INTERNATIONAL CONFERENCE ON APPLIED TECHNOLOGY (ICAT 2024)

Selected peer-reviewed full text papers from the 1st International Conference on Applied Technology (ICAT 2024)

Edited by
Prof. Suryadi Ismadji
Dr. Shella Permatasari Santoso
Dr. Jindrayani Nyoo Putro

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Preface

We are pleased to present this publication comprising the results of the International Conference on Applied
Teknologi Terapan XI on November 14, 2024. With the theme "Green Horizons: Building Resilient Futures through Sustainable Agility", the meeting provided a vital platform for researchers, industry leaders, and innovators to engage in forward-thinking dialogue at the intersection of technology and sustainability.

As humanity confronts unprecedented environmental challenges, this conference emphasizes sustainability **agility** underscoring the
fostering resilience within our communities and industries. Our commitment to this subject reflects a shared understanding of the need to not only sustain but also to adapt in an ever-evolving global landscape. Contributions to the conference demonstrated how technology can be harnessed to meet the demands of our changing world, reinforcing the value of agility and resilience in achieving a sustainable future.

This edition showcases cutting-edge research and practical applications across diverse fields, offering insights and inspiration for those committed to building resilient, sustainable futures. We extend our gratitude to all contributors, reviewers, and organizers whose hard work and dedication made this event possible. We hope this compilation will serve as a valuable resource for those seeking to lead with innovation and sustainability at the forefront of their efforts.

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Cinnamon Drying Machine Monitoring System Using IoT Technology

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Keywords: Drying Machine, Cinnamon, Monitoring System, IoT.

Abstract. Cinnamon bark drying machine is one of agricultural technology to dry up the cinnamon bark efficiently machine to monitor
conditions
Internet of Things (IoT) technology so that the system can be monitored remotely.
The proposed cinnamon bark drying machines uses Arduino Mega2560 as the main microcontroller with 4 Arduino Nano as additional microcontrollers to get star network topology and ESP8266 as a 20 ghtis used as communication device. Sensor
temperature sensor. There is simple Blynk application on smartphone as an IoT platform.
Based on the test results it can be concluded that the cinnamon bark drying machine monitoring system using IoT technology has good performance and capabilities. It can reduce material weight maximum down to 29,93% reached during the 55 ℃ is .
Transmission delay from the serial monitor to Blynk IoT Platform has a poor value based on TIPHON standardization. The average delay was 1.5 seconds. However, data error rate between serial monitor and Blynk is very small. The average data error rate is 0,21%.

Introduction

Cinnamon (*Cinnamomum burmanii*)
market, international, exported from Indonesia Malaysia through Penang and Singapore. West Sumatra and Jambi are cinnamon production centers in Indonesia. In this area, farmers' income from cinnamon is 26.93% of their farm income or 16.03% of their total income. Cinnamon is utilized for its bark can be
processed into various products such as in powder form used for various spices, essential oils, or oleoresins. Cinnamon products are known as cassievera [1].
The cinnamon drying process usually is done conventionally. The skin is dried under the sun for 3-4 days until the moisture content drops to 16% or the weight of the ingredients shrinks to 50%. During drying, the frequently results(drying often in poor quality wilted) materials. This is due to frequent rains or sunlight covered by clouds. To overcome this problems, cinnamon can be dried using a dryer [2].
Monitoring and Protection System for Arduino UNO based Automatic Cinnamon Bark Dryer was proposed by Indri (2017) [3]. Users can find out the temperature in the dryer to monitor the heating condition of the device. There is also a protection system that is ready to disconnect the device's circuit if the measured temperature is too high for the drying process.
Baiqi, et al. (2023) studied on how to improve the quality and quantity of cinnamon drying process using art cave in Lambung Bukit West Sumatra [4]. A machine was introduced to a cinnamon drying device named Art-Cave (Smart Dryer System for Cassiavera). This machine can dry cinnamon barks with humidity below 14%, while the heating temperature allowed is 60 °C to maintain the content of aetheric oil. The farmers can improve the drying process from 30 kg/day to 80 kg/day and maintain the temperature. The study concluded that the time needed to reach an average room temperature of 50 ° C-60 ° C is 5 minutes.
In this study, the authors propose a drying machine to achieved drying moisture of cinnamon bark around 14% to avoid mold growth with the maximum temperature in the drying process is 60 ℃ to maintain the content of essential oils and the target weight reduction is 50% from the initial weight. In this study the authors used DS18B20 sensor as a temperature sensor [5], load cell sensor as a weight

sensor [6], ESP8266 to connect to the internet network [7], heater device as a heating component, DC fan as hot air circulation tool, Arduino Nano as a connecting microcontroller [8], and Arduino Mega 2560 as the main microcontroller [9, 10]. The sensor network uses a star topology [11]. Blynk IoT platform is used to remotely monitor the condition inside the drying machine [12]. The aim of this research is to make a monitoring system for the cinnamon bark drying machine using IoT technology to facilitate farmers' work and expedite the post-harvest drying process.

