Development of Smart Child Care System

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Abstract

Worldwide the number of industrially working parents is increasing day by day. Some of them work for money and some like to stay occupied. So I clearly to say that it's to save passenger's time and save train authorization's time. As women are working outer the house more, they often face trouble taking care of their children. Children are always the first concern for every parent. But most of the time they don't get time to take proper care of their child. So sometimes they keep an assistant to keep their child, which is not enough for children's care. At an early age, every child properly needs extra care. The importance of early age care can't be exaggerated. To solve this problem I developed a project which name is Development Of Smart Child Care System. Which gives proper instructions most easily. Here parents will get needed information in an organized way and a properly created interface to take care of their child. Development Of Smart Child Care System is an android platform for parents from where a parent can know about their children's health condition, Teaching technic, Diet plans, and so on.

Keywords: Child Care; Health indicator ; BMI; Growth Tracker; Diet chart; Teaching Technic.

1. Introduction

1.1 Introduction

The document will highlight applications a well as reveal methods. I tried to reach the ultimate success and provide a helpful usable application to society. Caring child in the proper way is a big issue for parents. For that some of them waste huge time from their busy life to know how to care for a child properly, others don't get any way to serve proper care to the child which affects in future. With the help of my application parents will get the appropriate solution to treat the child. After taking the necessary input from users my application will set up automatically users need wise. This document describes the detailed story of the planning "Development Of Smart Child Care System" android application. Alongside, this document would expose the requirements, feasibility study, design, and development process of this application. Moreover, the incitement of this app and how it will help the users that will be described.

1.2 Motivation

The human brain grows rapidly in early childhood (0-6). So this time can be considered as the most important period in the human life cycle. Therefore special time needs to treated specially. Child care, as well as child future, depends on parents' knowledge. To help parents with that technology based on proper knowledge I come up with this project idea. To build this application many things motivated me. There were several reasons I stepped forward and thought to go ahead solve this problem.

Firstly, I thought that most of the parents think about "is their child growing properly?". "Is the child over weighted or underweighted?" and more of this kind of problem.Then, I planned and got interested to look into the problem and if I could make a platform to make the process easier form where parents can easily determine their child's health condition.

Secondly, I explored all android platforms and found barely any solution shaped enough for the problem. This lack of solution encouraged me in making a "Smart Child Care System".

Finally, the idea of inspiration came to create such a social application for frustrated parents and to maintain their time and children's health.

1.3 Objective

The objectives of my project are point out below.

- To provide a customized caring interface for the child.
- To get rid of browsing for information.
- To reduce the communications gap between child and parents.
- To give a health indicator.
- To give a proper diet chart for the child.
- To teach teaching technic for the child.
- To reduce false information harassments about child health.
- To save time.
- To measure accurate BMI.
- To have food calories idea.
- To grow a healthy child.
- To make the future world beautiful

1.4 Expended Outcome

Smart Child Care system is a platform that not only saves time but also gives appropriate outcomes for one child. Until now parents have been left to tedious ways of sourcing proper information about caring child. Such as finding the healthiest way through browsing endless websites and asking known for the best.

What normally happened next? The potential parent gets some inappropriate idea to take care child sometimes may appropriate but it takes huge time every day.

Well, now these things have changed. Smart Child Care System has turned the Process. By using this system a parent can easily have their needed information in a synchronized way. This process saves parents time. They can handle all these things from anywhere just need this application.

1.5 Report Layout

The report has six chapters. Every chapter describes the different aspects of the " Development of Child Care System". Every chapter has different parts describing in details.

- Chapter 1: Introduction
  The chapter explains the theoretical concepts behind my project. Here also explained my project motivation, objectives, and expected outcomes.
- Chapter 2: Background
  Here the chapter discusses our project-related works, comparative studies, and the scope of the problem.
- Chapter 3: Requirement Specification
  This chapter is going to show my project Use case modeling and description, Business Process Modeling, logical data model, requirement collection and analysis, and design requirements.
- Chapter 4: Design Specification
  It describes my project's front-end design, back-end design, interaction design, and UX and implementation requirements.
- Chapter 5: Implementation and Testing
  This chapter discusses the implementation of the database, front-end design, interactions, testing. Also, discuss test results and reports.
- Chapter 6: Conclusion and Future Scope
  The chapter explains the conclusion and future scope of my project.

2. BACKGROUND

2.1 Terminologies

Development of Smart Child Care System is an Android Application. This chapter is going to present details work, comparative analysis with my android application. Described the features of this application elaborately. The target and difficulties that I faced are described here.

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2.2 Related Works

There is some android application which worked with this kind of thoughts. Here I described the feature of those.

The "Baby Food Chart" application is to make your child recognized certain food at a particular age. So if you want to know which food should be recognized at which age, this app is for you. It also provides some recipes to the users.it indicates the perfect age for giving that food to the child. [1].

"Baby Meal Tracker" is a paid application for parents which gives you raw information about baby food nutrition and allows you to make a weekly diet plan by researching their food nutrition. They also connected the app with the baby meal community to ask for a meal plan from them. In addition, it provides you the opportunity to categorize your foo as to try, trying, tried, or watch list. [2].

"Child Care" is an android application, which will simply provide you some analytical information about basic child care tips. You can read those tips and get knowledge about caring for a child [3].

"child care and treatment" is an application that shows categorized information about several child caring fields. By using this app you can know about lots of common childhood diseases, child diet routines, education tips .[4].

"Happy Child Parenting App" is a unique child parenting application that helps parents to raise a well-adjusted child. They replaced parenting myths with new scientific research. When you will enter the app they will ask you for some information about your relationship with your child and what you want to fix. Then they will create a customized training interface. After completing one lesson they will unlock the next lesson for you. Which will you help to be more proper with your child [5]



Figure2.1: Related Application

2.3 Comparative Studies

Smart Child Care System is an android application based on a proper parenting system. There are several android applications based on parenting. Using those applications anyone can get knowledge about good parenting but each of them is just giving some theoretical knowledge which the users have to read and none of this information are

processed. Smart Child Care System particularly shaped to make parents time hassle-free and make them relief from the tension of child's health.

