Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 7, Number 4, October 2023
DOI : https://doi.org/10.33395/sinkron.v8i4.13095
e-ISSN : 2541-2019
p-ISSN : 2541-044X

Information System for Monitoring Production Process of Dried Kelor Leaf Dried Using the FAST Method

I Wayan Sudiarsa[1)], I Gede Iwan Sudipa[2)*], Putu Sugiartawan[3)], Ni Made Maharianingsih[4)], Ni Kadek Nita Noviani Pande[5)]
[1)]Fakultas Teknologi dan Informatika, Program Studi Sistem Komputer, Institut Bisnis dan Teknologi Indonesia
[2*,3, 5)]Fakultas Teknologi dan Informatika, Program Studi Teknik Informatika, Institut Bisnis dan Teknologi Indonesia
[4)]Jurusan Farmasi Klinis, Fakultas Ilmu Ilmu Kesehatan, Universitas Bali Internasional, Indonesia
[1)]sudiarsa@instiki.ac.id, [2)*] iwansudipa@instiki.ac.id, [3)]putu.sugiartawan@instiki.ac.id , [4)]maharianingsih@iikmpbali.ac.id , [5)] novy.pande@instiki.ac.id

Submitted : Oct 13, 2023 | **Accepted** : Oct 15, 2023 | **Published** : Oct 17, 2023

Abstract: Moringa or Kelor leaves, rich in nutrients and health benefits, are used in many culinary, supplement, and medicinal items. However, drying moringa leaves is a crucial step that impacts product quality. Companies must maintain product quality and production efficiency to meet rising demand. Since moringa leaf drying production management is difficult, this study uses the Framework for the Application System Thought (FAST) method. Its use in moringa drying allows thorough monitoring of temperature, humidity, drying duration, and other product quality factors. According to this research, using the FAST method in the moringa leaf drying production management monitoring application will help identify production issues, prevent product damage, and improve product quality. This research improves moringa production management and helps explain FAST method implementation in industrial process management. FAST is significant for monitoring applications because it can continually monitor all production conditions that affect drying moringa leaves. FAST can immediately detect dryer humidity issues. The FAST technique and moringa drying production management monitoring applications can be used to improve product quality, operational efficiency, and consumer safety in this research. Thus, this research gives tangible answers for the moringa processing business and can be applied to other industrial sectors facing comparable production process management issues.

Keywords: FAST method; Kelor Leaf Drying Production; Production Monitoring Information System

INTRODUCTION

The Moringa Leaf Drying Production Management Monitoring process is crucial for the moringa leaf processing industry to increase quality and efficiency. The implementation of the Framework for the Application System Thought (FAST) approach is pertinent to this investigation due to the intricacy associated with overseeing the dehydration of moringa leaves. The implementation of the Framework for the Application System Thought (FAST) approach is pertinent to this investigation due to the intricacy associated with overseeing the dehydrating production of moringa. The FAST method has demonstrated its efficacy in the identification and detection of disturbances across a range of production processes (Alfajhan, 2019; Rachmad et al., 2023; Romadhani et al., 2021).

In addition, it is anticipated that this application will efficiently utilize resources, minimize waste, and enhance overall operational effectiveness (Hidayanti et al., 2023; Sudiantini & Untoro, 2023). Therefore, this study comprises substantial advantages for both manufacturers and consumers of moringa-based products, as it is firmly grounded in resolving the issues of operational efficiency and production quality that plague the moringa processing sector. Furthermore, this study holds significance in light of industry developments that are progressively placing greater emphasis on the utilization of information systems and technology to enhance production management. The advancement of information technology has created novel prospects for the continuous surveillance and regulation of manufacturing operations (Chandra et al., 2019; Tanamal et al., 2023).

*I Gede Iwan Sudipa

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The implementation of the FAST method in the monitoring application for moringa leaf drying production management demonstrates a dedication to staying abreast of the most recent industry advancements and leveraging them to enhance both product quality and operational efficiency(Andrianof, 2018).