Research Methodology

This system was developed using the principle of heat transfer. The heat from heater device is spread throughout the internal dryer machine, so that the temperature increase and the humidity decrease. The research method starts from 2D and 3D images so that it can be seen the placement of sensors that use star topology, heating elements, blower fans, and can see the shape of this device if it is finished. Software design, including programs on Arduino for connection of sensors that use star topology, two-way communication set up, maximum and minimum temperature set up of the heating element, working time set up of the tool, and connecting the device to Blynk using ESP8266.

2D Design. Fig. 1 depicted that the width of the cinnamon drying machine is 100 cm. The door used by the cinnamon drying machine is 80 cm long and 110 cm high.

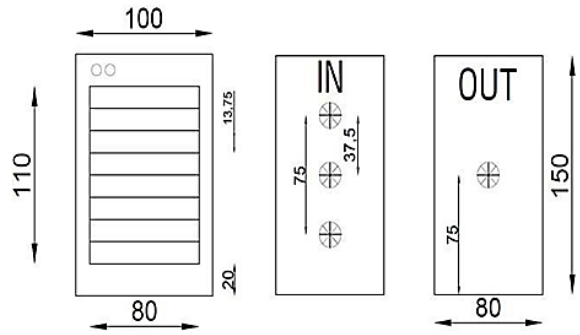

Fig. 1. 2D construction.

The distance between the shelves is 13.75 cm. The distance between the bottom shelf to the base of the drying machine is 20 cm. The distance between the top shelf to the roof of the drying machine is 20 cm. The distance between the shelves and the right and left walls is 10 cm. In the right side view, it can be seen that the height of the drying machine is 150cm, width 80cm. The number of air inlet fans is 3 pieces with a distance of 37.75 cm for each fan. Left side view shows that there is 1 exhaust fan located in the center with a distance between the roof and the base of the drying machine 75 cm.

3D Design. Fig. 2 shows the left side view of the cinnamon drying machine which has 3 heaters and 3 fans. The location of the heater and fan is symbolized by a red fan, because in that area the fan spreads hot air from the heater into the drying machine.

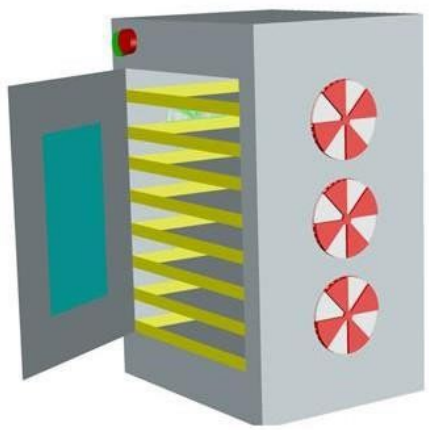

Fig. 2. 3D construction.

Sensor Placement. Fig. 3 shows an inside view of the back of the cinnamon drying machine. There is a design for the placement of load cell sensors, and DS18B20 sensors. It can also be seen that there are eight shelves that will be the place for cinnamon during the drying process.

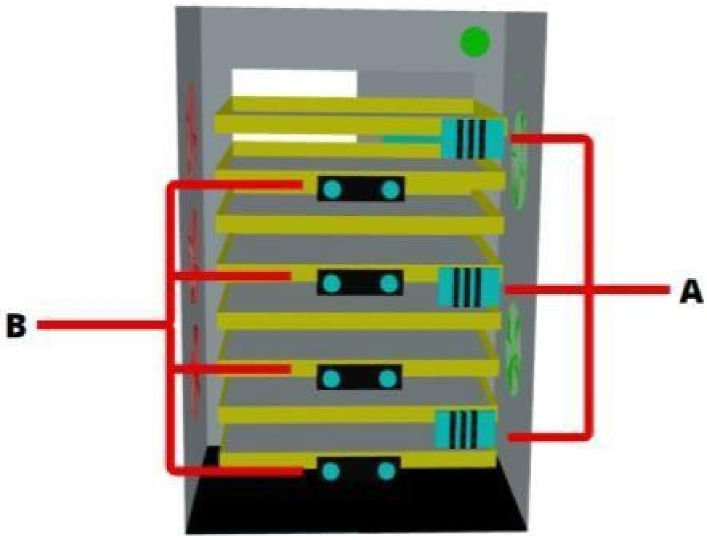

Fig. 3. Sensor placement

A = DS18B20 Sensor
B = LoadCell Sensor

Air Breaker. Fig. 4 shows a hot air breaker located on the side of the drying machine. Fig. 5 A shows the hot air flow from the heater which has gone through the air breaker and passes through the rack containing the cinnamon media. Fig. 5 B shows the top view of the air breaker.
Air circulation occurs inside the drying machine. Hot air and water vapor coming out through the exaust fan. The air breaker in the drying machine is useful for dispersing hot air from the heater. The reason for installing this air breaker is to make drying process more optimal and efficient.