2.3.1 Comparison with related applications

A comparative analysis of some related applications is shown in table 2.1.

Table 2.1: Comparative analysis Table

	Baby Food Chart	Baby Meal Tracker	Child Care	Child Care and Treatment	Happy Child Parenting App	Smart Child Care System
1.Registration	YES	YES	NO	NO	YES	NO
2. Edit Profile	YES	NO	NO	NO	YES	YES
3.Need Input From User	YES	YES	NO	NO	YES	YES
4.Calculates BMI	NO	NO	NO	NO	NO	YES
5.Growth Tracker	NO	NO	NO	NO	NO	YES
6.Food Tracker	YES	YES	NO	NO	NO	YES
7.Development Tracker	NO	NO	NO	NO	NO	YES
8.Calculates Per Day Calories need	NO	NO	NO	NO	NO	YES
9.Provides A Diet Plan	NO	YES	NO	YES	NO	YES
10.Provides Calories Wise Diet Plan	NO	NO	NO	NO	NO	YES
11.Provides teaching Lesson	NO	NO	YES	NO	YES	YES
12.Provides Age-Based Teaching Interface Automatically	NO	NO	NO	NO	NO	YES
13.Provides Age Base Teaching Technic	NO	NO	NO	NO	YES	YES

14.Provides Moral Lesson To Teach Daily		NO	NO	NO	NO	YES	YES

3. REQUIREMENT SPECIFICATION

3.1 Business Process Modeling

Business process modeling in business process management and systems engineering is the system of showing processes of an enterprise, thats why the present process may be analyzed, improved, and automated [6]. BPM of Smart Child Care System is showing in figure 3.1.

Smart Child Care System is an application that will provide a customized interface to parents for the child. The process will start by registering. Users have to register to use this system. After registering Users have to add their child by giving information about age, height, weight. If the age of the child is less than 6 months the system will show an interface that will be helpful to care for that infant else the system will calculate the BMI and measure how much calories will be needed per day. After doing that this app will suggest some food according to counted calories. This whole calculation will be updated each month. This application will also provide an education process according to age and a moral value will be shown each day.

Last but not least, this application will try to detect child diseases. 'This app will present some questions to the user for marking as 'yes' or no'. From the given symptoms the app will try to match and detect the disease and will show a basic solution for this.

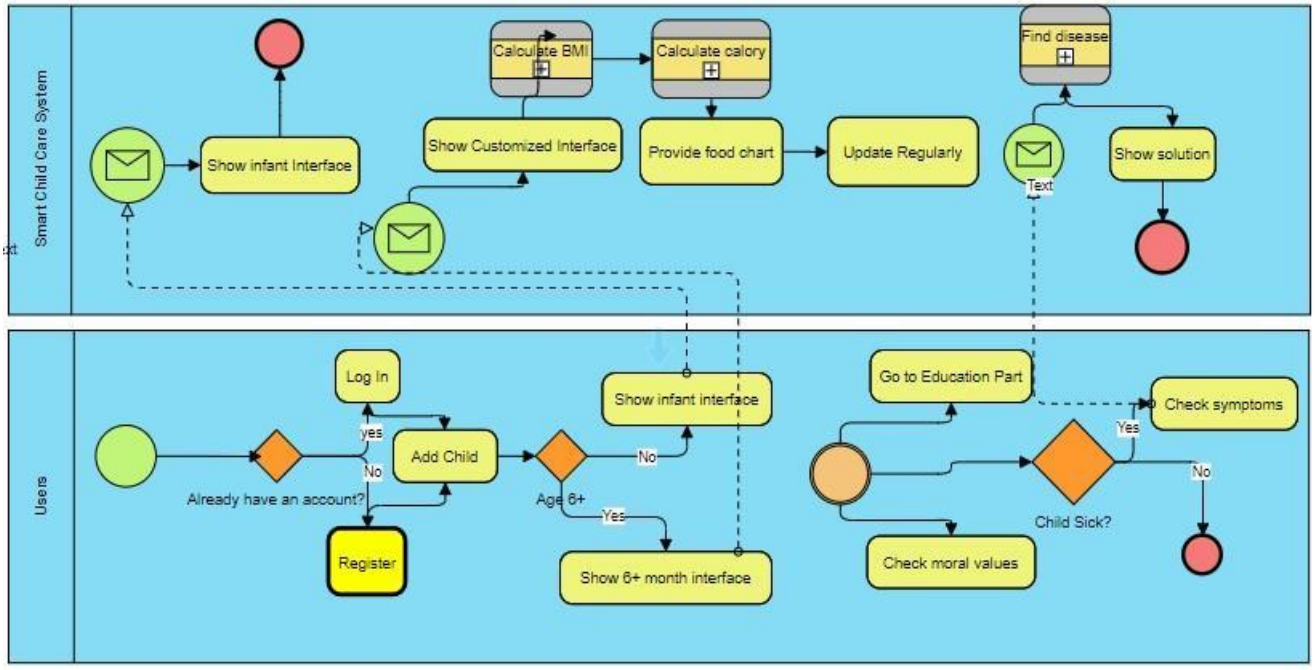


Figure 3.1: BPM of Smart Child Care System.

3.2 Requirement Collection and Analysis

3.2 .1 Software Requirements:

- Android Studio IDE: This is the official platform of Android. Android Stiodio provides equipment customized for developers with rich editing, debugging, testing, and profiling tools.

- Android Virtual Device: An ADV is a device layout that runs on the Android emulator. This

supplies a virtual Android platform where programmers can use and run their Android application.

- Database (Firebase): FCM gives a trustworthy and battery-efficient link between users server and device which permits users to provide and have messages on the web on iOS. user can address notification messages (2KB limit) and data messages (4KB Limit).

- Adobe XD: Adobe XD for Adobe Prototyping tools Interaction Designer. Adobe XD feature is used to create wireframes, prototypes, and screen designs for digital products such as websites and mobiles apps.