The research aims to combine the advantages of the FAST method and monitoring applications specific to moringa drying production management, to provide targeted solutions that focus on improving product quality, operational efficiency, and consumer safety. Thus, this research not only provides concrete solutions for the moringa processing industry, but can also be adapted for other industrial sectors facing similar challenges in the management of their production processes.

LITERATURE REVIEWS

Research on monitoring using the FAST method, among others, Ricky Agustian and Prionggo Hendradi in 2021 conducted research on designing an information system for monitoring inventory of goods at PT. Sumber Laris Abadi based on android with the FAST method, and produced results in the form of an android application that can help PT. Sumber Laris Abadi in monitoring goods (Agustian & Hendradi, 2021)(Gunawan et al., 2020). Susilawati, et al in 2021 conducted research on the monitoring and evaluation system for workplace practices using the FAST method, and produced results in the form of a website-based workplace practice monitoring and evaluation application and can assist in managing student and lecturer data, field supervisors and monitoring (Susilawati et al., 2021). Riki Afriansyah, et al in 2023 conducted research on designing the remember tuberculosis application in information services and drug use compliance using the FAST method, and produced results in the form of an android-based Re-Tuberis application that can make it easier for PMOs to monitor patients (Afriansyah, 2023). Robertus Nyarso Listiyono and Roenadi Koesdijarto in 2020 conducted research on a web-based medical device information system using the FAST method at RKZ Surabaya hospital, and produced results in the form of a website application that can manage and monitor the inventory of medical devices at RKZ Surabaya hospital (Listiyono & Roenadi, 2020). Fattya Ariani, et al in 2019 conducted research on designing web-based library information systems with the FAST method, and produced results in the form of library applications that can facilitate the process of monitoring library member data and borrowing books (Ariani, 2019).

METHODS

The researchers employed the FAST method, which is commonly used in system development, in this investigation. The Framework for the Application System Thought (FAST) method is an approach to developing application systems that improves the efficiency, effectiveness, accuracy, and timeliness of data and information management. Researchers employ a six-stage process according to this methodology: Scope Definition, Problem Analysis, Requirements Analysis, Logical Design, Decision Analysis, and Physical Design.

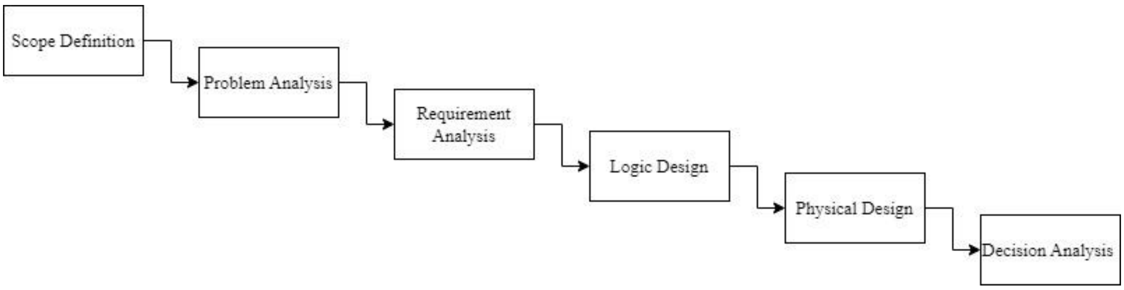

Fig. 1 Research Flow Diagram

On the basis of Figure 1, the following can be stated regarding the progression of research performed using the FAST method:

Scope Definition

This is the beginning of the study process, where scientists will first define the issues that need to be addressed in order to create a system and set boundaries for their investigation, which will only pertain to the production process monitoring information system.

Problem Analysis

During this phase, the researcher will conduct an analysis of the existing system problems by acquiring knowledge about the challenges associated with system development at the research site.

Requirement Analysis

The researcher will identify the necessary system requirements for an information system, specifically user demands and system requirements, at this stage.

