

DEVELOPMENT OF CHATBOT APPLICATIONS AS AN INFORMATION SEARCHING MEDIA IN THE FARMING SECTOR

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ABSTRACT

Dinas Ketahanan Pangan Dan Peternakan Provinsi Jawa Barat is a element organizer of Pemerintah Provinsi Jawa Barat has task principal for doing affairs government field of food and field of farm. Dinas Ketahanan Pangan Dan Peternakan Provinsi Jawa Barat continues strive improve knowledge breeder in field farm as farm cultivation. The Lack of information media owned, makes it difficult for farmers to get information and knowledge in farm cultivation. Therefore a chatbot application was built. Chatbot is one form of NLP (Natural Language Processing) application. This system is used to facilitate users in searching for information that contains information on knowledge in livestock cultivation to help farmers increase their farmers' knowledge about cultivation. This platform provides NLP (Natural Language Processing) services that make chatbots smarter so they can refute the intent of what users are asking. The results showed that 72% of farmers agreed that this chatbot application could help farmers increase their knowledge of livestock cultivation and 78% agreed to make it easier for farmers to find information on livestock farming.

Keywords : Farming, Chatbot, Natural Language Processing (NLP), Dialogflow

1. INTRODUCTION

Dinas Ketahanan Pangan Dan Peternakan Provinsi Jawa Barat is a element organizer of Pemerintah Provinsi Jawa Barat. Based on West Java Governor Regulation Number 66 of 2016 Dinas Ketahanan Pangan Dan Peternakan Provinsi Jawa Barat has the main duty to carry out government affairs in the field of food and agriculture, sub-affairs of livestock, including the availability and distribution, consumption and development of human resources, livestock production and animal health and veterinary public health which are under the authority of the Province, to carry out deconcentration tasks until they are formed The Governor's Secretariat is the Deputy of the Central Government and carries out co-administration tasks in accordance with his field of work [1].

In the mission Dinas Ketahanan Pangan Dan Peternakan Provinsi Jawa Barat strive to increase the productivity of livestock and livestock businesses that are environmentally sound and competitive, namely by conducting training to provide knowledge in livestock farming. Based on the results of evaluation of training activities from Dinas Ketahanan Pangan Dan Peternakan Provinsi Jawa Barat in 2017 It was found that the average pre-test of farmers' knowledge in livestock cultivation was 64.2%, in this case the department continued to improve farmers' knowledge to support the success of good farming practices. From the results of the questionnaire given to 15 breeders 60% said they had never studied knowledge in livestock farming. Based on interviews with the Head of Balai Pelatihan Peternakan Dinas Ketahanan Pangan Dan Peternakan Provinsi Jawa Barat, the limited budget or cost of carrying out training is an obstacle owned by the agency because it cannot accommodate all farmers to attend training held annually. So that the information provided in all livestock cultivation knowledge cannot be obtained by all breeders, and this makes farmers who cannot participate in training, unable to increase their knowledge in livestock farming because of the difficulty in obtaining information for knowledge in livestock cultivation held of Dinas Ketahanan Pangan Dan Peternakan Provinsi Jawa Barat.

The solution proposed to overcome this problem is to build a Chatbot application. The application of chatbot can be applied in the form of NLP (Natural Language Processing) which is one of the Artificial Intelligence fields to study communication carried out by humans with computers through natural language. Information retrieval using computational language models of nature is useful to facilitate communication between humans and computers, so that they can interact with each other [2]. Based on the results of questionnaires from 15 100% breeders agreed to be built a system that facilitates communication between farmers and computers with natural languages, namely in the form of chatbots because the delivery of information through chatbots can make it easy to get the desired information. And from the results of the questionnaire 15 farmers 53.3% used gadgets / smartphones as a support in using the application. Currently the platform is used

to develop Chatbot, one of which is API.AI or what is now called Dialogflow. This platform provides services NLP (Natural Language Processing) and NLU (Natural Language Understanding) that can make chatbots smarter and can understand the intent of what is asked by the user. Dialogflow can act as the brain of Chatbot which will determine what response the Chatbot will give to its users [3].