3.2.1 Software Requirements:

- Operating system: Windows
- Android supported device
- Android supported device:
  - RAM-8GB (min)
  - Hard Disk- 150GB (min)
  - Processor- 1.5GHz (min)

3.3 Use Case Modeling and Description

3.3.1 System Model

- Users Interface

Users can use the below operations in this android application.

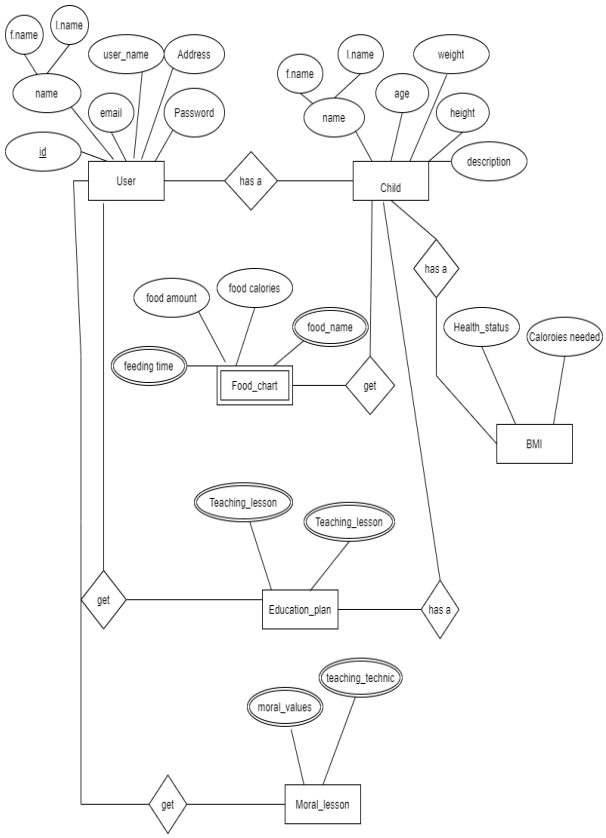
i. Registration
   Clients register them in the system by email verification.
ii. Login
   After registration clients can log in to the system.
iii. Add Child
   After log in parents have to add their child by giving input (age, height, weight).
iv. Edit Profile
   Users can edit his/her profile.
v. Check Health Status
   Users can check child health status from the system.
vi. Get Food Chart
   Users will get calories and age-wise customized food charts for their children.
vii. Get Education Plan
   Users will get an education plan and technics for their child age-wise.
viii. Get Moral Lesson
   By shaking the mobile a pop-up screen will come with the information about the moral lesson.
ix. Detect Disease
   Users can mark symptoms of their child's diseases the system will detect the disease, give the first-aid solution, and suggest a doctor.
x. Feedback
   After complete work users can give feedback and rating to the doctor.

3.4 Logical Data Model & Design Requirement

During designing systems or software, this issues need to be observed that propagate the whole design and the goals of that system is need to achieve. This terms were focused during designing the application:

Develop the system easy and flexible: The system users can easily use the system don't face any trouble while using it. Build the system well suited: It must be fit in the total system, future maintenance and enhancement should less. The following figure 3.4 is the flow chart of how a parent will get a customized interface for caring child in the system.

A logical data model describes the data processing modules. This is used for data analysis and processing easily. This Entity-Relationship Diagram/Model shows the logical data model, shown in figure 3.3.



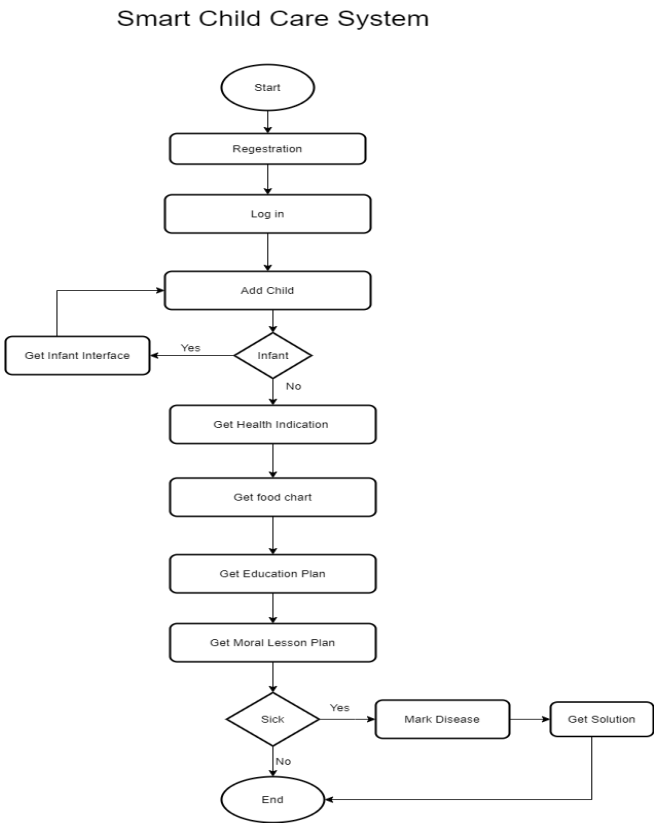


Figure 3.3: Logic Data Model & Design Requirement

3.3.2 The Use Case Diagram and Descriptions

Use case diagram is a graphic depiction of the interactions among the elements of a system [7]. Figure 3.2 shown the "Development Of Smart Child Care System" 's USD.

