The Development of a Laundry Location Tracking Application Model Based on Artificial Intelligence and Mobile Computing

Muhammad Chaizir*, Dahlan Abdullah, Muhammad Daud

Department of Information Technology, Universitas Malikussaleh, Aceh, Indonesia

*Corresponding Author Email: mchaizir@gmail.com

Abstract

There is a lack of information systems that can facilitate the laundry business in reaching the market, so an application is needed to provide information to be known by many people in the city of Banda Aceh. One is by delivering information using the nearest laundry location search application. With the help of the internet and smartphones, it can make it easier for people to find the nearest laundry. The researcher is interested in designing a smartphone application to provide information on the nearest laundry. This study aims to create information media to develop an artificial intelligence-based laundry location search application model and a laundry location search application model with mobile Computing in Banda Aceh. The stages of this research are field observation, application design and design, application trials, research implementation permits, research data collection, and analysis of research results. The research implementation is located in the city of Banda Aceh. This research method is included in the Research and Development (R&D) development category. The data collection used is as follows: notes on the results of interviews, field observations, and data related to informants. The results of this study are in the form of an application that provides information on the location of the nearest laundry from a distance of the user automatically when the application is run, and the user can search for the lowest price, 4+ star branches, and laundries that provide Pickup services.

Keywords: *Artificial Intelligence, Mobile Computing, Tracking Application, Android, Laundry.*

1. Introduction

The mobile application has become an application that is very familiar among the public; where this portable device is one of the gadgets that cannot be separated from everyone in the world, especially in the current era, this mobile gadget is a smartphone in which many applications help the community in getting information between fellow humans, buying and selling goods such as on the marketplace and location information such as google maps.

Google maps are comprehensive and general, so not all places, especially laundry that we need, are recorded in detail in this application due to the general knowledge of some laundry owners in recording their laundry so that they are not recorded on google maps and the lack of specific information about laundry services in this application. Therefore, the researcher wants to develop an application with unique details on the laundry business so that it is easier and more efficient for people to know the location of the nearest laundry and recommend the best laundry based on the satisfaction of other customers.

Today Artificial Intelligence is essential in increasing customer loyalty and customer relationships. Artificial intelligence can complement for humans to be able to reduce the level of decision-making based on personal beliefs [1]. The role of Artificial Intelligent (AI) in this study is meant to focus on a mobile application system that can process laundry data to provide the nearest information, calculate distances, and recommend good laundry services based on the results of the assessment and the consequences of laundry grades that have been previously subscribed to from other customers who have been using the laundry service to application users based on the location at the laundry customer position.

Laundry is one type of business engaged in clothes washing services, which makes it easy for people to wash clothes when life is busy so they can't take care of their laundry. Laundry service is a service for washing dirty clothes until they are dry and ready to use, in the sense that the clothes that were initially brought to the laundry service are dirty. When the consumer receives them back using the laundry service, the clothes are ready to be reused; they are clean, neat, and ironed. The tariff determination is based on the number of kilograms of clothes in the laundry [2].

Based on observations and interviews from one of the laundromats in the city of Banda Aceh named Berkah Laundry, it is clear that there is still a lack of laundry information systems that can facilitate laundry in embracing the market, so there is a need for applications that can provide information on their laundry to be known by many people in Banda Aceh City

So that people can easily find out the nearest laundry location, it is necessary to improve services in the information-based laundry market by applying Artificial Intelligent (AI) technology which is multiplying. One is by conveying information through mobile smartphone media, namely by using the application to find the nearest laundry location to make it easier for the people of Banda Aceh.

Based on the above background, researchers are interested in conducting research titled "Development of an Artificial Intelligence and Mobile Based Laundry Location Search Application Model in Banda Aceh City.

2. Literature Review

2.1. Information Technology
Information technology is currently an essential requirement for organizations or companies because information technology is intended to help work related to information processing [3]. Technology supports various types of human labor to improve convenience, effectiveness, and efficiency [4].