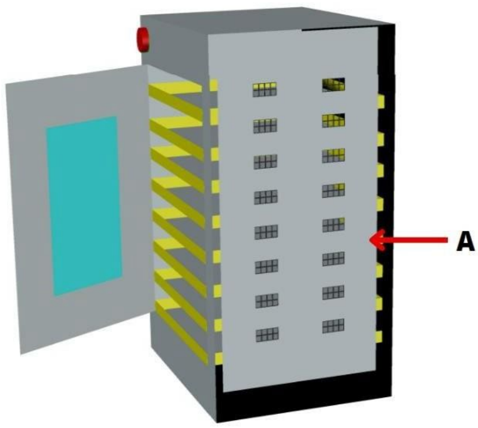

Fig. 4. Air Breaker

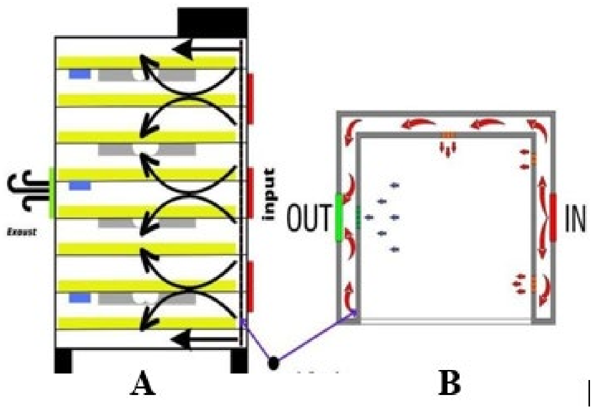

Fig. 5. Air Circulation.

Block Diagram. Fig. 6 shows the system design that consist of several hardware components such as Arduino Mega2560, Arduino Nano, ESP8266, load cell weight sensor, DS18B20 humidity sensor, relay, fan, and heater. Blynk platform with IoT will Arduino Mega2560 communicates through ESP8266 as a component that will connect to the internet.

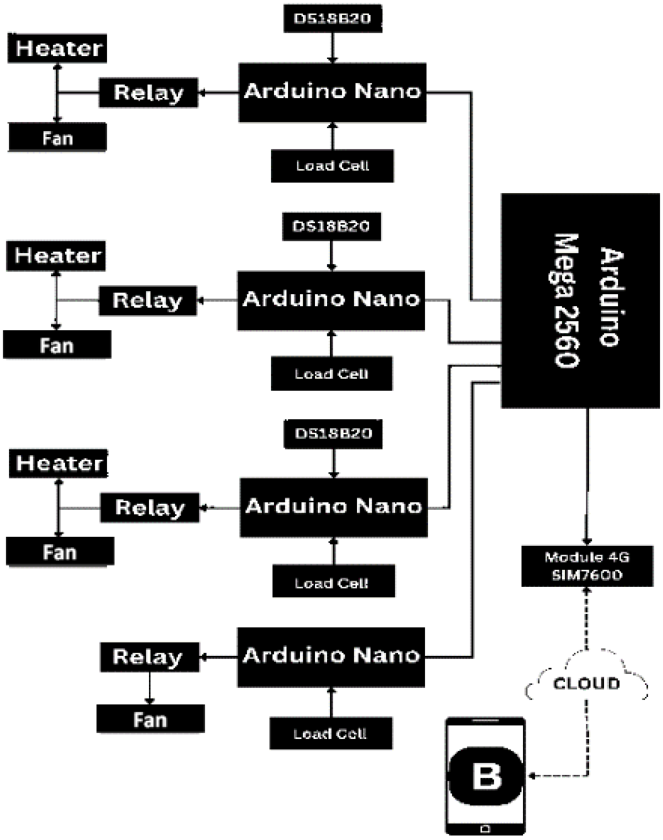

Fig. 6. Block Diagram

The data obtained from the load cell weight sensor and DS18B20 temperature sensor will enter the Arduino Nano input which is then sent to Arduino Mega to be processed. The data that has been processed by Arduino Mega will be sent back to Arduino Nano and will order the relay to turn off or turn on the fan and heater. The communication between Arduino Nano and Arduno Mega 2560 uses serial communication.
Serial
communication. Synchronous serial data communication is a form of communication that requires a clock signal for synchronization, while asynchronous communication does not require a clock signal as synchronization [9]. The wired sensor network on this drying machine uses a star topology.

Flow Chart. Flow chart in Fig. 7 begins with the input of temperature and weight sensor data that will be displayed in the Blynk application.

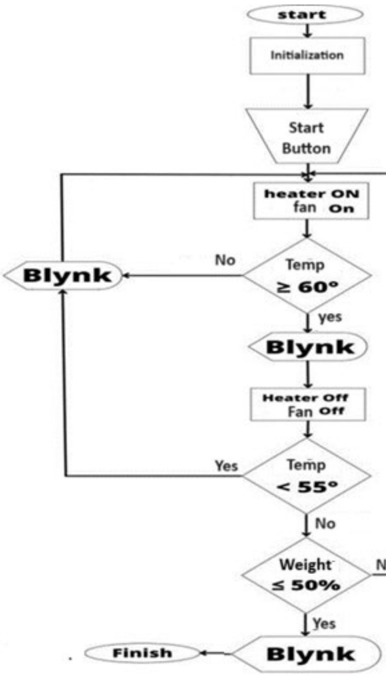

Fig. 7. Flow Chart.