*I Gede Iwan Sudipa

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Logic Design

Subsequently, the researcher initiates the planning phase in order to ascertain whether the constructed system possesses the capability to present the display to the user and functions as an intuitive web form. UML modeling is implemented in the design of applications through the utilization of Use Case Diagrams, Activity Diagrams, and Class Diagrams(Andrianto & Wijoyo, 2020).

Physical Design

At this stage researchers will plan the system interface and database, where for the database itself researchers use MySQL which is integrated with the Laravel Framework.

Decision Analysis

During this phase, the researcher conducts interviews and observations by observing the system in operation firsthand. In addition to gathering data utilized by the system, researchers will conduct an analysis of the system under development.

RESULT

System Overview

The main focus in this project is to develop a Moringa leaf drying system that uses OvenDrive IoT. OvenDrive is an IoT device that can precisely control temperature and time in an oven. This system will allow users to dry moringa leaves efficiently and monitor temperature and humidity data during the drying process. Apart from that, the system will also record the total production of dried Moringa leaves and allow users to set the temperature and time as needed.

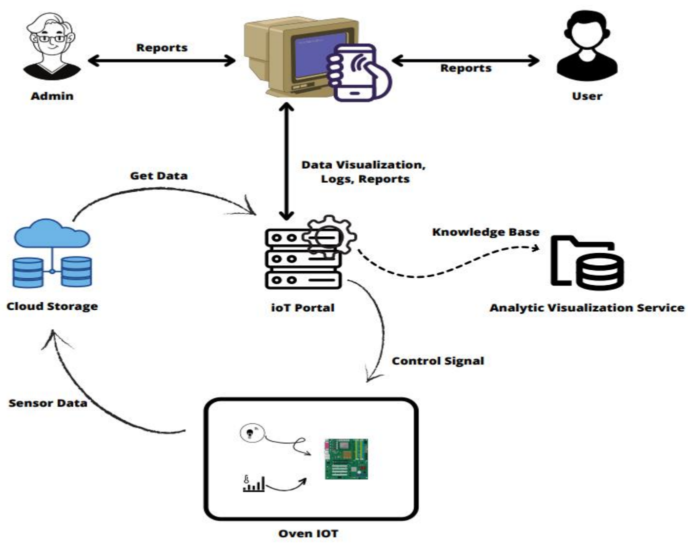

Fig.1 Design OvenDrive IoT

Analysis

In the OvenDrive IoT project, we will use UML as a tool to model the system. This approach will help in providing an expressive visual depiction of the OvenDrive IoT system, as well as making it easier for users to understand the system to be built. This analysis will include several types of UML diagrams, including use case diagrams, activity diagrams, sequence diagrams, and class diagrams.

Use Case Diagrams

Use case diagrams are a useful tool for depicting interactions between actors and systems. In the OvenDrive IoT project.

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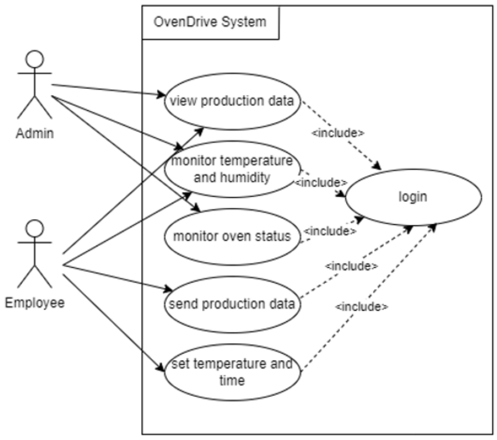

Fig. 2 Use Case Diagram English Version

Based on Figure 2, it can be explained that there are administrator users who can carry out the process - Use: view production data, access reports, monitor the drying process and monitor temperature and humidity. As well as Employee users who can carry out the process of monitoring temperature and humidity, Monitor the drying process, Set temperature and time and Send production results

Activity Diagrams

Activity diagrams will help in modeling workflows in the OvenDrive IoT system.

