects placed at the bottom of the box will affect changes in weight the surface of the box so that it will be indicated that there are objects on the surface which means there are objects in the box, then the microcontroller sends information to the smartphone that in the box there are objects through the Internet of Things (IOT) connection. In the smartphone to receive information used blynk application [9-10]. The blynk application allows the user to receive real-time updates and notifications regarding the status of their package. This real-time tracking and monitoring system provides convenience and peace of mind to customers, as they can easily monitor the status and location of their packages through their smartphones.

The use of the blynk application on this system where blynk is a platform for Mobile OS applications (iOS and Android). From this application platform, you can control anything remotely, wherever you are and at any time. With a record connected to the internet with a stable connection and this is what is called an Internet of Things (IOT) system.

System Design

The box is made to be able to receive ordered goods and is a special storage place in the form of a box equipped with a door to enter goods. Box uses 2 systems, box control system and monitoring system on smartphone.

Box Control System

The system is a control for security and control of the box so that the ordered goods avoid the risk of loss. The system is given a solenoid door lock that can only be opened by entering a password via the keypad, the password used is only valid once. Owner can unlock with master password. The presence of the contents in the box can be known/detected with the help of a load cell sensor which is from the results of weight measurements / changes in the surface weight of the box.

Monitoring system on smartphone

Smartphones can get information about objects in the box from the microcontroller after the system measures changes in the surface weight of the box, so that the box contents can be monitored. The information sent by the microcontroller to the smartphone before being displayed will be received by the blynk application via the internet network in real time.

Block diagram

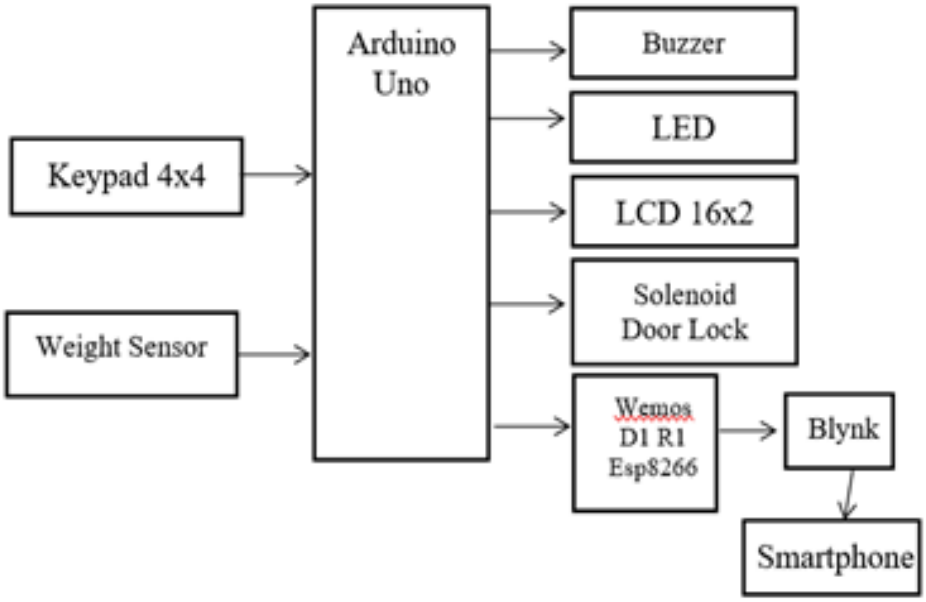


FIGURE 1.Block diagram of the system

System Flowchart

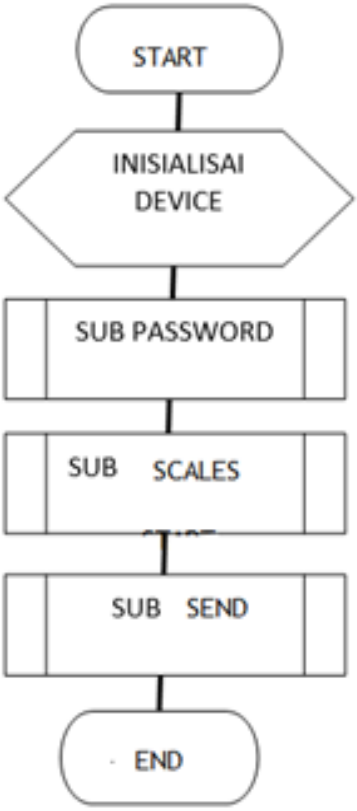
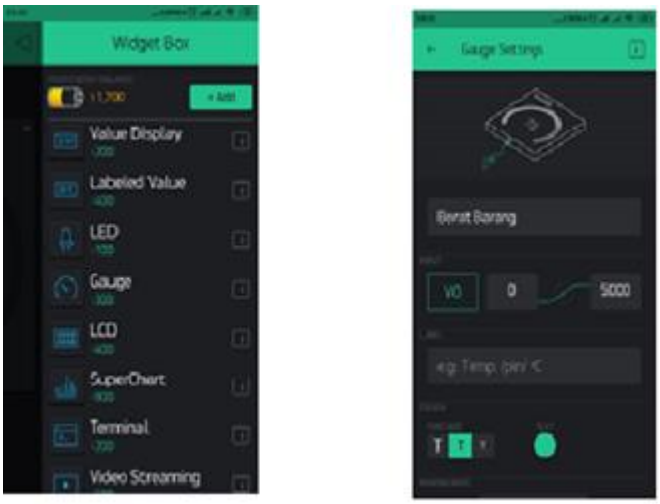