2.2. Database
The database is data collected in a system from various data so that it becomes a collection of data. A database is an automated collection of shared, formally defined, and controlled data. Control is centralized in an organization. The function of the database itself is to group data and information so that it is easier to understand, prevent duplicate data and data inconsistencies, and simplify the process of storing, accessing, updating, and deleting data [5]

2.3. MySQL
MYSQL is a relational database management system [6]. That is, the data managed in the database will be placed in several separate tables, so data manipulation will be much faster. MySQL is a continuation of the UNIREG project by Michael Monty Windenius and TcX (a software company from Sweden) [7].

2.4. Mobile Computing
Mobile Computing is an approach that enables the delivery of information in the form of data, voice, or video via wireless devices. The basic concept involved is an infrastructure that provides seamless connections, combining essential protocols, services, bandwidth, and portals to provide uninterrupted communication. The utilization of mobile Computing has changed the complete scenario of our daily life by delivering location flexibility, increased productivity, entertainment, and reduced time consumption. Mobile can be understood as high-tech objects that do not use cables, for example, smartphones, PDAs, and tablets [8].

2.5. Android
Android is software that operates on mobile devices, especially smartphones. Android is an operating system used on smartphones that use Linux as the basis for the operating system. Android has an open-source nature which permits anyone to develop it [9].

2.6. GPS (Global Positioning System)
Global Positioning System (GPS) is a tool or system that can inform the user where he is (globally) on the earth's surface based on satellites. Data is sent from satellites through radio signals with digital data [10].

2.7. Google Maps API
Google Maps API is a technology development from Google that embeds Google Maps in an application that Google does not make. Google Maps API is a library in the form of javascript that is useful for modifying maps on Google Maps as needed. In its development, the Google Maps API was able to take static map images. Perform geocoding, and provide directions. Google Maps API is free for the digital public [11].

2.8. Artificial Intelligence (AI)
Artificial intelligence (AI) has now opened a new phenomenon in the field of business corporations and also the government. Artificial intelligence is generally associated with a tool to find a problem and solve complex issues in various situations in business, corporations, and government fields [11].
Artificial intelligence (AI) has reached or exceeded human limits in perceptual intelligence, such as speech-to-text, NLP (natural language processing), and video comprehension. In cognitive intelligence, AI is still in the early stages of development. Cognitive intelligence will draw on ideas from cognitive psychology, brain science, and social media history. This is combined with Techniques such as cross-domain. This allows machines to understand and utilize knowledge to achieve breakthroughs to get the key to perceptual intelligence [12].

2.9. Dijkstra's Algorithm
Dijkstra's algorithm is an algorithm that is used to solve the shortest path problem for a directed graph. Dijkstra's algorithm creates a path to a single optimal node at each step. In the nth stage, there are at least n nodes whose shortest paths we already know [13].

2.10. Use Case Diagram
A use case or use case diagram is a model for the behavior (behavior) of the information system. The use case describes an interaction between one or more actors and the information system that will be created. Roughly speaking, use cases determine what functions are in an information system and who has the right to use those functions. [14].

2.11. Laundry
Laundry businesses or washing services in Indonesia are multiplying. According to data reported by SWA (2016), business development in Indonesia has increased rapidly by up to 20%. The number of laundry players is also growing, ranging from garment class laundry, commercial laundry, and kilogram laundry to laundry to serve hotels and hospitals, which is also increasing. This business can also position itself as a complementary business to developing the hospitality industry in Indonesia, ranging from hotels and hospitals to the food and beverage industry [15].

3. Methods

3.1. Research Procedure
This research was carried out over approximately seven months in 2022, including preparation and implementation. The stages and research schedule are (1) Field observations, (2) Application Design and Design, (3) Application trials, (4) Research Implementation Permits, (5) Research data collection, and (6) Analysis of research results.

3.2. Research Location
This research was conducted in Banda Aceh. This city is one of the municipalities in Aceh Province. Banda Aceh is one of the cities in Aceh, and it is the center of the capital of Aceh Province, Indonesia.