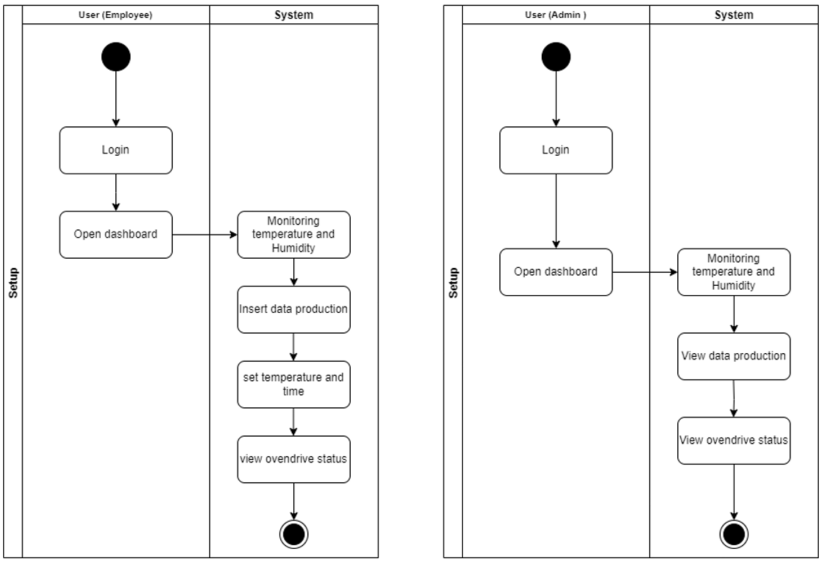

Fig. 3 Activity Diagram Monitoring Temperature and temperature

The process flow within the system can be delineated as follows, as depicted in Figure 3: the login procedure initiates the system dashboard page, which subsequently presents the following: the temperature and humidity monitoring page, the send and view production data page, the temperature and time setting page, and the view oven status page.

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Sequence Diagrams

Sequence diagrams will describe interactions and message sequences between objects in the system.

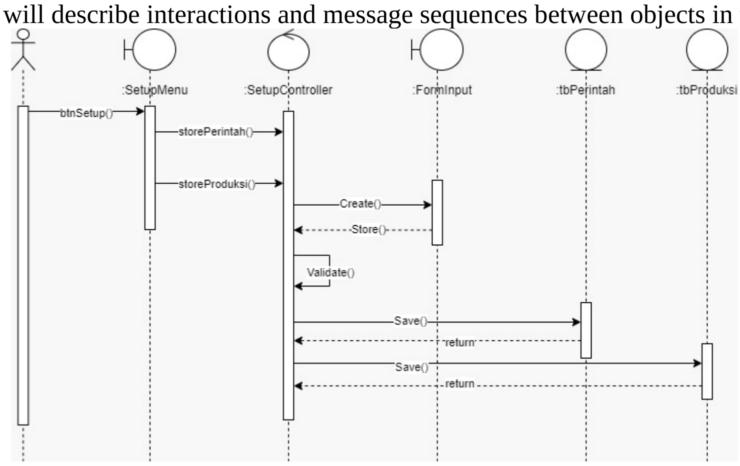

Fig. 4 Sequence Diagrams

The sequence of operations performed by user objects on the boundary setup menu can be delineated using Figure 4. Specifically, the sequence consists of the following: obtain data store commands and store production on the setupcontroller controller; subsequently, execute a get create and store operation that stores production in the entities tbcommands and tbproduction; and finally, retrieve production data from the setup controller, which is subsequently displayed on the boundary setupmenu.

Class Diagrams

Class diagrams will be used to model the class structure in the system, including relevant attributes and methods.