FIGURE 2. System Flowchart

Blynk Application for smartphone



(a) (b)

FIGURE 3. the maker of the monitoring system for the existence of goods in the box with the blynk application, (a) adding a gauge widget, (b) setting the gauge widget.

RESULT AND DISCUSSION

Weight Sensor Test

Weight sensor testing is carried out to determine whether the weight sensor can work as designed.

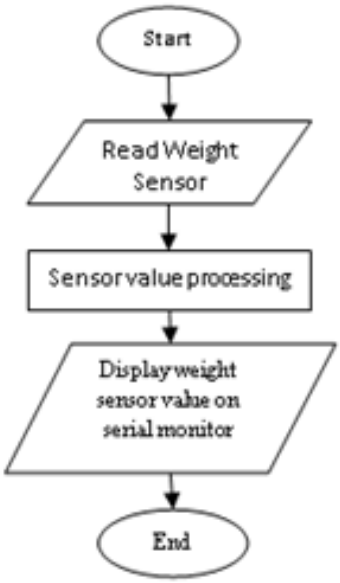


FIGURE 3. Weight sensor test flowchart

Test Result

FIGURE 5 are the results of testing the weight sensor which was tested by placing 1 item weighing 235 grams.

FIGURE 4. (a) snippet of the weight sensor reading program. (b) the results of the weight sensor readings under load.

TABLE 1. measuring the weight of goods weighing 235 grams with a load cell sensor

TEST	MEASUREMENT CONVERSION RESULTS (gram)	DESCRIPTION
1	234.58	middle position
2	233.34	left position
3	234.27	right position
4	234.36	Top position
5	232.97	down position

Testing Analysis

Based on the results of testing on 1 item with a load of 235 grams, the measurement results of the weight sensor displayed on the serial monitor are 233.90 grams. The resulting measurement value is not correct due to the influence of stability on the weight sensor or the position of placing the goods.

Weight Sensor Monitoring Test

Weight sensor monitoring test to determine whether the process of monitoring the results of the load cell sensor can be carried out.

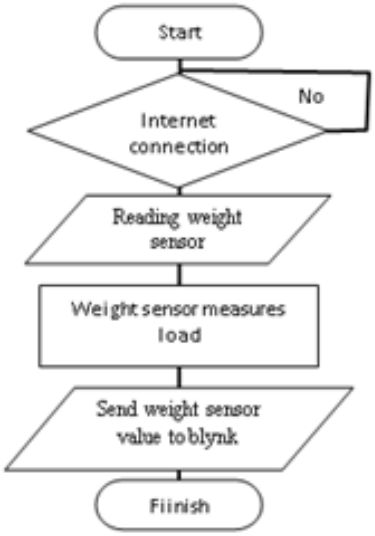


FIGURE 5. Weight sensor monitoring test flowchart

Testing Result

Below are the results of the weight sensor monitoring test that was tested by placing 1 bag of flour weighing 235 grams:

```
void load()
{
  scale.set_scale(calibration_factor);
  GRAM = scale.get_units(), 4;
  Blynk.virtualWrite(V0,GRAM);
}

void loop()
{
  Blynk.run();
  load();
  Serial.println(GRAM);
}
```

FIGURE 6. (a) snippet of the weight sensor monitoring program. (b) the results of monitoring the value of the weight sensor when it is loaded.

Testing Analysis

Based on the test results in the image above, it can be concluded that the weight sensor value is forwarded to the wemos d1 r1 and then can be sent to the blynk application in the form of a gauge widget. Through the internet. The speed of data transmission is every 1 second if the internet connection used is good.

CONCLUSION

After completing several stages from design to testing of the weight detection system and monitoring of goods in the box, the authors can conclude that:

1. Based on the test results, the weight sensor can be used to determine the presence of goods in the box by measuring changes in the surface weight of the box. However, the

measurement value is not correct due to the influence of the stability of the position of the layout of the goods on the box.

2. Based on the results of the weight sensor monitoring test. The value of the weight of the load in the box can be sent via the Blynk application. Thus the box can be monitored remotely using the Blynk application on a smartphone.

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