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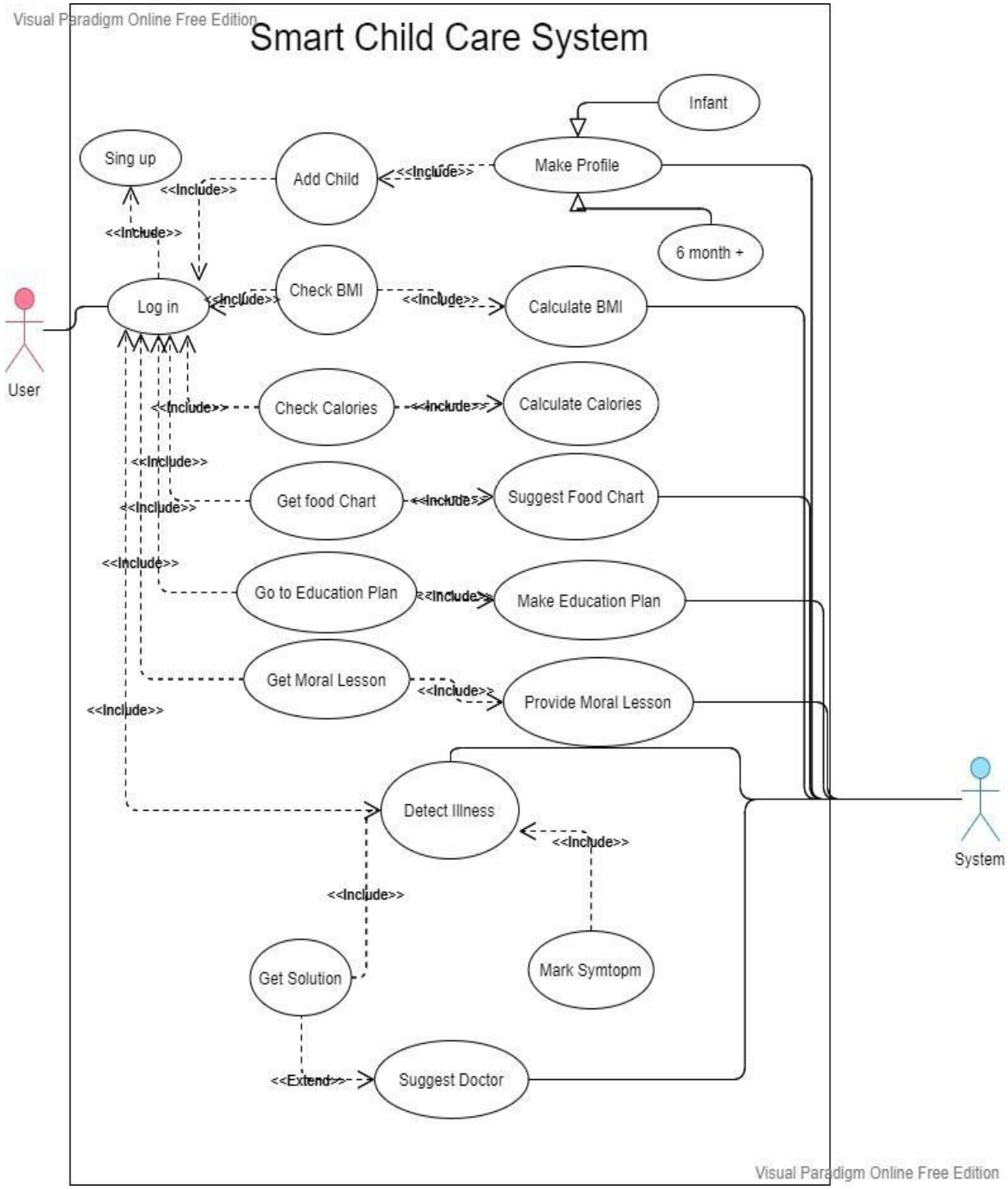


Figure 3.2: Use Case Model

4. DESIGN SPECIFICATION

4.1 Front-end Design

Front-end Design is the major allure for a system. It attracts the public most to use an system this needs to be friendly for users. My app is made in beautiful front-end Designing way. I also tried to make it friendly for users. At front-end design, my Application has following screen.

4.1.1 Splash Screen

This application will start by splashing splash screen which first has the application logo, after that will open method users can login by e-mail and password, google, facebook. Need to register for new user / before signup.

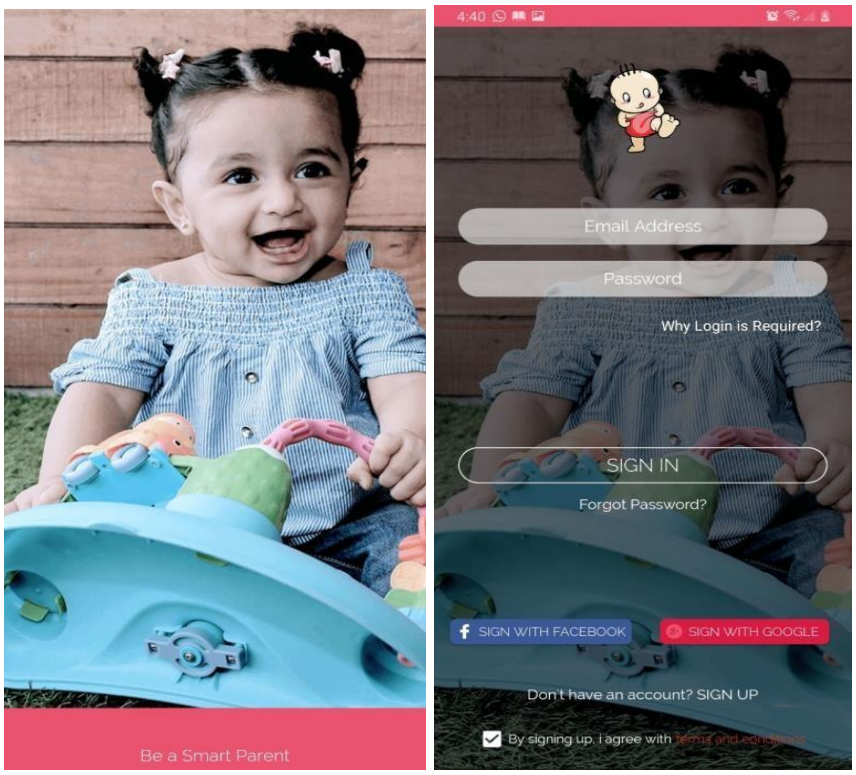


Figure 4.1 : Splash Screen and Login Option

4.1.2 Select Option for Interface

People have to select if the baby is a new born or 6+ aged. If new born selected this application will take the user to infant interface, there user has to put select the age. Otherwise for age more than 6 months user has to provide some more information.