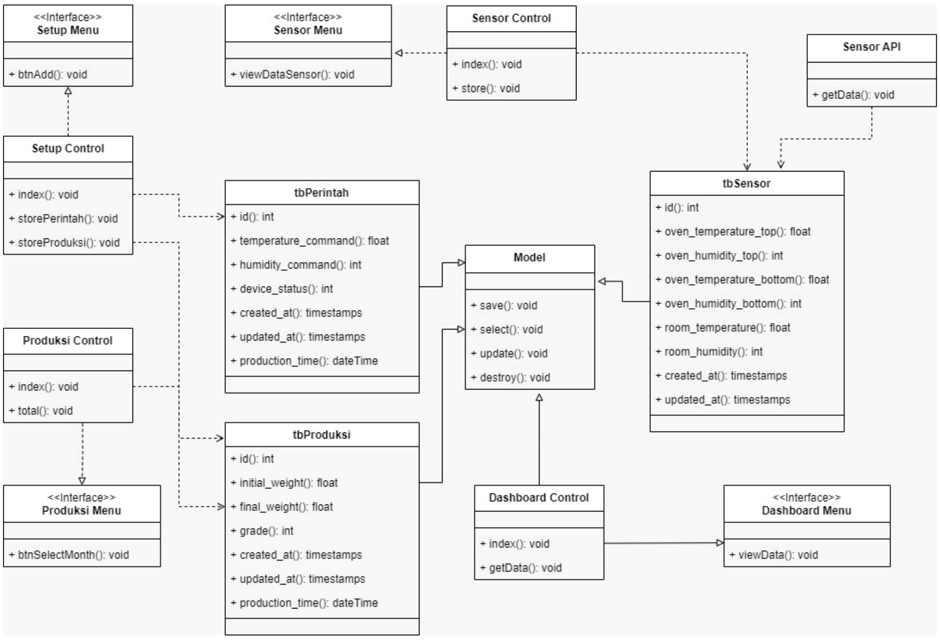

Fig. 5 Class Diagrams

The Class Diagram depicted in Figure 5 includes the tbGovernment table, which is utilized to store command data including id, temperature_command, humidity_command, device_status, created_at, and update_at; and the tbProduction table, which is employed to store production data including id, initial_weight, final_weight, grade, created_at, and update_at. id, oven_temperature_top, oven_humidity_top, oven_temperature_bottom, room_humidity, created_at, and update_at are some of the sensor data objects that are stored in the tbSensor. SetupController contains the functions function index, storeGovernment, and storeProduction; ProductionController contains the functions function index and total; SensorController contains the functions function index and store; and DashboardController contains the functions function index and getData and sensorView. In addition, the interface features the following menus: Setup (btnAdd), Production

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(btnSelectMonth), Sensor (viewDataSensor), and Dashboard (viewData). In addition, certain varieties include save and select capabilities. In the image above, one can also see a Sensor API containing the getData function.

Data Communication

By utilizing an API, the OvenDrive IOT system will link the OvenDrive to the server. Periodically, the OvenDrive IoT will utilize this API to transmit temperature and humidity data to the server. The server shall retrieve the aforementioned data through HTTP requests and subsequently furnish the OvenDrive IOT with temperature and time configuration instructions, also through the API. By establishing efficient and coordinated communication between OvenDrive IOT and the server, this feature guarantees the server's optimal performance.

Table 1 API List Data

Method		Parameters	Data Type
InsertData	Request	id	integer
		temperature	float
		humidity	float
		created_at	timestamps
		updated_at	timestamps
	Response	id	integer
		temperature	float
		humidity	float

Based on tabel 1, it can be explained that there is a List API table with the InsertData method with Request id, oven_temperature_top, oven_humidity_top, oven_temperature_bottom, oven_humidity_bottom, room_temperature, room_humidity, created_at, and update_at and Response id, oven_temperature_top, oven_humidity_top, oven_temperature_bottom, oven_humidity_bottom, room_temperature, room_humidity.

DISCUSSIONS

Implementation

Before entering the implementation stage, it is important to remember that we have designed the front end of the OvenDrive IoT system using the Laravel framework. The next stage is evaluating the results of the system prototype by involving users(Purnomo, 2017). This evaluation aims to ensure that the initial display design that has been created meets the user's needs and expectations(Rahman et al., 2020). If during the evaluation a discrepancy is found that requires further adjustment, we will make the necessary changes.