3.4. Research Design
This research is focused on product development in the form of an application to search for the nearest laundry location based on Artificial Intelligence and Mobile Computing in Banda Aceh. This research belongs to the development methods or Research and Development (R&D) category. Research and Development (R&D) are steps to develop or perfect an existing product [16].

3.3. Data Collection
Primary data can be obtained from informant sources, namely individuals or individuals such as the results of interviews conducted by researchers, namely:
a.   Record of interview results.
b.   Results of field observations.
c.   Data regarding informants.

3.6. Use Case
Use Case Diagram describes the process flow carried out by the system to be built and who interacts with the system. A set of use cases describes a system in terms of user processes on the system. The Use Case for this Artificial Intelligence-Based Laundry Search Application Model is shown in the following figure:
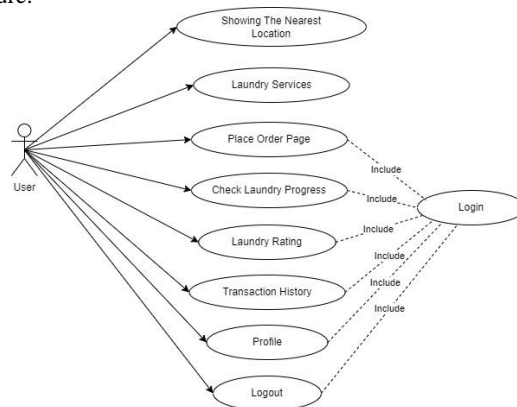

Fig 1. Use Case

3.6. Activity Diagram
An activity Diagram is a flow of activity or workflow in a system that will be run. Here's the workflow on this system.
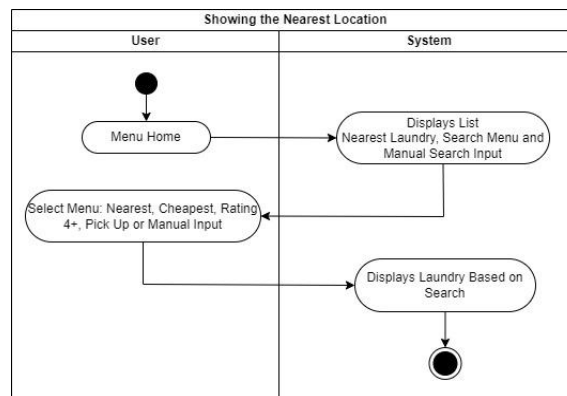a.   Activity Diagram Laundry

Fig 2. Activity Diagram Laundry
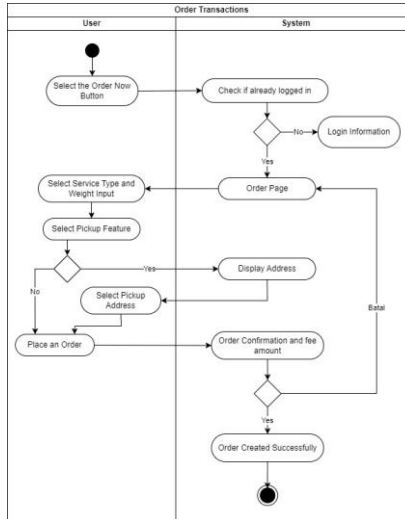
b.   Activity Diagram Order Transactions

Fig 3. Activity Diagram Order Transactions
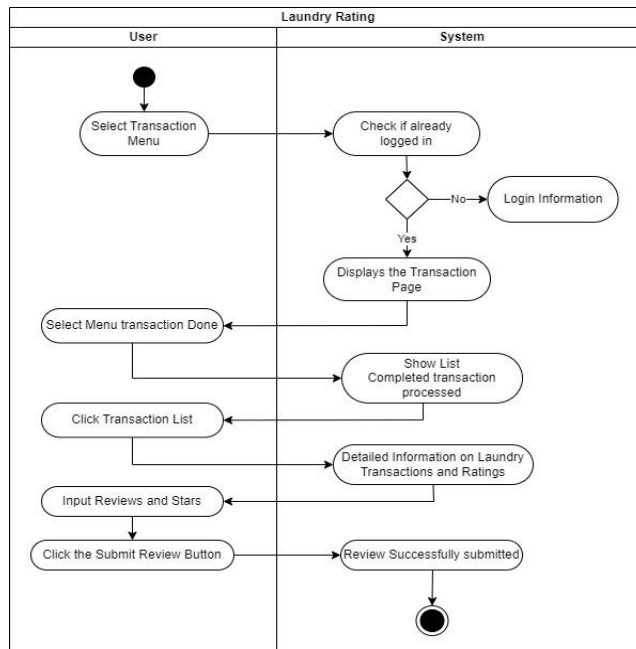
c.   Activity Diagram Laundry Value