Here user has go provide the age of the baby, then they will get customized Interface for that child.

For 6+ months aged child user has to give age, height, weight of that child.

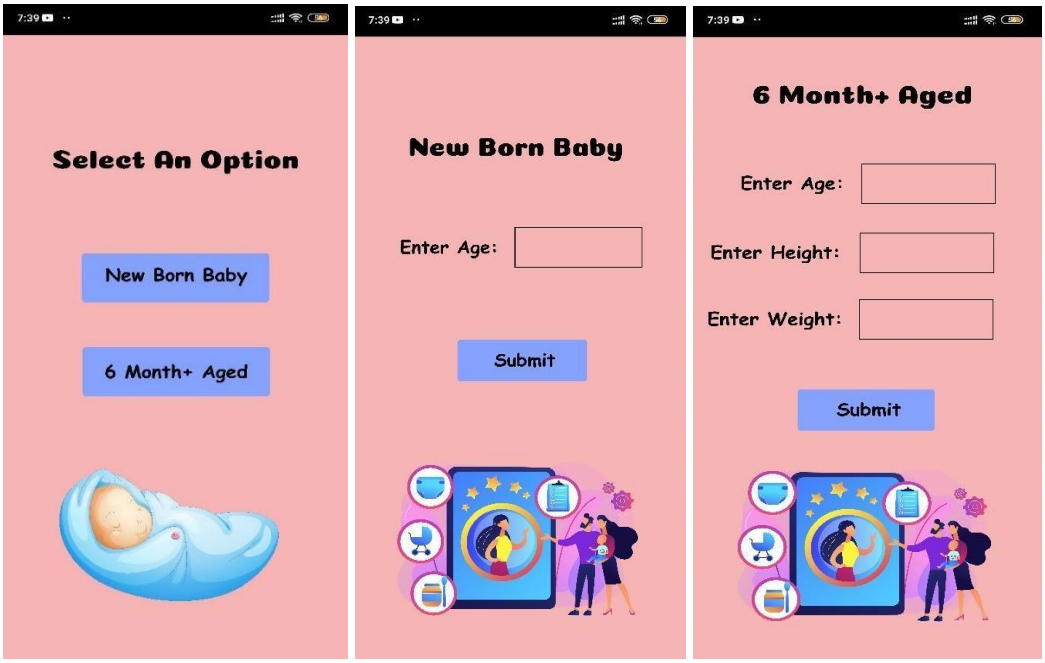


Figure 4.2 : Select an Interface

4.1.5 Home page

- Growth Tracker: Will get calculated BMI, Calories and a status about health
- Food Tracker: Will get food chart regularly.
- Development Tracker: Monthly has to update the weight and yearly height.
- Add button: Child information can be updated from here.
- Information page: Here the users will get the information about the application.

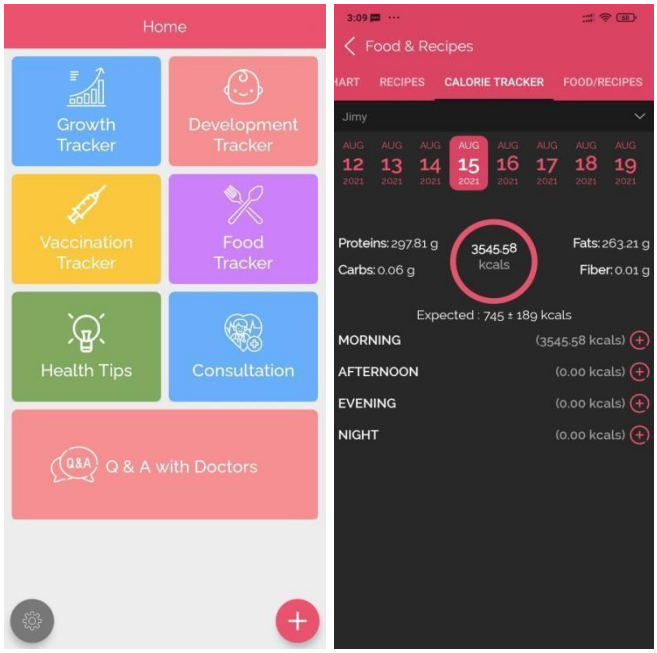


Figure 4.5: Home (Option after Login) & Food recipes.

4.1.6 Age Wise Diet Chart

The user will get an appropriate diet chart about what to feed their child in which amount. Moreover the chart will be age, height, weight wise. Which means it will be a customized diet chart for each user.