The temperature sensor sends data to the microcontroller input. If the temperature is more than 60 ° C, then the fan and heater will be turned off by the microcontroller. The fan and heater will be turned on again if it gets data input of temperature less than 55 ° C. The load cell sensor will send the weight loss data of the dried media to the microcontroller for the next process, if the weight loss of the dried media is still less than 50% of the initial weight. Drying process will continue until the load cell sensor detects a decrease in media weight of more than equal to 60% of the initial weight then the drying process is complete. Any changes in temperature and weight during the drying process will be displayed in the Blynk application.

Result and Discussion

Sensor Calibration

DS18B20. DS18B20 sensor
machine during the drying process.

Table 1. Temperature Sensor Calibration.

DS18B20			
Sensor	DS18B20 [°C]	Analog Thermometer [°C]	Error Value [%]
1	42	43	3.4
2	42.5	42.5	1
3	40.2	42.5	4.8
	Average % error		3,07

Table 1 shows the temperature data on the Blynk GUI and analog thermometer used to determine the calibration accuracy process shows that is quite successful.

LoadCell. Loadcell sensor testing is carried out to determine the initial weight of the material being dried and the reduction in the weight during the drying process. Table 2 is the data displayed on the data monitor Arduino serial using during calibration process. T is a comparison value of the loadcell sensor value. Average % error shows that the calibration process is successful.

Table 2. Weight Sensor Calibration.

LoadCell			
Sensor	LoadCell [g]	Digital Scale [g]	Error Value [%]
1	981.25	470.75	2.5
2	971.75	470.75	0.3
3	981	470.75	1
4	969.5	470.75	1.9
	Average % error		1,43

Drying Testing. Drying testing of the drying machine is carried out to determine the performance of the sensor in reading the weight loss and temperature increase during the drying process. This test was also carried out on the Blynk platform to see the success of connecting the dryer to the internet. Table 3 is the initial weight data of the material (cinnamon bark) before drying.

Table 3. Cinnamon Bark Initial Weight.

Initial Weight of Cinnamon Bark			
Shelf #	Loadcell [gram]	Digital Scale [gram]	*Error* [%]
1	1.570	1.557	0,8
2	1.622	1.638	0,9
3	1.635	1.653	1
4	1.562	1.627	3,9
Average	1.597	1.618	1,65

Table 3 is the initial weight of cinnamon bark media before drying. Based on table 7, loadcell sensor can measure weight well. in the table there are two types of data to determine the error value, namely the comparative value derived from analog scales and the measurement value of the loadcell sensor. For the average value of the error obtained by the sensor during the drying process is 1.6% which shows a very small error value.

Table 4 is the weight of cinnamon skin media after drying. Table 8 shows that the loadcell sensor can measure weight well. In the table, there are two types of data to determine the error value, namely the comparative value derived from analog scales and the measurement value of the loadcell sensor. For the average value of the error obtained by the sensor during the drying process is 3.2% which shows a very small error value.

Table 4. Cinnamon Bark weight after drying.

Weight after drying process			
Shelf #	Loadcell (gram)	Digital Scale (gram)	*Error* (%)
1	466	475	4
2	487	496	1,8
3	469	478	1,8
4	491	518	5,2
Average	478	492	3,2

From Table 3 and Table 4, it can be seen that drying machine can decrease the weight of the cinnamon bark become 29,93% (loadcell) or 30,4% (digital scale) from initial weight. This weight reduction is exceeding the target of this study, which is 50% weight reduction.

Transmission Delay with Blynk. The data transmission process between the microcontroller device and the Blynk platform involves a series of operations such as the sending of data from the device, the reception of data by the Blynk server, and the response sent back to the device. A number of factors can affect the speed of this transmission, including the quality of the internet connection, network traffic density, and hardware and software configuration. Transmission delay standard by TIPHON for comparison reference of this device performance using Blynk is as Table 5.

Table 5. TIPHON Standardization.

Category	Large *Delay*	Index
Excellent	< 150 ms	4
Good	150 s/d 300 ms	3
Medium	300 s/d 450 ms	2
Bad	> 450 ms	1

The data given has an average delay of 1.5 seconds. Based on TIPHON standardization in table 5, the average delay in Table 6 shows index 1 in TIPHON standardization or poor service quality.

Table 6. Data Transmission Delay.

Data Transmission Delay		
Time Sent	Time Received	*Delay* [s]
10:37:22	10:37:24	2
10:37:24	10:37:26	2
10:37:26	10:37:27	1
10:37:27	10:37:29	2
10:37:29	10:37:30	1
10:37:30	10:37:31	1
10:37:31	10:37:33	2
10:37:33	10:37:34	1
10:37:34	10:37:35	1
10:37:35	10:37:37	2
Average		1,5

Data Error Rate. Data error rate is a critical aspect to ensure the quality of communication between the microcontroller device and the Blynk server. Data error rate refers to how often errors occur in sending or receiving data between the serial monitor and the data. Data error rate was calculated using average data of 3 temperature sensor, which are 0,396%, 0,227%, and 0%. Total average of data error is 0,21% which is considered very small error.