From the proposed solution, the authors hope that the chatbot application that will be built can overcome the above problems. Therefore the author wants to do this final project research with the title ”**DEVELOPMENT OF CHATBOT APPLICATIONS AS AN INFORMATION SEARCHING MEDIA IN THE FARMING SECTOR**”.

2. RESEARCH CONTENT

2.1 Theoretical Basis

To support the making of this report, it is necessary to state matters or theories relating to the problem and the scope of the discussion as the basis for making this report.

2.1.1 Farming

Farming is all matters relating to the protection of physical resources, seeds, seeds, going, breeding ruminants, feed, tools and machinery for livestock, livestock cultivation, harvesting, post-harvest, processing, marketing, business, financing, as well as facilities and infrastructure[4].

2.1.2 Chatbot

Chatbot is a computer program designed to be able to interact with humans through text and sound. Chatbot is usually also equipped with artificial intelligence and natural language processing which makes it a smart computer program and can answer questions given by humans. Many existing chatbots are built according to the topics and problems that someone wants to solve for personal or business purposes. In the chatbot a knowledge model has been embedded to answer questions that are in accordance with the context that has been prepared [3]. Where chatbots are designed by providing knowledge within the system which will then be matched from the question patterns entered. Information provided by chatbots can provide relatively fast and short information because the information needed will be directly provided by the chatbot [5].

2.1.3 Natural Language Processing (NLP)

Natural Language Processing (NLP) is a language processing, such as oral and written by humans in carrying out daily conversations through computers. The computational process for language processing is done, must be represented in a series of symbols that meet certain rules. In the process, NLP will make the computer understand from every command or standard of language that is usually written or done by men. The output of the standard

answers entered by the user is based on the meanings summarized from the input [6].

2.1.4 Dialogflow

Dialogflow is a platform that can be used to develop chatbot applications by applying the concept of natural language. Intent and Context in Dialogflow are used as a concept to model the behavior that exists on chatbots. So Dialogflow will map every input entered by the user and Dialogflow will determine the action or response that will be carried out by the bot. To be able to distinguish input made by users who have the possibility of different intentions from the previous user's input, the context will make an understanding of each input obtained. The first stage when the user enters data into Dialogflow, it will be matched to each word pattern in Dialogflow. To handle the input results that do not match the purpose of the previous input, Dialogflow has the Default Fallback Intent. In doing matching can be limited by getting some contexts that are likely to have a match so that it can add and delete the intended context. So that with this system and context it can make provisions to develop chat-bots that have large complexity and current [7].

2.1.5 Android

Android is an operating system from Google whose distribution is done in open source, so that the Android operating system can be managed by various parties because it does not require a special license in this operating system. Linux is the basis of this operating system that is specifically intended for smartphone users. Each version, the Android operating system has a different version, until August 19, 2015, the version of the Android operating system that has been released reached 23 API levels. API (Application Programming Interface) can be used as a tool or container to be able to develop a software consisting of commands, functions, and protocols that are in the operating system and commonly used by programmers. Programmers can use the API to perform standard functions in the operating system to be able to interact [8].

2.1.5 Google Maps

Google Maps API is a device from Google that can provide services to users to be integrated into an application to provide a location to users who can help and provide convenience to users. Javascript is a library used by Google Maps. In Google Maps there are Markers that can be used as a sign to position a place on the map. Google Maps has several map models that can be chosen by users, namely map models such as Map, Satellite and Hybrid [9].

2.2 Research Methods

The research methodology used in this study is to use descriptive methods, namely by describing all data to be analyzed and compared based on

ongoing reality and then try to provide solutions to existing problems [10].