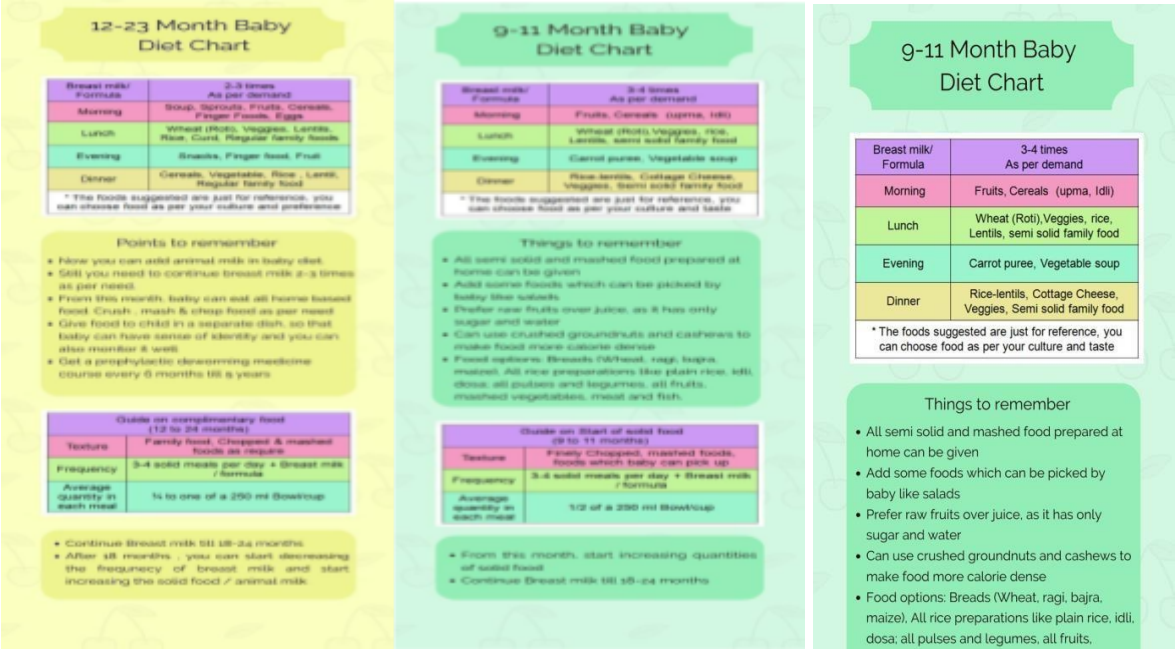
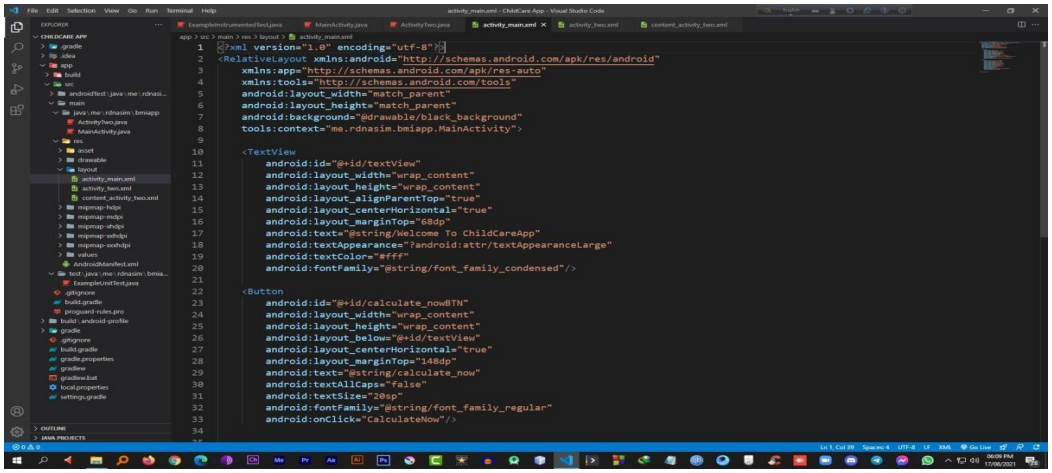


Figure 4.7: Age wise diet chart

4.2 Back-end Design

Back-end is an important part of a mobile application that stores data, security, and business logic. An application backend is like a server for mobile applications, as it stores and sorts important information that the end user does not see [9]. The back edge is written in Java, which is great. In addition to the Java Standard Library android library during application coding. It gives access to a ton of pre-made objects, and the APIs are documented online by Oracle and Google [10]. In this application I am using SQLite database. Users using mail have storage in this database and display it in a table.

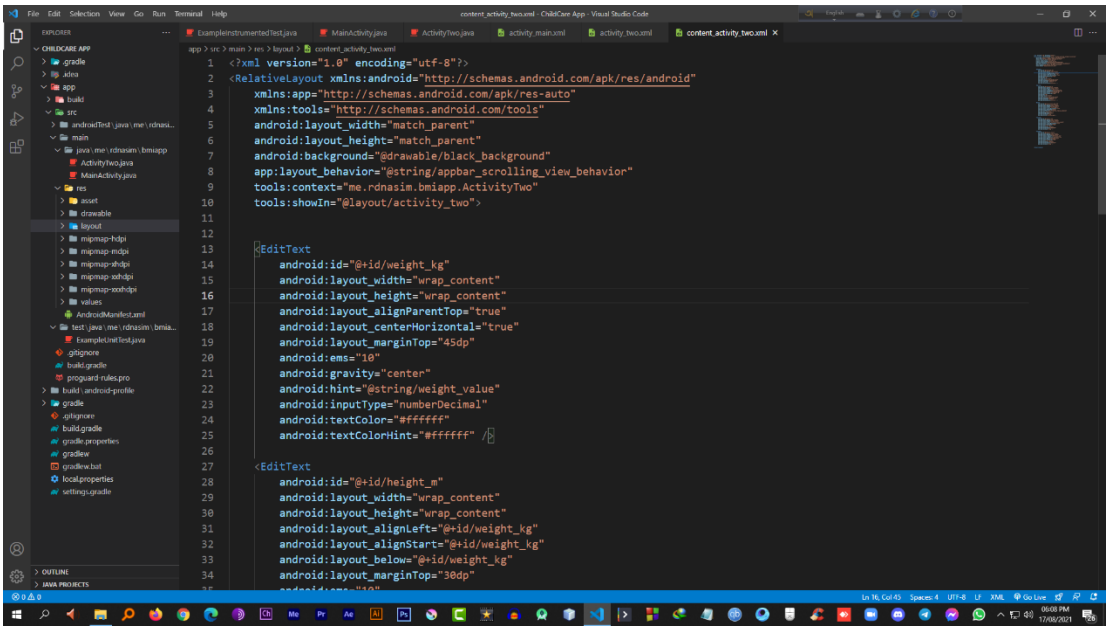


```
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="@drawable/black_background"
    tools:context="me.rdnasim.bmiapp.MainActivity">

    <TextView
        android:id="@+id/textView"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentTop="true"
        android:layout_centerHorizontal="true"
        android:layout_marginTop="68dp"
        android:text="@string/Welcome To ChildCareApp"
        android:textAppearance="?android:attr/textAppearanceLarge"
        android:textColor="#fff"
        android:fontFamily="@string/font_family_condensed"/>

    <Button
        android:id="@+id/calculate_nowBTN"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_below="@+id/textView"
        android:layout_centerHorizontal="true"
        android:layout_marginTop="148dp"
        android:text="@string/calculate_now"
        android:textAllCaps="false"
        android:textSize="20sp"
        android:fontFamily="@string/font_family_regular"
        android:onClick="CalculateNow"/>
```