Fig 4. Activity Diagram Laundry Value
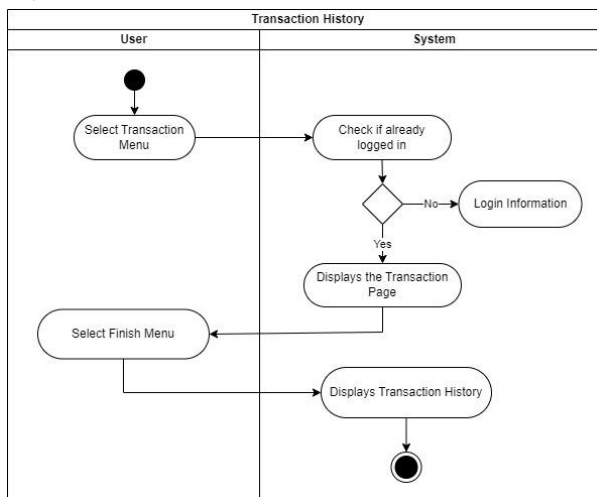
d.   Activity Diagram Transaction History

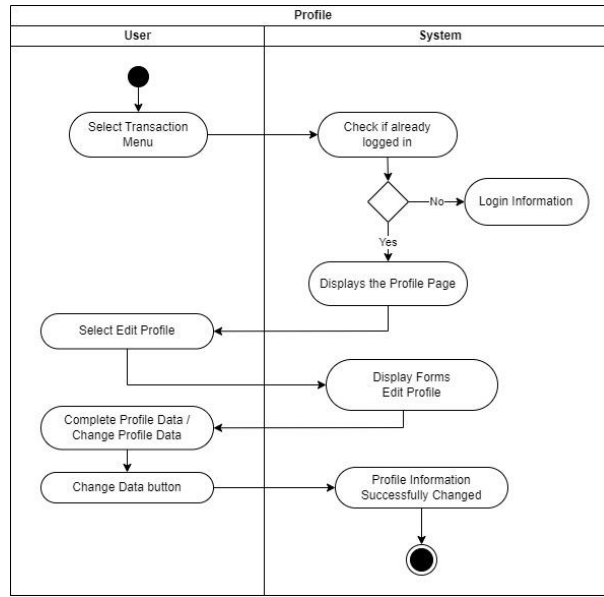**Fig. 5:** Activity Diagram Transaction History