2.2.1 Data Collection Phase

Data collection methods used in this study are as follows:

a. Interview

Data collection by conducting interviews directly with the Head of the Office of Balai Pelatihan Peternakan Dinas Ketahanan Pangan Dan Peternakan Provinsi Jawa Barat on existing problems.

b. Literature Study

Pengumpulan data melalui informasi yang diperoleh dari buku atau literatur, jurnal, penelitian-penelitian khususnya mengenai chatbot dan peternakan.

c. Observation

Data collection by conducting research and review directly in Dinas Ketahanan Pangan Dan Peternakan Provinsi Jawa Barat and the field of problems that are currently happening.

d. Questionnaire

Data collection by giving questionnaires to farmers to find out the existing problems.

2.2.2 Software Development Phase

The software development method used in this study is the Ian Sommerville (2011) waterfall method [11], the waterfall method was chosen because the stages of each process are appropriate and in accordance with the development of this chatbot application. The following stages of the waterfall model can be seen in Figure 2.1

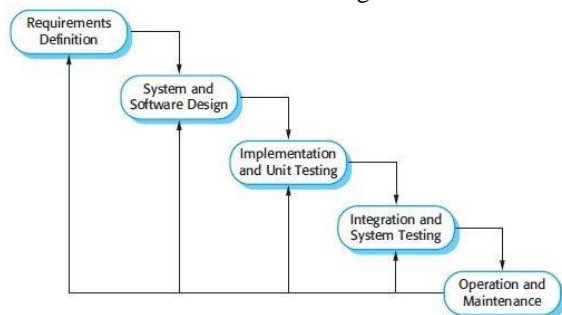


Figure 2.1 Waterfall Model

1. Requirements Definition

Requirements Definition is a step to analyze every need in the development of this chatbot system, such as re-identifying problems, understanding user needs and system functionality.

2. System and Software Design

System and Software Design is the design stage of the design to translate from the needs analysis of the chatbot system which is built into an expected application design, before going to the next stage.

3. Implementation and Unit Testing

Implementation and Unit Testing is the stage of implementation to translate data or problems that exist in designing into a programming language.

4. Integration and System Testing

Integration and System Testing is the testing phase that is carried out after the coding phase is complete, the testing phase aims to determine the chatbot system that was built whether it has been running in accordance with existing functionality.

5. Operation and Maintenance

Operation and Maintenance is a maintenance phase that is carried out after the construction of the chatbot system has been completed and has been used by the user.

2.3 Results and Discussion

The following is a discussion of the chatbot application that will be built along with the results.

2.3.1 Solution Built

Based on an analysis of the existing problems, a media that can be used to find information about knowledge in livestock farming is needed. The media is in the form of a chatbot application. The following are the characteristics of the chatbot that will be built:

1. Users can interact with bots to increase knowledge in livestock farming.
2. Users can interact with bots to get information about livestock cultivation.
3. Users can interact with bots interactively like humans.

2.3.2 Data analysis

Data analysis is an analysis of the data needed in this study, to support the process of building a chatbot application. The details of information that can be provided by the chatbot application are knowledge about livestock cultivation and information on the location of animal husbandry consultations which can be seen in Table 2.1 and Table 2.2.

Table 2.1 Animal Cultivation Material

No	Material Name	Material Type
1	Domba	Pemilihan Bibit
		Pakan
		Penyakit
		Perkandangan
2	Sapi Potong	Pemilihan Bibit
		Pakan
		Penyakit
		Perkandangan
3	Sapi Perah	Pemilihan Bibit
		Pakan
		Penyakit
		Perkandangan
4	Itik	Pemilihan Bibit
		Pakan
		Penyakit
		Perkandangan
5	Ayam Buras	Pemilihan Bibit
		Pakan
		Penyakit
		Perkandangan