Figure 4.8: Dashboard Page XML



```
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="@drawable/black_background"
    app:layout_behavior="@string/appbar_scrolling_view_behavior"
    tools:context="me.rdnasim.bmiapp.ActivityTwo"
    tools:showIn="@layout/activity_two">


    <EditText
        android:id="@+id/weight_kg"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentTop="true"
        android:layout_centerHorizontal="true"
        android:layout_marginTop="45dp"
        android:ems="10"
        android:gravity="center"
        android:hint="@string/weight_value"
        android:inputType="numberDecimal"
        android:textColor="#ffffff"
        android:textColorHint="#ffffff" />

    <EditText
        android:id="@+id/height_m"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignLeft="@+id/weight_kg"
        android:layout_alignStart="@+id/weight_kg"
        android:layout_below="@+id/weight_kg"
        android:layout_marginTop="30dp"
```

Figure 4.9: BMI and Calories Calculator

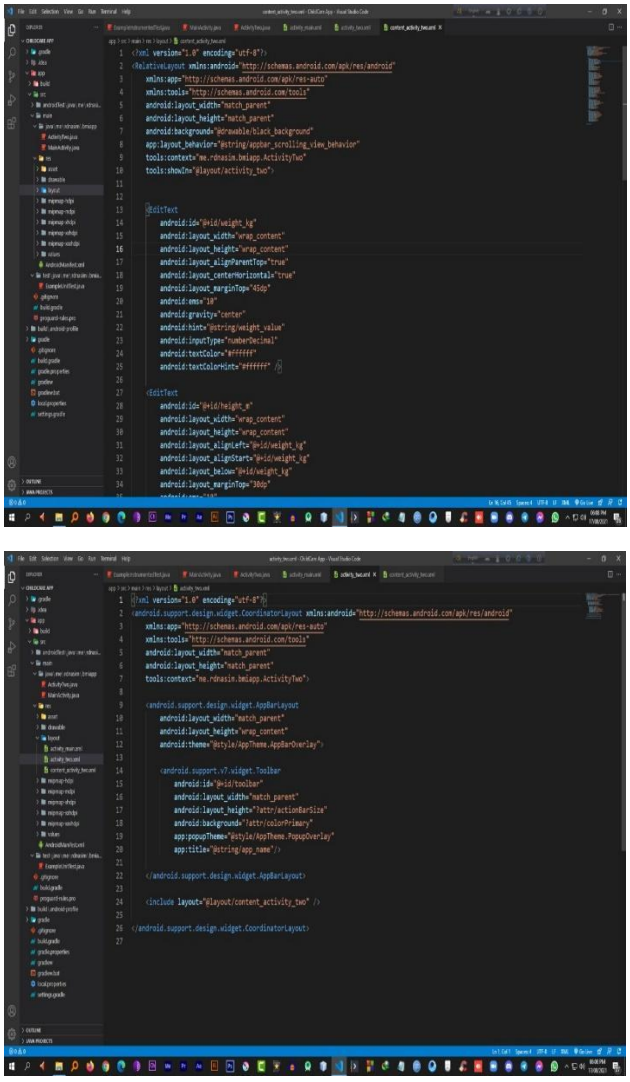


Figure 4.10 Main Activity & Dashboard page java.

4.3 Interaction Design and User Experience (UX)

Interaction design is the creation of a conversation between a person and a product, system or within service. This conversation is both physical and sensitive in nature and it is revealed interplay in technology as experienced in form, function and time [11].

The user experience (UX) is not the product they use as an overall travel user. This includes their direct interaction with the product and how it fits them. The process of completing the overall task [12].

In Smart Child Care System application necessary function show in first page in simple way. Eye healing color use for no effect and pressure on eyes while user work in this system. Avoid unnecessary function so that all class people can use this application. All the functions are easy and generated. In user interface user can easily see all functions.