After the display design is determined to meet user needs, we will continue with the implementation phase. At this stage, we as developers will build the overall system based on the approved design(Riyadli et al., 2020). Using the Laravel framework for the front end will simplify the process of developing this system(Yudhanto & Prasetyo, 2018). Additionally, we have also selected a sql database for this system.

Login view

The OvenDrive IoT login interface is the primary gateway to accessing this system(Zanofa et al., 2020). With a simple but professional design, users will feel comfortable when accessing it. The OvenDrive IoT login interface is designed with the goal of providing a good user experience, with a focus on ease of use and security(Putri et al., 2021). With clear and uncluttered elements, users can easily access the system by entering their login information.

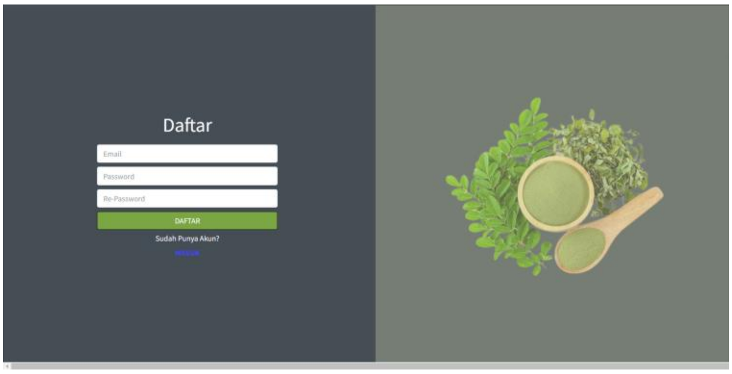

Fig. 6 Login Pages

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Temperature and humidity monitoring page

This page allows users to monitor temperature and humidity while the OvenDrive IoT machine is operating. And can monitor the temperature and humidity outside the oven.

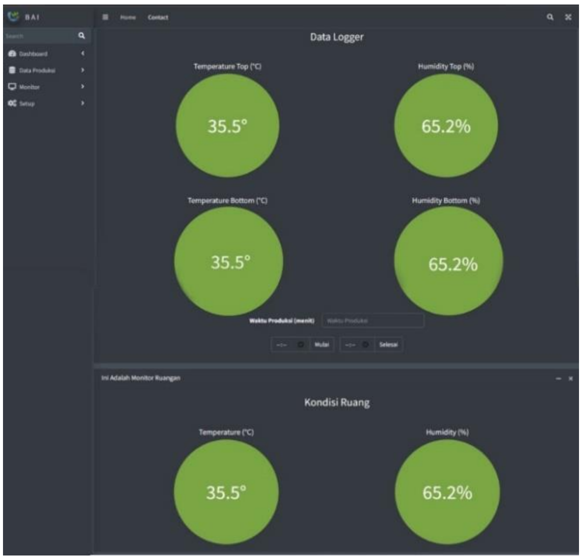

Fig. 7 Temperature and Humidity Monitoring

Temperature and time set page and production data delivery

This page allows users, particularly employees, to submit production data generated by OvenDrive IoT. And to set the desired temperature and operating time of OvenDrive IoT.

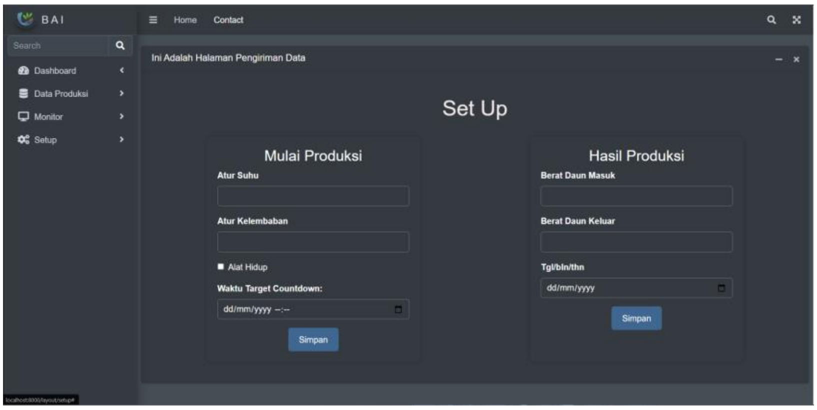

Fig. 8 Set Temperature and Time and Send Production Data

Production data page

This page allows users, especially admins, to view production data that has been collected by OvenDrive IoT.