Table 2.2 Location of Consultation

No	Name	Address
1	Balai Pelatihan Ketahanan Pangan dan Peternakan	Jl. Raya Tangkuban Perahu KM. 22 Cikole Lembang Telp. (022) 2787107
2	Balai Perbibitan dan Pengembangan Inseminasi Buatan Ternak Sapi Perah Bunikasih Cianjur	Jl. Padalengsar RT 01/09 Ds. Bunikasih Kec. Warungkondang – Cianjur Telp. (0263) 2283108
3	Balai Perbibitan dan Pengembangan Ternak Sapi Potong Ciamis	Dsn. Kidul Kec. Cijeunjing Kab. Ciamis Telp. (0265) 772170, 771059
4	Balai Pengembangan Perbibitan Ternak Domba Margawati Garut	Jl. Margawati KM. 7 Kel. Sukanegla Kec. Garut Kab. Garut Telp. (0265) 4772666
5	Balai Pengembangan Perbibitan Ternak Unggas Jatiwangi Majalengka	Jl. Raya Loji KM. 35 Jatiwangi 45454 Majalengka Telp. (0233) 881622

2.3.3 System architecture

System architecture analysis is an analysis of the architecture design in the chatbot application that will be built. A system can be defined as a unit consisting of two or more components or subsystems intended to achieve a goal[12]. This application, named SiPeter, is a system that can interact using human language in conducting conversations. The application in the siPeter application is a chat application, where users can interact directly with Chatbot. In this application the user can do question and answer to get the information needed. siPeter provides answers according to the knowledge base they have.

In this system architecture, the development of the chatbot application will use the services described by the previous author, using the Android platform and Dialogflow NLP services. In order for chatbots and data management systems to interact, design is needed to support this. For system architecture images can be seen in Figure 2.2 System Architecture.

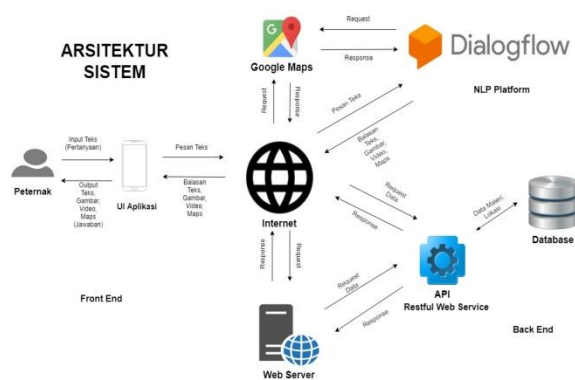


Figure 2.2 System Architecture

The following is an explanation of the system architecture in Figure 2.2:

1. Interaksi User – UI Aplikasi

Users input text on existing interfaces to get the information needed. After the text is inputted, the input results will be processed to the next stage, namely the request to Dialogflow.

2. Request Dialogflow

After the user input the text on the interface. Dialogflow will check the words or sentences entered by the user, then each word or keyword will be entered into the brainfile in the system.

3. Respon Dialogflow

Then Dialogflow responds, after matching the words in the brainfile. In the Dialogflow response it will provide output to the user according to the input results provided by the user.

4. Balasan Dialogflow

After that the user will receive from the response the answer given by Dialogflow from the input results provided where the output on the chatbot will be text, video and maps.

5. Database

Admin input data in the database to manage data, which in this database to manage material data and locations which will then be brainfiled in chatbots.

6. Rest API request Database

Rest API requests to be able to access data in a database as brainfile, namely by converting input values into string or array values to be able to retrieve data or brainfiles in the database.

7. Dialogflow request Rest Api

Dialogflow requests to Rest Fire to be able to access brainfile in the Database by converting input values to string values or arrays by Rest Fire which will be sent to brainfiles in the Database.

8. Dialogflow request Google Maps

Dialogflow requests to Google Maps to request brainfiles in the form of location data. Where Google Maps is used as a brainfile to

provide responses in the form of locations or maps to users.