e.   Activity Diagram Profil

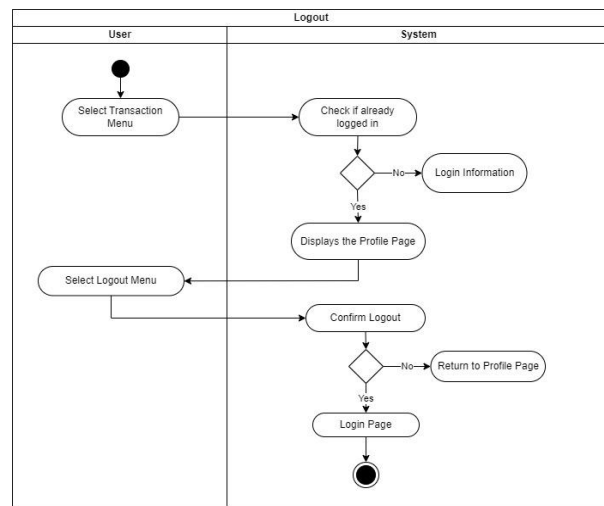**Fig 6.** Activity Diagram Profil

f.   Activity Diagram Logout

Fig 7. Activity Diagram Logout

3.6. Sequence Diagram

A sequence diagram is an image of the interaction between objects in each use case in a time sequence. This interaction is in the form of sending a series of data between interacting objects.
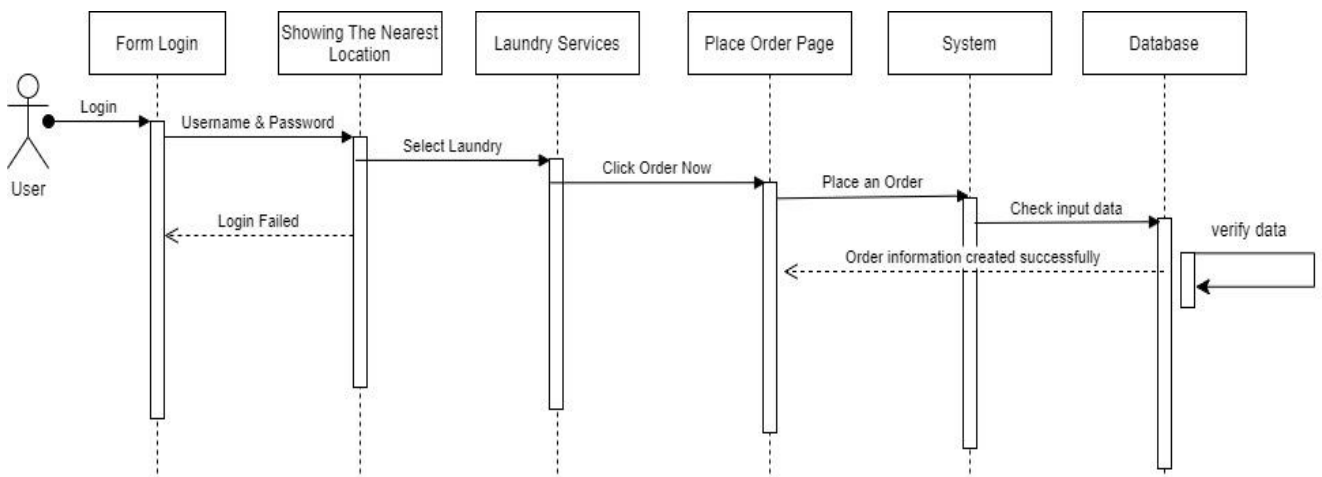

Fig 8. Sequence Diagram

3.7. Class Diagram

Class diagrams describe the structure and relationships between the objects contained in the system. The design includes the attributes and methods that exist in each class. The following is a class diagram image of this system.

Fig 9. Class Diagram

4. Results and Discussion

Based on the design and analysis of the research problem formulation, the researchers produced a laundry location search application based on artificial intelligence and mobile Computing in the city of Banda Aceh. The description of system implementation can be explained in the following description.

4.1. Software Implementation

The resulting application can run normally using the appropriate software specifications, for example, in Table 1.

Table 1. Software Specifications

Software Name	Specification
OS	Androids
Expo SDK Version	46.0.0
ReactNative	0.69.5
Backend	Laravel (PHP language)
frontend	React Native (Javascript Language)

4.2. Hardware Implementation

When using the built system, hardware is needed to run the system, where the required device is an Android phone; the minimum requirements are given in Table 2 as follows.

Table 2. Minimum hardware specifications

Device Name	Specification
RAM	1GB
Internal Memory	4GB
GPS version	29.19.15.220149

4.3. Implementation of Dijkstra's Algorithm

This research uses Dijkstra's algorithm to calculate the distance to the closest laundry and an overview of the application of Dijkstra's algorithm in this study.