5. IMPLEMENTATION AND TESTING

5.1 Implementation of Database

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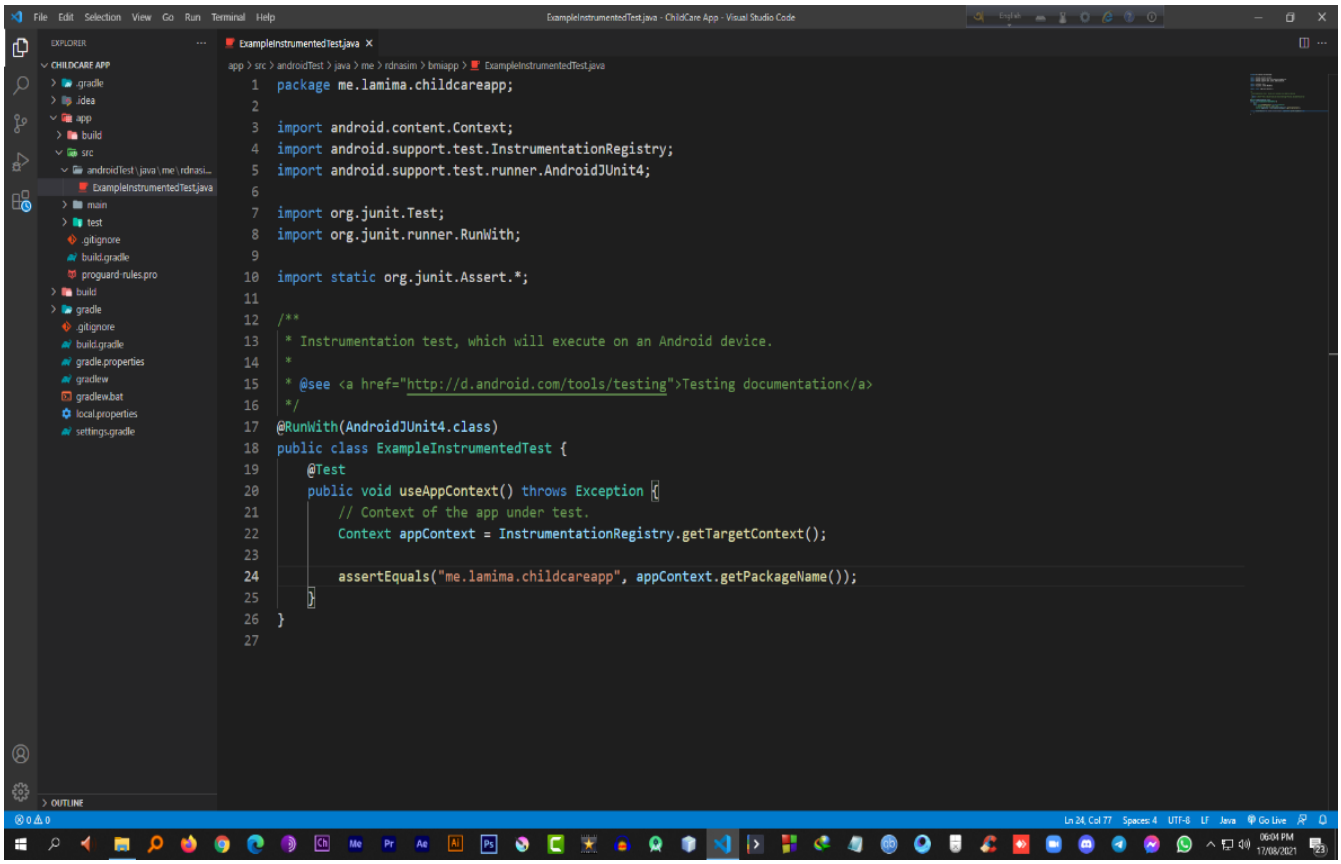
For the project, I used SQLite to store data. The data is stored file format this data is stored within a single file. Every database file is bestowed within a file system. Instead of interfacing with the operating system directly, the application is required to supply an adaptor component that implements the SQLite Virtual File System interface.

5.2 Testing Implementation

For android here are some type of testing. There are unit tests, Instrumented tests, unit tests, Integration tests, system tests. The local unit are Connect with local computer where the android studio installed and connected with database. They use Java on computers so it works extremely fast so they didn't be an emulator is needed to do this. We know that system tests test the whole system. These are the tests used to check the code test. Unit testing is important because software developers sometimes try to save time minimum unit test and cost is high as a result of this mythical reason inappropriate unit test error fixing during system testing, integration testing and even beta testing the application is built. If initial unit testing is done at an early stage, it saves time and money in the end [13]. For more testing by integrating test frameworks test android is called Unit test.

5.3 Test Results and Reports

The test of the application runs success fully. This application calculates everything perfectly. It is also able to make the perfect interface for every user.




```java
package me.lamima.childcareapp;

import android.content.Context;
import android.support.test.InstrumentationRegistry;
import android.support.test.runner.AndroidJUnit4;

import org.junit.Test;
import org.junit.runner.RunWith;

import static org.junit.Assert.*;

/**
 * Instrumentation test, which will execute on an Android device.
 *
 * @see <a href="http://d.android.com/tools/testing">Testing documentation</a>
 */
@RunWith(AndroidJUnit4.class)
public class ExampleInstrumentedTest {
    @Test
    public void useAppContext() throws Exception {
        // Context of the app under test.
        Context appContext = InstrumentationRegistry.getTargetContext();

        assertEquals("me.lamima.childcareapp", appContext.getPackageName());
    }
}
```

Figure 5.1: Testing

6. CONCLUATION AND FUTURE SCOPE

6.1 Discussion and Conclusion

By the grace of Almighty ALLAH, I have accomplished my project reporting. This system will improve our society one step forward.

It will be a helping hand for those frustrated parents who are worried about regular child health maintaining, How to teach their child age-wise, What should teach their child, and this kind of more things. My application will help out them with the solution.

I can emphasize that this project will be a privilege for both parent and child. They will get their all needs in one application. The world has been changed with technology, everyone should get the benefit of the changing world. This application is to make beneficial the parent and child eventually to make the future world more beautiful.

6.2 Scope for Further Developments

I make some plans for future development of the system. Some of the plans are:

1. Develop the information more.
2. Most advanced question about child health.
3. AI base legal help.
4. Connecting the app with a doctor.
5. Enrich Database.

Acknowledgements

I would like to express my gratitude to our PetaAI Solutions for providing all research resources. My supervisor deserve special thanks for his patience and support in helping me overcome the lot of obstacles I encountered during my research.

Appendix A: Project Reflection

During the work I learnt a lot about children, their parents and about caring them. Child care is one of the biggest issue in the world.

Each and every child need to care differently according to their response. Which can't be measured by a machine. Emotional things can't be counted. Parents has to understand their mind and behave with them according that. This application can just provide a common guideline for them but it can't control everything. Parents has to be careful about every step of their child.

Nepoleon said "Give me an educated mother, I shall promise you the birth of a civilized, educated nation." This quote describes a lot. An educated mother can make her child educated. To build a wealthy nation child care is one of the essential step. To ensure appropriate child care making parents knowledged is the first step. This application can help to make the parents knowledged.

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(*The Basics of an Android App*, n.d.)
(*User Experience*, n.d.)
(*Unit Testing Tutorial: What Is, Types, Tools & Test EXAMPLE*, n.d.)



Syeda Lamima Farhat, was born Mymensingh, Bangladesh on March 27, 1998. She has recently completed BSC in CSE from Daffodil International University. She is currently working on

research field and getting prepared to study further. She has a keen interest on Artificial Intelligence related field, interested in working broadly in the deep learning process.She has a good capability of adapting knowledge easily.