2.3.4 Technology Analysis

Technology analysis is the stage of analysis of the technology used in the development of this chatbot application, namely by identifying each of the stages. The technology used to build this chatbot application is Dialogflow. In the analysis of Dialogflow technology that was built there are two analysis of Dialogflow technology, namely analysis of Dialogflow technology for material objects and technology analysis for Locations.

1. Dialogflow Analysis of Material Objects

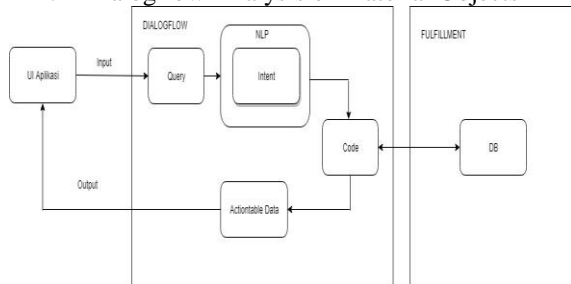


Figure 2.3 Dialogflow Analysis Object Material

Figure 2.3 is a general description of how it works within the Dialogflow platform for Material objects.

- A user in this case the farmer sends a text message to the device or application.
 - The application or device sends a message inputted by the farmer to Dialogflow
 - The message that is covered by the farmer will be categorized and matched in the intent, intent is a Natural Language Processing process that is on Dialogflow.
 - After categorizing and matching and finding keywords, the keywords will be forwarded to the code.
 - The keyword will be checked to Fulfillment Dialogflow, Dialogflow will check the brainfile that is in the Database to find answers to the keywords that are obtained and then give the system a response.
 - A database that functions as brainfile will send back the required information to Dialogflow.
 - Dialogflow will receive information provided by the Database.
 - Then the Code will forward the information obtained to the action table of the data generated.
 - The data or information will be sent back to the output of the Application or Device.
 - Users or breeders will get a response based on the results of the text input.
2. Dialogflow Analysis of Location Objects

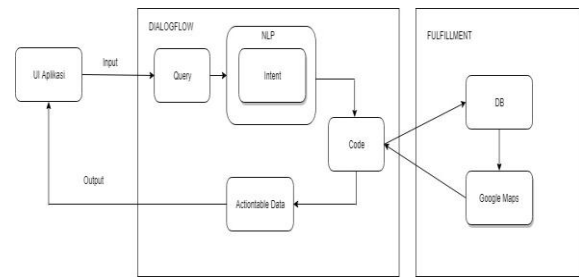


Figure 2.4 Dialogflow Analysis of Location Objects

Figure 2.4 is an overview of how it works within the Dialogflow platform for Location objects.

- A user in this case the farmer sends a text message to the device or application.
- The application or device sends a message inputted by the farmer to Dialogflow.
- The message that is covered by the farmer will be categorized and matched in the intent, intent is a Natural Language Processing process that is on Dialogflow.
- After categorizing and matching and finding keywords, the keywords will be forwarded to the code.
- The keyword will be checked to Fulfillment Dialogflow, Dialogflow will check the brainfile that is in the Database to find answers to the keywords that are obtained and then give the system a response.
- A database that functions as brainfile will make a request to Google Maps to get the location needed by the user.
- Google Maps will send back the required information to Dialogflow.
- Dialogflow will receive information provided by Google Maps.
- Then the Code will forward the information obtained to the action table of the data generated.
- The data or information will be sent back to the Application / Device output.
- Users or breeders will get a response based on the results of the text input.

2.3.5 Use Case Diagram

Use case diagram is a stage for the description of every functional requirement that exists in the development of this chatbot application [13]. Use case diagram in the construction of the chatbot system can be seen in Figure 2.5 Use Case Diagram.