1. The laundry location graph uses a weighted chart that retrieves distance information between points from Maps and calculates the distance from one point to another in kilometers. The value at that distance is the weight of each edge, so the graph is declared as a weighted graph, as shown in Figure 10, it is a weighted graph.
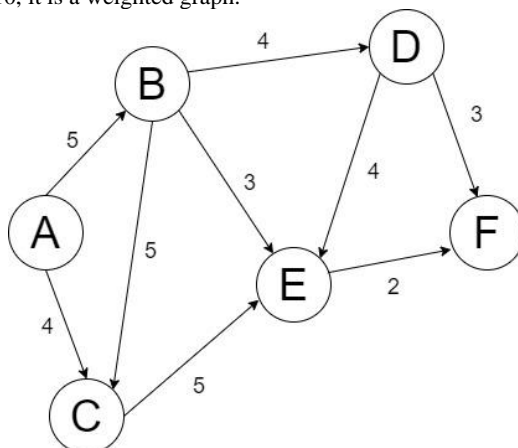
Fig 10. Weighted Graph

2. The following is Table 3, which contains laundry data along with the starting point and description of the place in this study.

Table 3. Location point description

No.	Laundry Name	Information
1	Abi Laundry	Starting Point
2	D&A Laundry	point B
3	Laundry Blessing	point C
4	Laundry Nanggroe Wash	point D
5	D'Green Laundry	point E
6	Beautiful Wash Laundry	F point

3. A connected graph distance table, where the distance from one point to another is expressed in kilometers and ∞ indicates whether there are no edges between the points. The following is a description in Table 4.

Table 4. Distance connected

	A	B	C	D	E	F
A	0	5	4	∞	∞	∞
B	0	5	10	9	8	∞
E	0	5	10	9	8	10
D	0	5	10	9	8	12
C	0	5	10	9	8	10

4. Determining the shortest distance from the calculation results above, it can be concluded that the shortest distance from the starting point to point F is ABEF. Following are the details of the calculations.
   Determine the shortest distance from the user point to the nearest laundry point:
   A → B = 5
   B → C = 10
   E → D = 8
   D → F =12
   C → F = 10

From the calculation above, the calculation that gives the most negligible weight is used, so it is used as the shortest distance.
   A → B = 5
   B → E = 3
   E → F = 2
   Total = 10 km

Based on the calculation above, it can be concluded that crossing the A → B → E → F route results in a total distance of 10 km to go to the Indah Wash Laundry location.

4.3. Interface Implementation

This system is used by users using an Android smartphone along with the implementation prepared by the researcher.

a.   Login

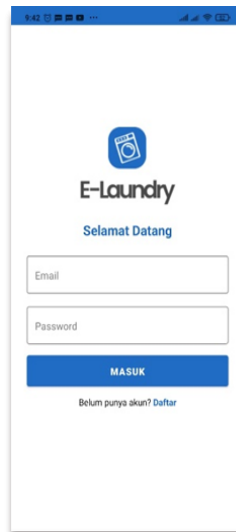The login page is used to access the system by filling in the registered email and password.

Fig 11. Login Page

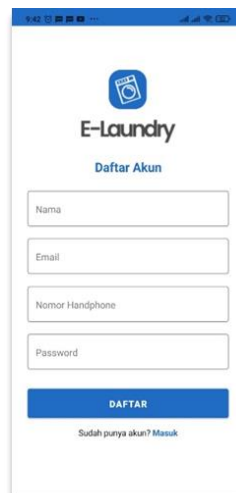b.   User Registration

This page serves to register new users.

Fig 12. User Registration

c.   Showing The Nearest Location

This page displays the laundry based on the location and rate of satisfaction.
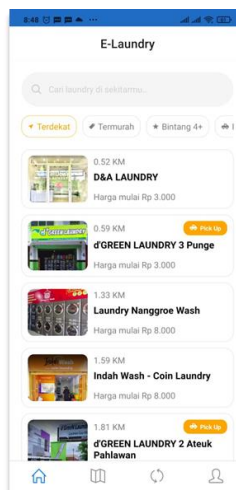

Fig 13. Showing the Nearest Location

d. The Display of Laundry Services

This page displays detailed information about the most popular services, prices, and other services available on the app.

Fig 14. The Display of Laundry Services

e. Place Order Page

This page places an order by specifying the weight, selecting a service, and placing an order.