Conclusion

Based on the results of the drying test of the cinnamon bark drying machine monitoring system using IoT technology, it can be concluded that the cinnamon bark drying machine monitoring system using IoT technology has good performance and capabilities. It can reduce material weight down to 29,93% for the maximum temperature reached during the drying process is 55 ° C

Data transmission delay from the serial monitor to Blynk IoT Platform has a poor value based on TIPHON standardization. The average delay was 1.5 seconds. However, data error rate between serial monitor and Blynk is very small. The average data error rate is 0,21%.

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Monitoring System for Tobacco Drying Machine Using IoT Technology

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Keywords: Drying Machine, Tobacco, Monitoring System, IoT

Abstract. Tobacco is one of the most widely cultivated plants in Indonesia, especially in highland areas. Conventional tobacco drying process relies on solar heat. The biggest problem in drying using the sun is erratic weather and also in highland areas, the chance of rainfall is also high.
Monitoring system
answer to the problems that occur. By utilizing IoT technology, this tobacco drying machine can be monitored remotely using smartphone or other mobile device. Monitoring that can be done remotely is temperature inside the drying machine, the weight of tobacco during drying, and also On Off state of the drying machine. In this study, for tobacco drying machines a
topology that connects several Arduino nano as a slave and Arduino mega 2560 as a master. Arduino nano plays a role in controlling the DS18B20 temperature sensor, load cell, heater relay, and fan relay. Arduino mega as a master acts as a data processing center and main control in the monitoring system of the temabkau drying machine. ESP8266 is used to connect to the internet using wifi. There is simple Blynk application on smartphone as an IoT platform.
After some testing done, it turns out that tobacco drying machine has good performance in terms of tobacco weight reduction down to (load cell) and 30,56% (digital scales). However,
internal machine temperature during drying process only reach 42,75° C. Data transmission delay from the serial monitor to Blynk IoT Platform has a poor value based on TIPHON standardization, which is 1.4 seconds. However, data ,
0,099% for load cell data and 0,28% for temperature sensor data.

Introduction

Tobacco was brought to Indonesia by the history of Western colonialism, at least in the early 17th century [1]. provider of
employment, and a source of state revenue from both foreign exchange and excise [2]. Direct and indirect labor that are absorbed from tobacco business reaches 6.4 million people.

The moisture content in the tobacco must be in the right amount, so that tobacco can be stored properly and the quality is maintained [3]. The dryness level is rated as good (moisture content of dry-knitted tobacco is estimated at a maximum of 12%), fair (maximum 13%), medium (maximum 14%), and poor (more than 14%).

The problem with tobacco processing in Indonesia is traditional processing that rely on the sunlight. Disadvantages of this processing are; need a spacious place for sun drying, need time to flip the tobacco, so that the drying becomes even to all tobacco, and sunlight will not so hot in rainy season, even there will not be sunlight at all. All of these problems will not occur when drying process is using drying machine.

Prasetyo (2011) The study of evaluation of the Hybrid Dryer Unit conclude the
process the dryer machine is depend on the [4]. The
average temperature inside the drying chamber without heating with biomass or wood charcoal (solar energy heating) higher than
temperature outside.

In 2016, research on the
shortcomings, among others, it has less effective in the process of making hot air for heating process

[5]. This machine still uses hot air from burning husks. If the husk has run out, the addition of husks is still done manually.

Based on the above-mentioned problems, the authors proposed a monitoring system for tobacco drying machines using IoT technology. The ideal moisture content for storing tobacco is between 12-14% for tobacco that will be processed into final products such as cigarettes and cigars [6]. This study uses DS18B20 as a temperature sensor [7], load cell as a weight sensor [8], heater as the main component in this dryer, DC fan as a heat circulation tool and as a heat dissipator. All these components are controlled using Arduino Mega and Arduino Uno [9]. ESP8266 is used to connect to the internet [10]. The sensors in this dryer use BUS network topology [11]. Blynk IoT platform is used as the main monitoring platform in this research [12].

Research Methodology

This section will discuss the construction of the tobacco drying machine, block diagram of the system, flowchart, and GUI design of the Blynk application. Setting condition where the drying process is completed is when the moisture content of the tobacco has decreased by 70% or 50% weight reduction. Fresh tobacco leaves from farmers is used for machine testing and evaluation. In the process of data collection, the data recorded in the Blynk server. The data recorded are temperature changes using a DS18B20 temperature sensor, and a decrease in water content using a load cell sensor. Analysis of the drying experiment results is used to determine the success of the tobacco drying system design. Connecting the drying system to the Blynk IoT platform is one of the determinants of the success of the tobacco drying machine design using IoT technology.

Drying Machine Construction. Fig. 1 shows a 2D front view and side view design of tobacco drying machine. Overall height of the machine is 150 cm, width of 80 cm, and length of 100 cm. The door width is 80 cm, 110 cm high. The distance between shelves is 13.75 cm.