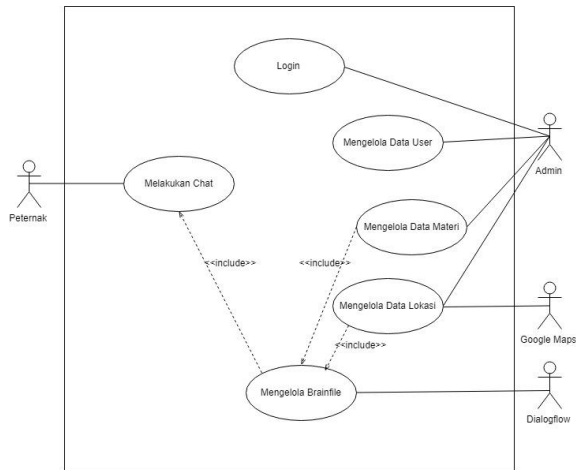


Figure 2.5 Use Case Diagram

2.3.6 Use Case Definition

Use Case definitions are used to define each functional that exists in the built-in chatbot application. Use Case Definition can be seen in Table 2.3.

Table 2.3 Use Case Definitions

No	Use Case	Description
1	Melakukan Chat	Is a process that is carried out to get information through chat
2	Login	Is a process for authenticating users to be able to enter the system
3	Mengelola Data Materi	Is a process used to process material data
4	Mengelola Data Lokasi	Is a process that is used to process location data
5	Mengelola Data User	Is a process used to process user data
6	Mengelola Brainfile	Is a process for managing brainfile

2.3.7 Activity Diagram

Activity Diagram is a depiction of every activity carried out by the system in performing every functional that exists in this chatbot application. Activity Chat Do Diagram can be seen in Figure 2.6.

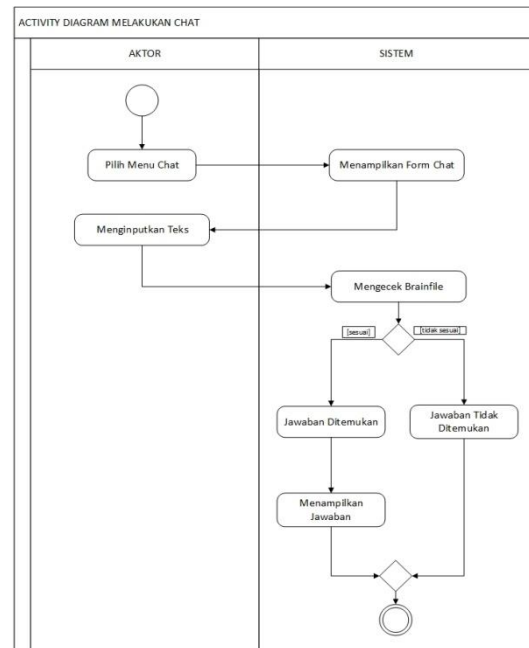


Figure 2.6 Activity Diagram Melakukan Chat

2.3.8 Class Diagram

Class Diagram is the design stage for each class to build this chatbot application. Class Diagrams can be seen in Figure 2.7.

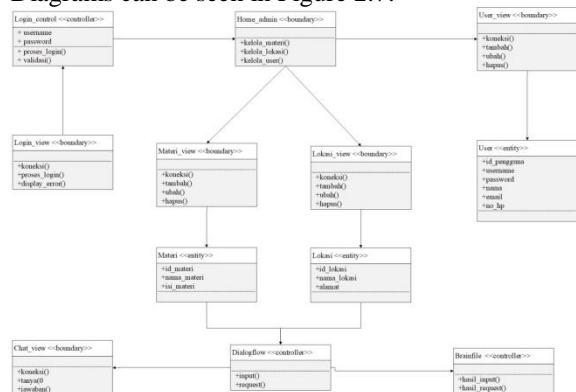


Figure 2.7 Class Diagram

2.3.9 Sequence Diagram

Sequence Diagram is a step to describe the flow or process of each interaction that is the object in Use Case. Sequence Diagram Chat on an application built can be seen in Figure 2.8.