Fig 15. The Display of Laundry Services

f. Transaction Details Page

This page displays transaction details, and the customer can cancel the transaction if the laundry order has not been received.
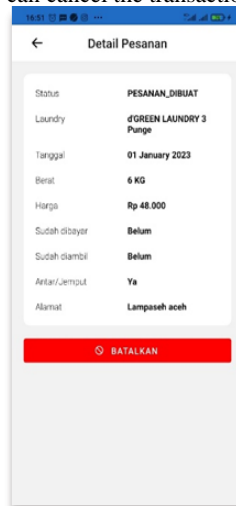

Fig 16. Transaction Details Page

g. The Display of Transaction
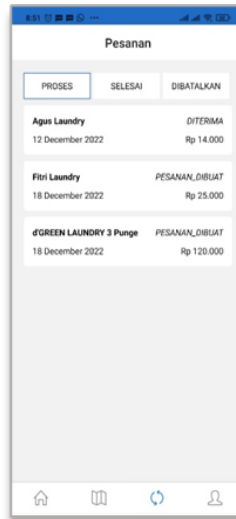This page displays information on transactions in progress, completed, and canceled.

Fig. 17. Transaction Details Page

h. Profile Page
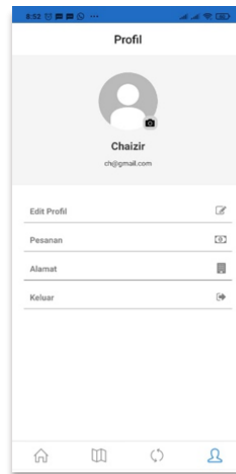The profile page displays the profile photo, order menu, address, and exit.

Fig 18. Profile Page

i. Edit Profile
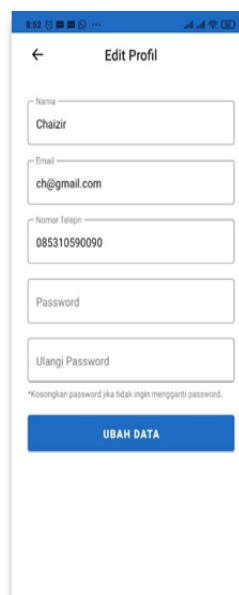This page serves to change user profile data

Fig 19. Edit Profile

j. Address List
This page displays a list of user addresses

Fig 20. Address List

k. Add Address
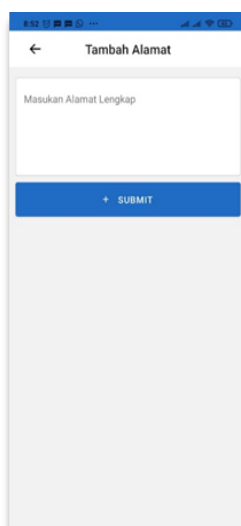This page functions to edit user address data.

Fig 21. Address List

5. Conclusion

Based on the results of the discussion regarding the Development of an Application Model for Laundry Location Search Based on Artificial Intelligence and Mobile Computing in the City of Banda Aceh, it can be concluded the following points:
1. This research produces an application that automatically provides information on the location of the nearest laundry from a distance of the user when the application is run. The user can search for the lowest price, 4+ star branches, and laundries that provide Pickup services.
2. This application is designed for android smartphones so that users in the city of Banda Aceh can easily use it.
3. Tests in this study used a Likert Scale with the results obtained from users, namely 88% in the category of strongly agreeing, while from laundry, namely 87% in the strongly agreeing.
4. This application works as expected. A laundry Location Search Application Based on Artificial Intelligence and Mobile Computing was built to fulfill the background of this research.