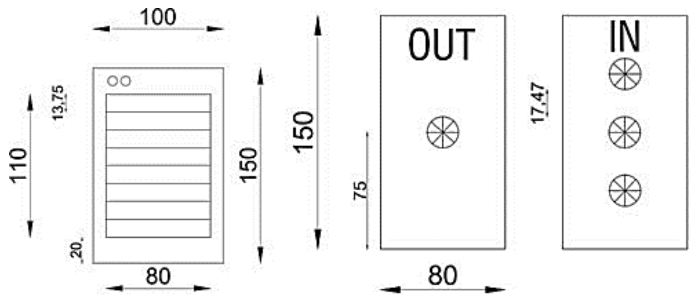

Fig. 1. Construction design of tobacco drying machine.

Fig. 2 shows the interior view of this drying machine. The placement of the DS18B20 sensor and load cell used in this research can be seen. This tobacco drying machine uses eight trays that will hold the tobacco to be dried.

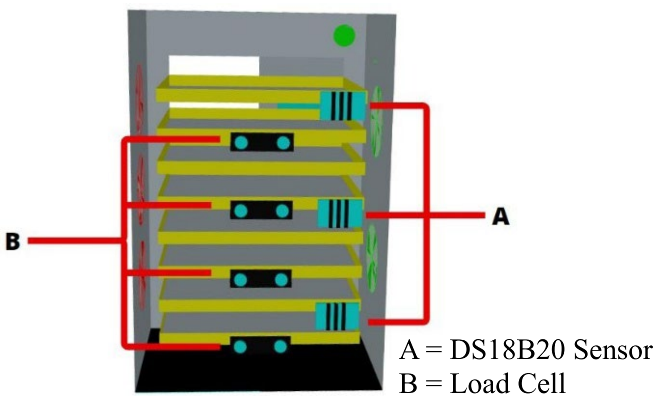

Fig. 2. Sensor Placement

Fig. 3 shows the design of the air flow breaker. Fig. 4 A shows the front view of the hot air flow after passing through the air flow breaker, while Fig. 4 B shows the top view of the hot air circulation after
distribute hot air from the heater. The purpose of installing this air breaker is to make drying more optimal and ensure even drying.

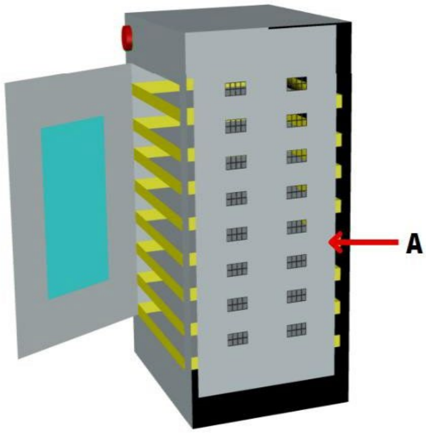

Fig. 3. Air Breake

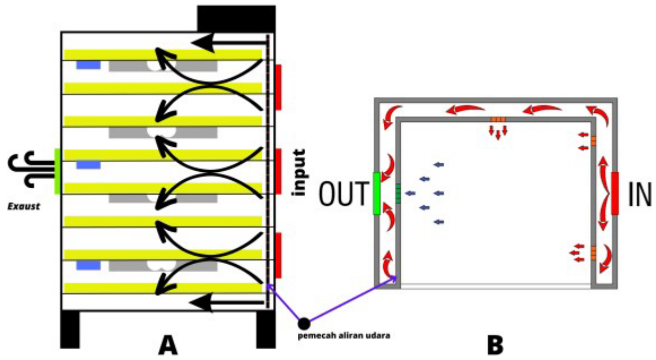

Fig. 4. Air Circulation

Block Diagram. Fig. 5 is a block diagram of the tobacco drying machine monitoring system using IoT technology. This system design includes several hardware components such as Arduino Mega 2560, Arduino Nano, DS18B20 sensor, load sensor, ESP8266 module, heater, and fan. Blynk is a software component that communicates with the Arduino Mega 2560 via the ESP8266 module, which connects to the internet. Data from the sensors are input to the Arduino Nano and then forwarded to the Arduino Mega 2560 for processing.