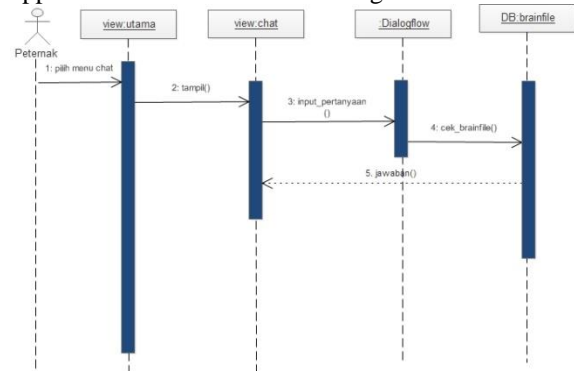


Figure 2.8 Sequence Diagram Melakukan Chat

2.3.10 Interface Design

Designing the interface is the stage for interface design implemented in the program on this chatbot application built.

1. Design of the Main Page Interface

Design of the Main Page Interface

The design of the main page interface is used as an interface for users or breeders to see the menus contained in the built-in chatbot application. The design of the main page interface can be seen in Figure 2.9.

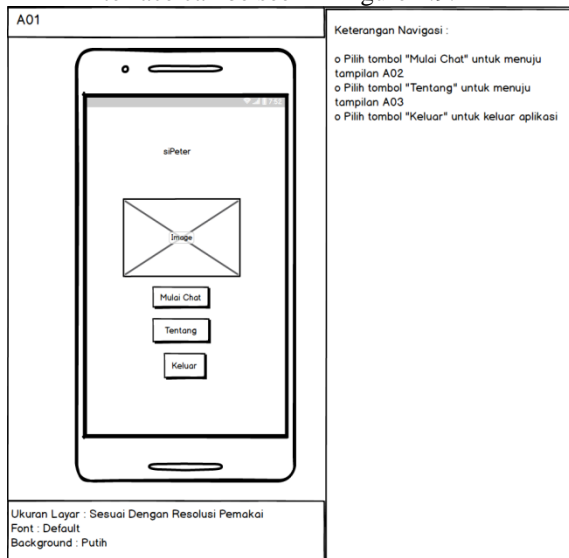


Figure 2.9 Main page

2. The design of the interface about the application is used as an interface that can be used by users or breeders to see menus about the applications contained in the built-in chatbot application. The design of the page interface can be seen in Figure 2.10.

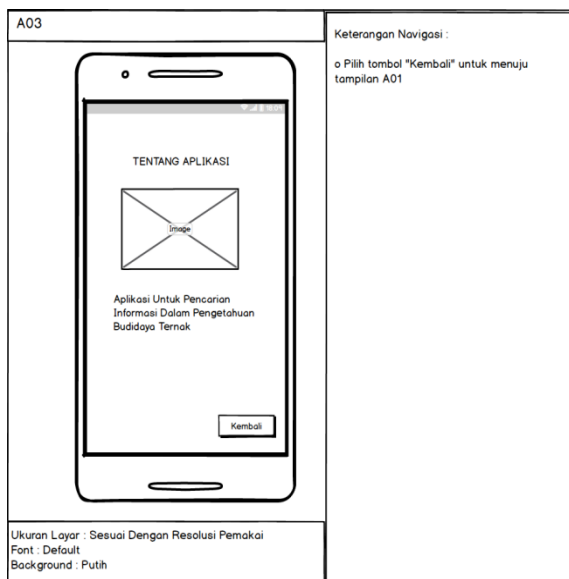


Figure 2.10 About page

3. The design of the chat application interface is used for the interface that can be used by

users or breeders to chat or answer questions related to the built-in chatbot application. Figure 2.11.