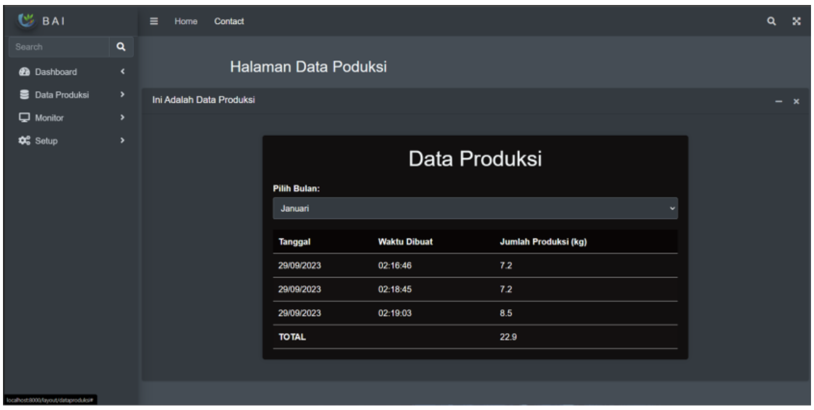

Fig. 9 Production Data Page

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All of these pages are designed with a focus on an intuitive user experience and ease of use, so users can easily monitor, organize, send, and view production data within the OvenDrive IoT system.

Blackbox Testing

System testing will include verifying accurate temperature and humidity measurements, testing temperature and time settings, and testing notifications if there are problems with environmental conditions in the oven. Black box testing includes user interface functionality as well as checking the suitability of system features(Perwitasari et al., 2020; Rachmad et al., 2023).

Table 2 Blackbox Testing

No	System Features	Testing Scenarios	Test result
1	Login Page	It's as expected	Valid
2	Temperature and humidity monitoring page	It's as expected	Valid
3	Temperature and time setup page and production data delivery	It's as expected	Valid
4	Temperature and time set page and production data delivery	It's as expected	Valid

CONCLUSION

The following conclusions were drawn from the analysis of the moringa leaf drying production management monitoring application using the Framework for the Application System Though (FAST) method: 1) The OvenDrive IoT system was developed through the implementation of a series of methodical procedures. The primary phase entailed the development of the front end interface utilizing the Laravel framework, with a specific emphasis on meeting the requirements and anticipations of the users. Evaluation of the prototype ensures that the design meets the requirements of the users; modifications are implemented in the event that any inconsistencies are discovered. 2) Once the design has been deemed suitable, the implementation phase commences with the construction of the entire system in accordance with the approved design. It is anticipated that utilizing the Laravel framework for the front end will streamline the development procedure. Technical considerations also factored into the decision to implement a SQL database for this system. 3) Security and usability were prioritized in the design of the OvenDrive IoT front end, which includes the login page, monitoring pages for temperature and humidity, time and temperature configurations, pages for submitting production data, and pages for accessing production data. It is anticipated to deliver a positive user experience. 4) Blackbox testing was incorporated into the system testing process, consisting of test scenarios that encompassed critical features. As demonstrated by the test results, every feature has been examined and found to be legitimate.

ACKNOWLEDGMENTS

Thanks to the Ministry of Education, Culture, Research and Technology (Kemedikbudristek) of the Republic of Indonesia for funding the Kedaireka Matching Fund Grant, DRPM INSTIKI for its support, research partners and various parties who have supported this research so that it runs smoothly and successfully.

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*I Gede Iwan Sudipa