References

[1] Bullock, J. B. (2019). Artificial Intelligence, Discretion, and Bureaucracy. American Review of Public Administration, 1-11.
[2] H. Kamil and A. Duhani, "Pembangunan Sistem Informasi Pelayanan Jasa Laundry Berbasis Web Dengan Fitur Mobile Pada 21 Laundry Padang," Semin. Nas. Sains dan Teknol. Fak. Tek. Univ. Muhammadiyah Jakarta, vol. 8, no. November, pp. 1–9, 2016, [Online]. Available: https://media.neliti.com/media/publications/172316-ID-pembangunan-sistem-informasi-pelayanan-j.pdf.
[3] Hanum, W. S., & Saifudin, A. (2019). Rancang Bangun Aplikasi Panduan Pariwisata di Kabupaten Banyuwangi Mobile Berbasis Android. Jurnal Teknologi Sistem Informasi dan Aplikasi, 2(2), 59-65. doi:10.32493/jtsi.v2i2.2798.
[4] Taufiq, R., Magfiroh, D. A., Yusup, D., & Yulianti, Y. (2020). Analisis dan Desain Sistem Informasi Pembayaran Sumbangan Pembinaan Pendidikan (SPP) di SMK Avicena Rajeg. Jurnal Teknologi Sistem Informasi dan Aplikasi, 3(1), 15-21. doi:10.32493/jtsi.v3i1.4308.

[5]   Rahardja, U., Febriyanto, E., Handayani, I., & Ningsih, H. W. (2019). *Penerapan Teknologi Open Journal System Sebagai Media Publikasi Jurnal Ilmiah Elektronik Bagi Perguruan Tinggi Non It Di Tangerang*. SNPMas : Seminar Nasional Pengabdian Pada Masyarakat, 16–2019.

[6]   Novendri, Muhammad Saed dkk. 2019. "Aplikasi Inventaris Barang Pada MTS Nurul Islam Dumai Menggunakan PHP dan MySQL" dalam jurnal Lentera Dumai Vol. 10 No.2 (hlm.1) Dumai: Manajemen Informatika.

[7]   Fitri, Rahimi, S. Kom, and M. Kom. *Pemrograman Basis Data Menggunakan MySQL*. Deepublish, 2020.

[8]   Pane, Y., Suhelmi, Simamora, A. M., & Sembiring, D. S. P. S. (2021). Control Valve pada Irigasi Persawahan (M. Arifin (ed.)). UMSU PRESS. https://www.google.co.id/books/edition/Control_Valve_Pada_Irigasi_Persawahan/iLRIEAAAQBAJ?hl=id&gbpv=1&dq=Control +Valve+pada+Irigasi+Persawahan&pg=PT71&printsec=frontcover.

[9]   Gunawan, Gunawan, et al. *Dasar-Dasar Pemrograman Android*. Yayasan Kita Menulis, 2021

[10]   Munari, Aip Suprapto, Muhammad Yusril Helmi Setyawan, and Mohamad Nurkamal Fauzan. *Panduan Lengkap Algoritma Haversine Formula Pada Sistem Monitoring Mahasiswa Internship Berbasis GPS*. CV. Kreatif Industri Nusantara, 2020.

[11]   Fauzan, Ivan.2020. Artificial Intelligence (Ai) Pada Proses Pengawasan Dan Pengendalian Kepegawaian – Sebuah Eksplorasi Konsep Setelah Masa Pandemi Berakhir. Civil Service VOL. 14, No.1, Juni 2020: 31 – 42

[12]   Goralski, M. A., & Tan, T. K. (2020). Artificial intelligence and sustainable development. The International Journal of Management Education, 18(1), 100330.

[13]   Putro, S. S., Anamisa, D. R., & Mufarroha, F. A. (2019). Algoritma Pemrograman (Cetakan pe). Media Nusa Creative. https://www.google.co.id/books/edition/ Algoritma_Pemrograman/diCeEAAAQBAJ?hl=id&gbpv=1

[14]   A.S Rosa , dan M.Shalahuddin. 2014. *Rekayasa Perangkat Lunak Struktur dan Berorientasi Objek*. Bandung: Informatika.

[15]   Nuraini, Ani, et al. "Menggagas Pembelajaran Kewirausahaan Sosial." (2021).

[16]   Bogaert, A. F., & Skorska, M. N. (2020). A short review of biological research on the development of sexual orientation. Hormones and Behavior, 119, 104659. https://doi.org/10.1016/J.YHBEH.2019.104659