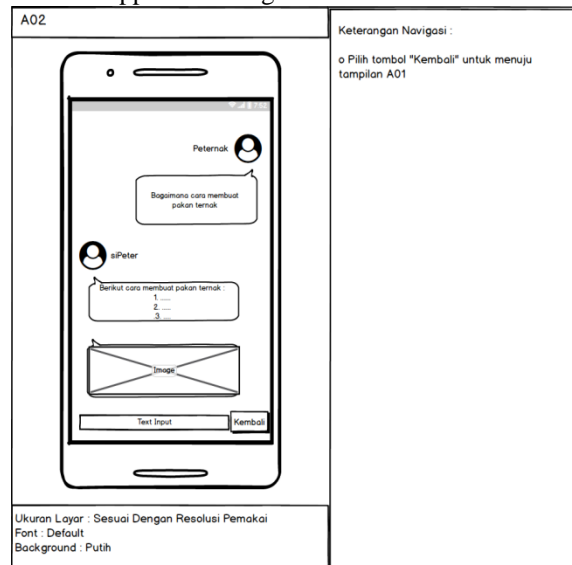


Figure 2.11 Chat Page

2.3.11 Beta Testing

Beta testing is the stage for testing the chatbot application that was built whether it has been able to overcome the existing problems objectively, namely by conducting a test directly by giving questionnaires to users to get an assessment of the chatbot application that was built.

Table 2.4 Questionnaire Questions

No	Question	Assessment				
		SA	A	N	D	SD
1	Do you agree that this application can help farmers increase their knowledge in livestock farming?	1	12	5	2	0
2	Do you agree that this application can help farmers get information in knowledge of livestock cultivation?	3	13	3	1	0
3	Do you agree that this application can help the agency in	3	13	4	0	0

	providing information and knowledge on livestock cultivation to livestock?					
4	Do you agree that this application is easy to use?	3	13	4	0	0

Information :

SA : Strongly Agree

A : Agree

N : Neutral

D : Disagree

SD : Strongly Disagree

Based on questionnaires obtained from users, then calculate to find out the percentage value of the questionnaire results.

$$Y = \frac{P}{Q} * 100\%$$

Information :

Y : Percentage value

P : Total Score

Q : Highest score

Determination of the Score of each variable given to assess the results of the questionnaire obtained can be seen in Table 2.5.

Table 2.5 Value of the Likert Scale

Scale Answer	Information	Score
SA	Strongly Agree	5
A	Agree	4
N	Neutral	3
D	Disagree	2
SD	Strongly Disagree	1

Determination of results for decisions on the value of percentage scores that have been calculated can be seen in Table 2.6.

Table 2.6 Calculation Score Interpretation

Point	Information
80% - 100%	Strongly Agree
61% - 80%	Agree
41% - 60%	Neutral
21% - 40%	Disagree
0% - 20%	Strongly Disagree

The results of beta testing of each questionnaire given to users can be seen in Table 2.7.

Table 2.7 Beta Test Recapitulation

No	Question	Score	Percentage	Decision
1	Do you agree that this application	72	72%	Agree

	can help farmers increase their knowledge in livestock farming?			
2	Do you agree that this application can help farmers get information in knowledge of livestock cultivation?	78	78%	Agree
3	Do you agree that this application can help the agency in providing information and knowledge on livestock cultivation to livestock?	79	79%	Agree
4	Do you agree that this application is easy to use?	79	79%	Agree

3. CLOSING

3.1 Conclusion

Based on research, implementation and testing of the development of chatbot applications, the authors draw the conclusion that namely:

1. Farmers can increase their knowledge in livestock farming.
2. Farmers can find out information in the knowledge of livestock cultivation.
3. Dinas Ketahanan Pangan Dan Peternakan Provinsi Jawa Barat is helped to provide information in the knowledge of livestock cultivation to farmers..

3.2 Suggestion

To develop this interactive media application in order to improve the application better, the suggestions from the author are :

1. In the chatbot application multiplying the brainfile will make the chatbot smarter to be able to give many responses and answers.

2. In order for material data to be more orderly, it is necessary to classify or categorize material data.

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