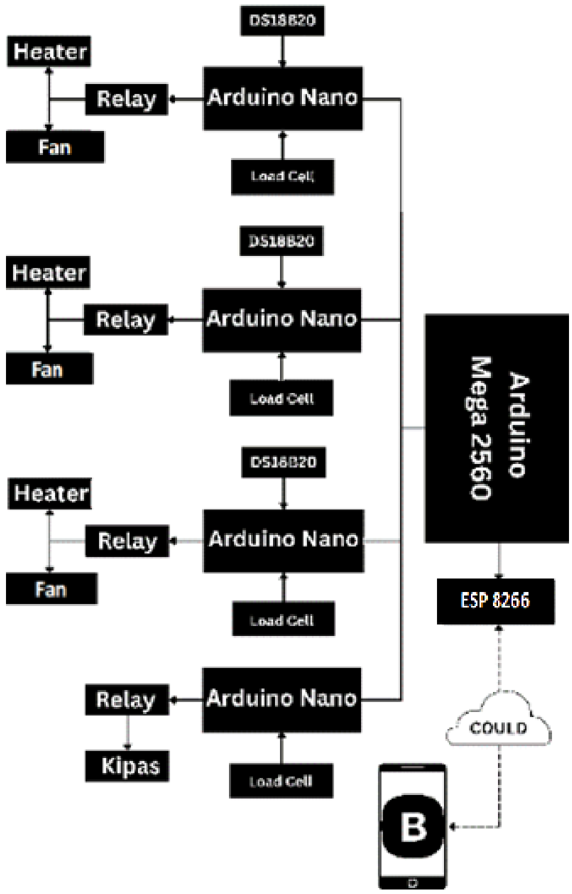

Fig. 5. Block Diagram

The processed data is sent back to the Arduino Nano, which then instructs the relay to turn the fan and heater on or off. Communication between the Arduino Nano and Arduino Mega 2560, or vice versa, uses serial communication. RS485 is an additional component for communication between the master Arduino and slave Arduino. RS485 connects multiple slave Arduinos and the master Arduino on a single line, forming a bus network topology.

Flow Chart. Fig. 6 is a flow chart of the tobacco drying machine using IoT technology. The process begins with input from temperature and weight sensors, which are displayed on the Blynk application. The user can press the start button to operate the drying machine according to the material to be dried. The microcontroller will command the fan and heater to turn on. The temperature sensor sends data to the microcontroller, which will command the fan and heater to turn off if the temperature is equal to or greater than 65 degrees Celsius.

The fan and heater will turn back on if the temperature falls below 55 degrees Celsius inside the tobacco drying machine. The load cell sensor will send data about the reduction in the weight of the drying material to the microcontroller for further processing. If the weight reduction is still less than 50%

reduction of 70% or more from the initial weight, at which point the drying process is complete. Any

ed on the changes Blynk

application.

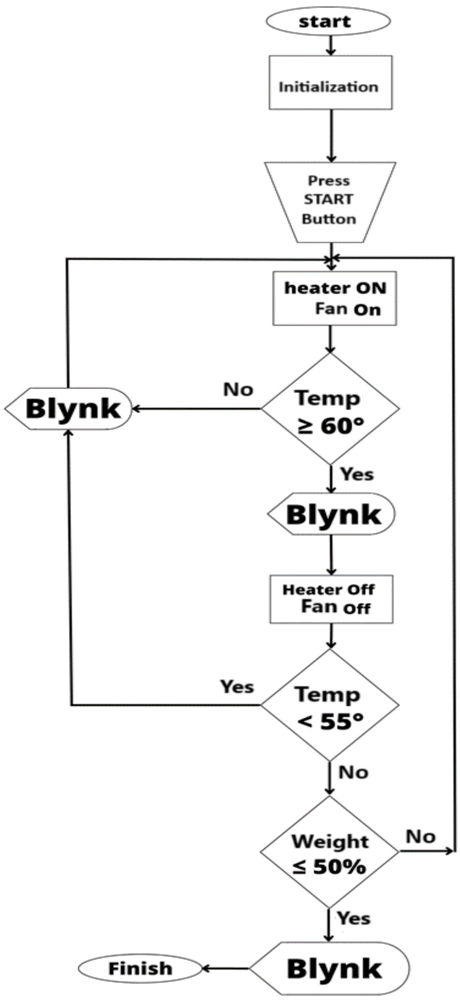

Fig. 6. Flow Chart

Fig. 7. Blynk GUI Design

GUI Blynk. Fig. 7 shows the GUI in the Blynk application on a smartphone. In the GUI display above, there are buttons for selecting the material to be dried and machine control buttons for on or off. There are two notification LEDs to indicate whether the machine is still drying or has completed the process. If drying is ongoing, the green LED will be on, and when drying is complete, the red LED will be on. To monitor the temperature inside the drying machine and the weight reduction of the drying material, there are temperature and weight displays. The user can also view graphs of the temperature rise inside the drying machine and the weight reduction of the drying material on the Blynk application. The graphs displayed in the Blynk app are available for intervals of 30 minutes, 1 hour, 3 hours, 6 hours, and live data when the drying machine is turned on.

Result and Discussion

Sensor Calibration

Temperature Sensor. This sensor, as shown in Table 1. Table 1 consist of comparison temperature readings displayed on the serial monitor with those on an analog thermometer.

Table 1. Temperature Sensor Calibration Data

Average Temperature Sensor Calibration			
Sensor	DS18B20 [°C]	Analog Thermometer [°C]	Data error [%]
1	42.25	42.75	1.09
2	42.25	40.25	5.65
3	38.75	40.25	3.91

Based on the temperature sensor testing data, the sensor performs well. The testing involves the DS18B20 two types temperature analog the from dings thermometer. The experiment results show a small error value.

Load Cell. This testing is conducted to evaluate the performance of the load cell sensor as shown in Table 2. The testing involves filling all trays with weights and turning on the drying process. This process is used to determine the accuracy of the weight measurements displayed on the serial monitor by comparing them with readings from a digital scale.

Tabel 2. Load Cell Calibration Data

Average Load Cell Calibration			
Sensor	Load Cell [g]	Digital Scale [g]	Data Error [%]
1	972.5	970.7	1.65
2	1099.2	1105.7	1.07
3	709.7	705.5	1.63
4	1098.2	1101	2.1

Based on the load cell sensor testing data, the sensor performs well. The testing involves two types of data for calculating the error value: the comparison values from the weight sensor readings using the load cell and the weight readings from the digital scale.

Tobacco Drying Test. Table 3. shows the average of initial weight tobacco before the drying process and the final weight of tobacco after drying from 3 loadcells. According to the data in the table, the load cell effectively measures weight and can be relied upon. The error value is determined by comparing the load cell readings with those from the digital scale.

Table 3. Weight of Tobacco Before and After Drying Process

Tobacco Drying Test			
	Load Cell [gram]	Digital Scale [gram]	Data *Error* [%]
Before	7571	7576	1.25
After	2269	2315	1.92

The average error obtained in the tobacco drying machine testing is 1.92%. From the average data error results, it can be concluded that the load cell is reliable with an accuracy of 98.08%. It can be seen that drying process has good results as it can reduce the weight of the tobacco down to 29,97% (load cell) and 30,56% (digital scales), more that the target weight reduction, that is 50%.

Load Cell Data Eror. Data error rate shows the data difference between serial monitor (transmitter) and Blynk server (receiver). The error rate is calculated by comparing the values from the serial monitor with values from Blynk. The result is expressed as a percentage as depicted in Table 4.

Table 4. Load Cell Data Error

Average Load Cell Data			
Load cell	Serial monitor [gram]	Blynk [gram]	Data Error [%]
1	1.847	1.847	0.114
2	1.949	1.950	0.052
3	1.913	1.914	0.131
4	1.453	1.452	0.1
	Average		0,099

In Table 1.4, the average error values obtained are as follows: Load Cell 1 shows 0.114%, Load Cell 2 shows 0.052%, Load Cell 3 shows 0.131%, and Load Cell 4 shows 0.1%. This error value is considered very small and the system is considered to be high performance system.

DS18B20 Data Error. Table 5 shows the average data error of 3 temperature sensor data. Data error obtained are as follows: 0.38% error for DS18B20 Sensor 1, 0.464% error for DS18B20 Sensor 2, and 0% for DS18B20 Sensor 3. This error value is also considered very small and the system is considered to be high performance system.

Table 5. Temperature Sensor Data Error

Average Temperature Sensor Data			
Sensor suhu	Serial monitor (°C)	Blynk (°C)	Data Error (%)
1	48.8	49.8	0.38
2	41.1	40.9	0.464
3	37.4	37.4	0
	Average		0.28

achine **Data TransmDelay.** In the
delay is measured by comparing the time sent from the serial monitor with the time received by Blynk as shown in Table 6. Several factors affect data transmission delay, including the internet speed used, network traffic density, and the distance between the sender and receiver.

The data above indicates an average data transmission delay of 1.4 seconds. Transmission delay standard by TIPHON for comparison reference of this device performance using Blynk is as Table 7. Based on TIPHON standardization, the average delay in table 6 shows index 1 in TIPHON standardization or poor service quality.

Table 6. Data Transmission Delay

Sent Time	Received Time	*Delay* (Second)
14:25:26	14:25:27	1
14:25:27	14:25:29	2
14:25:29	14:25:31	1
14::25:31	14:25:32	1
14:25:32	14:25:34	2
14:25:34	14:25:35	1
14:25:35	14:25:36	1
14:25:36	14:25:38	2
14:25:38	14:25:39	1
14:25:39	14:25:41	2
Average		1,4

Table 7. TIPHON Standardization .

Category	Large *Delay*	Index
Excellent	< 150 ms	4
Good	150 s/d 300 ms	3
Medium	300 s/d 450 ms	2
Bad	> 450 ms	1

Conclusion

Based on the results of the drying test of the tobacco drying machine, it can be concluded that the tobacco drying machine has good performance in terms of tobacco weight reduction. However, internal machine temperature during drying process still cannot reach the target temperature of 55° C. It can reduce tobacco weight down to to 29,97% (load cell) and 30,56% (digital scales) for the maximum temperature reached during the drying process is 42,75° C

Data transmission delay from the serial monitor to Blynk IoT Platform has a poor value based on TIPHON standardization. The average delay was 1.4 seconds. However, data error rate between serial monitor and Blynk is very small. The average data error rate is 0,099% for load cell data and 0,28% for temperature sensor data.

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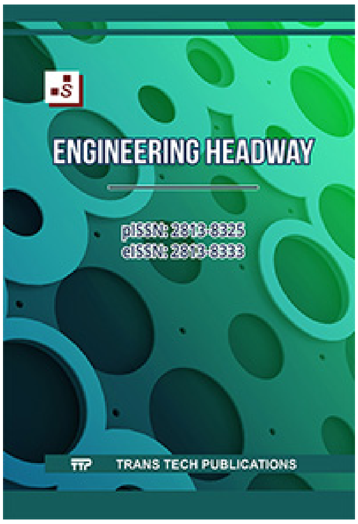

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